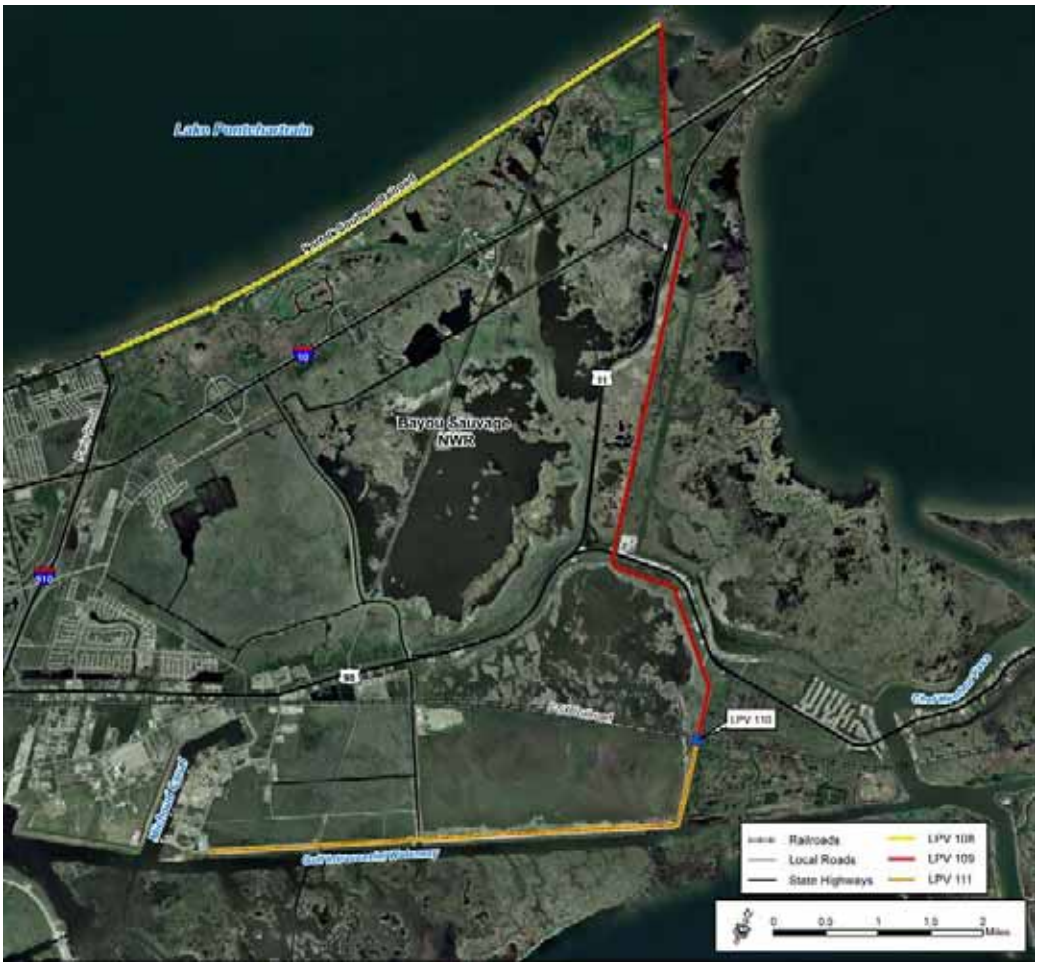
DRAFT INDIVIDUAL ENVIRONMENTAL REPORT

LAKE PONTCHARTRAIN AND VICINITY
NEW ORLEANS EAST LAKEFRONT TO MICHOUD CANAL

ORLEANS PARISH, LOUISIANA

IER #7



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1. INTRODUCTION

The United States Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report #7 (IER #7) to evaluate potential impacts associated with proposed improvements to three reaches of the East Orleans Hurricane Protection Levee that were originally constructed as part of the Lake Pontchartrain and Vicinity (LPV) project. The proposed action is located in the New Orleans East area of Orleans Parish, Louisiana (Figure 1), and includes three LPV reaches (109, 110 and 111) where approximately 13 miles of levees, floodwalls, and floodgates extending from South Point, south to the Gulf Intracoastal Waterway (GIWW) and west to the Michoud Canal Floodwall (Figure 2), would be modified to provide the 100-year level of risk reduction. Along with LPV 108 (which is located between Paris Road and South Point and is being raised to the previously authorized elevation that is equal to or greater than the 100-year level of risk reduction for this location), these reaches are locally known as the Lakefront to Michoud Canal Levee.

IER #7 has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council of Environmental Quality's (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508), as reflected in USACE Engineering Regulation (ER) 200-2-2. The execution of an IER, in lieu of a traditional Environmental Assessment (EA) or Environmental Impact Statement (EIS), is provided for in ER 200-2-2, Environmental Quality, Procedures for Implementing NEPA (33 CFR 230) and pursuant to CEQ NEPA Implementation Regulations (40 CFR § 1506.11). The Alternative Arrangements can be found at www.nolaenvironmental.gov and are incorporated herein by reference.

CEMVN implemented Alternative Arrangements on 13 March 2007 under provisions of CEQ Regulations for Implementing NEPA (40 CFR §1506.11). This process was implemented in order to expeditiously complete environmental analysis for any changes to the authorized system and the 100-year level of Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS), formerly known as Hurricane Protection System, authorized and funded by Congress and the Administration. Proposed actions are located in southeastern Louisiana and are part of the Federal effort to rebuild and complete construction of the HSDRRS in the New Orleans Metropolitan area as a result of Hurricanes Katrina and Rita.

This draft IER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action will be held if requested by a stakeholder during the review period. Any comments received during this public meeting will be considered part of the official record. After the 30-day comment period, and public meeting if requested, the CEMVN District Commander will review all comments received during the review period and make a determination if they rise to the level of being substantive in nature. If comments are not considered to be substantive, the District Commander will make a decision on the proposed action. This decision will be documented in an IER Decision Record. If a comment(s) is determined to be substantive in nature, an Addendum to the IER will be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period the District Commander will make a decision on the proposed action. The decision will be documented in an IER Decision Record.

1.1. PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to provide 100-year level of risk reduction for New Orleans East. The proposed action results from a defined need to reduce hurricane and storm damage to residences, businesses, and other infrastructure from hurricanes (100-year storm events) and other high water events in Lake Pontchartrain. Elevations of the existing floodwalls

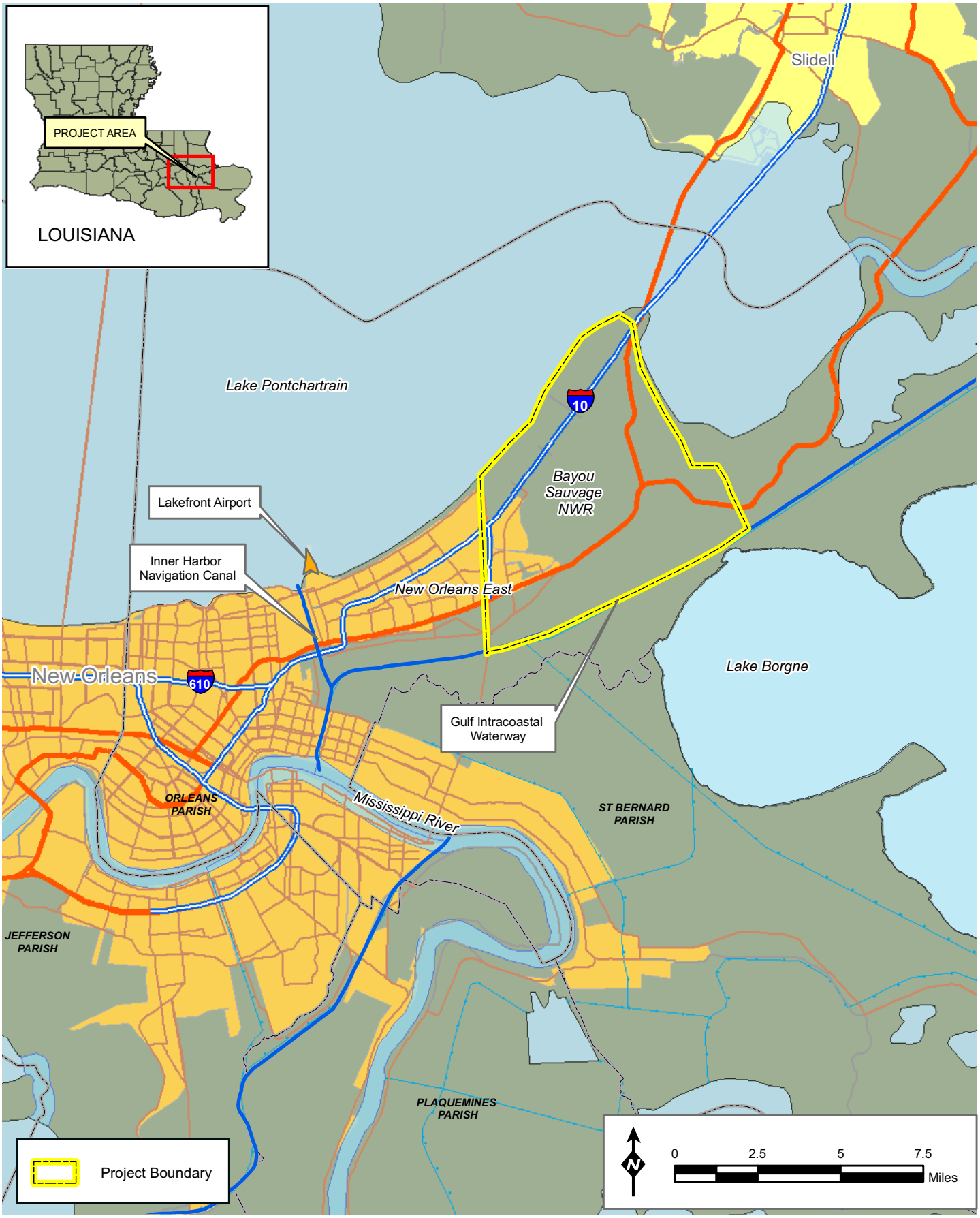

Figure 1: Vicinity Map for the New Orleans East Lakefront to Michoud Canal Project (IER #7)

Figure 2: Project Area for LPV 109, 110, and 111; New Orleans East Lakefront to Michoud Canal (IER #7). LPV 108 is Part of the Project Area but will be Raised to the Previously Authorized Level of Risk Reduction Which also Provides the 100-year Level of Risk Reduction.

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and levees within three reaches of the LPV project (reaches 109, 110 and 111) are below 100-year design elevations, and do not meet CEMVN design criteria. The proposed action is needed to meet the 100-year design elevations and design criteria in these three reaches. The completed HSDRRS would lower the risk of harm to citizens and damage to infrastructure during a storm event. The safety of people in the region is the highest priority of the CEMVN.

The term "100-year level of risk reduction," as it is used throughout this document, refers to a level of flood protection which reduces the risk of hurricane surge and wave driven flooding that the New Orleans Metropolitan area has a one percent chance of experiencing each year.

1.2. AUTHORITY FOR THE PROPOSED ACTION

The authority for the proposed action was provided as part of a number of hurricane risk reduction projects spanning southeastern Louisiana, including the LPV Hurricane Protection Project and the West Bank and Vicinity (WBV) Hurricane Protection Project. Congress and the Administration granted a series of supplemental appropriations acts following Hurricanes Katrina and Rita, to repair and upgrade the project systems damaged by the storms, which gave additional authority to the USACE to construct 100-year HSDRRS projects.

The LPV project was authorized under the Flood Control Act of 1965 (Public Law [P.L.] 89-298, Title II, Sec. 204), which amended and authorized "project for hurricane protection on Lake Pontchartrain, Louisiana ... substantially in accordance with the recommendations of the Chief of Engineers in House Document 231, Eighty-ninth Congress." The original statutory authorization for the LPV Project was amended by the Water Resources Development Acts (WRDA) of 1974 (P.L. 93-251, Title I, Sec. 92), 1986 (P.L. 99-662, Title VIII, Sec. 805), 1990 (P.L. 101-640, Sec. 116), 1992 (P.L. 102-580, Sec. 102), 1996 (P.L. 104-303, Sec. 325), 1999 (P.L. 106-53, Sec. 324), 2000 (P.L. 106-541, Sec. 432) and Energy and Water Development Appropriations Acts of 1992 (P.L. 102-104, Title I, Construction, General), 1993 (P.L. 102-377, Title I, Construction, General), and 1994 (P.L. 103-126, Title I, Construction, General).

The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental - P.L. 109-148, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorized accelerated completion of the project and restoration of project features to design elevations at 100 percent Federal cost. The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - P.L. 109-234, Title II, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorizes construction of a 100-year level of risk reduction; the replacement or reinforcement of floodwalls; and the construction of levee armoring at critical locations. Additional Supplemental Appropriations include the United States (U.S.) Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 House of Representatives 2206 (pg. 41-44) Title IV, Chapter 3, Flood Control and Coastal Emergencies, (5th Supplemental), General Provisions, Sec. 4302 and the 6th Supplemental (P.L. 110-252), Title III, Chapter 3, Construction.

1.3. PRIOR REPORTS

A number of studies and reports on water resources development in the Lakefront to Michoud Canal project area have been prepared by the CEMVN and other Federal, state and local agencies, research institutes, and individuals. Pertinent studies, reports and projects are discussed below and incorporated herein by reference:

- On 13 March 2009, the CEMVN District Engineer signed the Decision Record on IER #4 entitled "Lake Pontchartrain and Vicinity, Orleans East Bank, New Orleans Lakefront Levee, West of Inner Harbor Navigational Canal to the east bank of 17th Street Canal,

Orleans Parish, Louisiana." IER #4 evaluates the potential impacts associated with rebuilding and/or modifying earthen levees and floodwalls, replacing or adding new floodgates, modifying the Bayou St. John gate structure, and rebuilding roadway ramps within Orleans Parish.

- On 18 February 2009, the CEMVN District Engineer signed Decision Record on IER #12 entitled "GIWW, Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana." IER #12 evaluates the potential impacts associated with raising and/or constructing levees, floodwalls, and other structures to meet the 100-year level of risk reduction for Harvey-Westwego, Gretna-Algiers, and Belle Chase areas."

- On 3 February 2009, the CEMVN signed a Decision Record on IER #25 entitled "Government Furnished Borrow Material, Orleans, Plaquemines and Jefferson Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 21 January 2009, the CEMVN signed a Decision Record on IER #17 entitled "West Bank and Vicinity, Company Canal Floodwall, Jefferson Parish, Louisiana." The document was prepared to evaluate the potential impacts associated with the proposed construction and maintenance of a 100-year level of risk reduction along the WBV, Company Canal Floodwall from the Bayou Segnette State Park to the New Westwego Pumping Station.

- On 21 October 2008, the CEMVN signed a Decision Record on IER #11 entitled "Improved Protection on the Inner Harbor Navigation Canal, Tier 2 Borgne Orleans and St. Bernard Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with constructing a surge barrier on Lake Borgne.

- On 20 October 2008, the CEMVN signed a Decision Record on IER #26 entitled "Pre-Approved Contractor Furnished Borrow Material # 3, Jefferson, Plaquemines, and St. John the Baptist Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 25 July 2008, the CEMVN signed a Decision Record on IER #3, entitled "Lake Pontchartrain and Vicinity, Lakefront Levee, Jefferson Parish, Louisiana." The proposed action includes rebuilding earthen levees, upgrading foreshore protection, replacing floodgates, constructing fronting protection for four pumping stations, and constructing or modifying breakwaters at four pumping stations in Jefferson Parish, Louisiana.

- On 18 July 2008, the CEMVN signed a Decision Record on IER #2, entitled "LPV West Return Floodwall, Jefferson and St. Charles Parishes, Louisiana." The proposed action includes replacing 3.4 miles of floodwall in Jefferson and St. Charles Parishes, Louisiana.

- On 9 June 2008, the CEMVN signed a Decision Record on IER #1, entitled "Lake Pontchartrain and Vicinity, La Branche Wetlands Levee, St. Charles Parish, Louisiana." The proposed action includes raising approximately nine miles of earthen levees, replacing over 3,000 feet of floodwalls, rebuilding or modifying four drainage structures, closing one drainage structure, and modifying one railroad gate in St. Charles Parish, Louisiana.

- On 30 May 2008, the CEMVN signed a Decision Record on IER #22 entitled "Government Furnished Borrow Material, Plaquemines and Jefferson Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 6 May 2008, the CEMVN signed a Decision Record on IER #23 entitled "Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors in the excavating of borrow areas for use in construction of the HSDRSS.

- On 14 March 2008, the CEMVN signed a Decision Record on IER #11 (Tier 1) entitled "Improved Protection on the Inner Harbor Navigation Canal, Orleans and St. Bernard Parishes, Louisiana." The document was prepared to evaluate potential impacts associated with building navigable and structural barriers to prevent storm surge from entering the Inner Harbor Navigation Canal from Lake Pontchartrain and/or the Gulf Intracoastal Waterway-Mississippi River Gulf Outlet-Lake Borgne complex. (Two Tier 2 documents discussing alignment alternatives and designs of the navigable and structural barriers, and the impacts associated with exact footprints, are being completed.)

- On 21 February 2008, the CEMVN signed a Decision Record on IER #18 entitled "Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 14 February 2008, the CEMVN signed a Decision Record on IER #19 entitled "Pre-Approved Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.

- On 24 July 2006, CEMVN signed a Finding of No Significant Impact (FONSI) on EA #433 entitled, "USACE Response to Hurricanes Katrina & Rita in Louisiana" (USACE 2006). The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of Hurricanes Katrina and Rita.

- On 12 September 1990, CEMVN signed a FONSI on EA #105 entitled "LPV Hurricane Protection – South Point to Gulf Intracoastal Waterway, A. V. Keeler and Company Alternative Borrow Site." The report addressed the impacts associated with the excavation of a borrow area in Slidell, Louisiana for LPV construction.

- SIR #29 entitled "LPV Hurricane Protection – South Point to GIWW Levee Enlargement" was signed by CEMVN on 12 June 1987. The report discussed the impacts associated with the enlargement of the GIWW.

- In December 1984, a Supplemental Information Report (SIR) to complement the Supplement to Final EIS on the LPV Hurricane Protection project was filed with the U.S. Environmental Protection Agency (USEPA).

- The Final EIS for the LPV Hurricane Protection Project, dated August 1974. A Statement of Findings was signed by CEMVN on 2 December 1974. Final Supplement I to the EIS, dated July 1984, was followed by a Record of Decision (ROD), signed by CEMVN on 7 February, 1985. Final Supplement II to the EIS, dated August 1994, was followed by a ROD signed by CEMVN on 3 November 1994.

- A report entitled "Flood Control, Mississippi River and Tributaries," published as House Document No. 90, 70th Congress, 1st Session, submitted 18 December, 1927 resulted in authorization of a project by the Flood Control Act of 1928. The project provided comprehensive flood control for the lower Mississippi Valley below Cairo, Illinois. The Flood Control Act of 1944 authorized the USACE to construct, operate, and maintain water resources development projects. The Flood Control Acts have had an important impact on water and land resources in the proposed project area.

1.4. INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS

In addition to this IER, CEMVN is preparing a draft Comprehensive Environmental Document (CED) that will describe the work completed and remaining to be constructed within the HSDRRS. The purpose of the draft CED will be to document work completed by CEMVN on a system-wide scale. The draft CED will describe the integration of individual IERs into a systematic planning effort. Overall cumulative impacts and future operations and maintenance requirements will also be included. Additionally, the draft CED will contain updated information for any IER that had incomplete or unavailable data at the time it was posted for public review.

The draft CED will be available for a 60-day public review period. The document will be posted on www.nolaenvironmental.gov, or can be requested by contacting CEMVN. A notice of availability will be mailed/e-mailed to interested parties advising them of the availability of the draft CED for review. Additionally, a notice will be placed in national and local newspapers. Upon completion of the 60-day review period, all comments will be compiled and appropriately addressed. Upon resolution of any comments received, a final CED will be prepared, signed by the District Commander, and made available to any stakeholders requesting a copy.

Compensatory mitigation for unavoidable impacts associated with this and other proposed HSDRRS projects will be documented in forthcoming mitigation IERs, which are being written concurrently with all other IERs.

1.5. PUBLIC CONCERNS

The foremost public concern is reducing risk of hurricane, storm, and flood damage for businesses and residences, and enhancing public safety during major storm events in the Greater New Orleans metropolitan area. Hurricane Katrina forced most Orleans Parish residents from their homes, and, due to extensive flooding, made returning to their homes in a timely manner unsafe. Additional concerns have been expressed by resource agencies during monthly interagency meetings and during periodic public meetings held in New Orleans East about impacts on wetlands and water control structures at Bayou Sauvage National Wildlife Refuge (NWR) from levee construction, and impacts on wetlands and submerged aquatic vegetation (SAV) in Lake Pontchartrain. The public also expressed concerns about highway closures, noise impacts and air emissions from construction activities and the amount of borrow material being investigated in New Orleans East.

1.6. DATA GAPS AND UNCERTAINTIES

At the time of submission of this report, engineering designs had not been completed for all of the proposed action and alternatives. Final selection and engineering details (*e.g.*, location of haul roads, actual footprint expansion) of the proposed action could vary based on the final engineering designs. Substantial changes to the proposed action resulting in further impact to the natural or human environment would be addressed in a supplemental IER.

Because designs for IER 11 Tier 2 Borgne are not yet completed, potential design of transition structures from this project to the IHNC are yet to be determined. For example, a T-Wall and transition could be constructed near the west end of the LPV 111 levee. However, the design of the tie-in structure that would provide permanent protection at the tie-in point of LPV 111 and the Inner Harbor Navigation Canal (IHNC) surge wall discussed in IER #11 Tier 2 Borgne has not yet been completed. This option includes approximately 1,000 linear feet of new T-Wall, bringing the new protection elevation to +34.0 feet. The approximate stations of the new T-Wall extend from Station 1342+74 to Station 1352+74 with the tie-in structure extending approximately 100 feet past to Station 1353+74. Note that these stations have not reached final determination and are for informational purposes.

Transportation routes for delivery of construction materials have not been determined. Large quantities of material (*e.g.*, concrete, pilings, sheet pile, rebar, soil) would be delivered to the Lakefront to Michoud Canal project corridor, as well as to other ongoing HSDRRS projects. This could have localized short-term impacts on transportation corridors that cannot be quantified.

The construction schedule (*e.g.*, exact start and end dates of construction work, and phasing of construction activities) is also not known at this time. It is anticipated that the construction period for the entire Lakefront to Michoud Canal project would not exceed 2 years, and that construction could take place 24 hours per day, 7 days per week.

Only limited data for post-Hurricane Katrina socioeconomic status in the metropolitan New Orleans area are available. The recovery effort is ongoing, and the status of jobs, economic growth, housing, education and business success are rapidly changing. Best available, pre- and post-Hurricane Katrina, information was used to analyze potential socioeconomic impacts. Public meetings have been held in the project area during the development of this IER to insure that the concerns expressed by the public are included. Meetings were held on 24 July 2007; 25 October 2007; 10 March 2008; 29 April 2008; and 29 August 2008 to provide information and address public comments on IER #7.

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2. ALTERNATIVES

2.1. ALTERNATIVES DEVELOPMENT AND PRELIMINARY SCREENING CRITERIA

Because portions of New Orleans East are located below sea level and gravity drainage is not possible, the project area, which is located in New Orleans East (see Figure 1) relies upon a series of levees, floodwalls, floodgates, and forced drainage (*i.e.*, pumps) for hurricane and storm damage risk reduction. Existing levees and floodwalls that protect all of New Orleans East, including the Lakefront to Michoud Canal levees and floodwalls extending from Paris Road to the GIWW and Michoud Canal, were constructed as part of the LPV project. Each reach is identified by a project identification number (*e.g.*, LPV 109).

LPV 109 includes a 39,500 linear foot section of levee located between Lake Pontchartrain and the CSX Railroad (Figure 2). The earthen levee has an average existing crest elevation ranging from +13.0 feet to +19.7 feet North American Vertical Datum (NAVD) 88 (Photograph 1). Two pump stations and four drainage structures managed by U.S. Fish and Wildlife Service (USFWS) to control water levels and salinities within Bayou Sauvage NWR are located within the levee alignment. Interstate 10 (I-10), U.S. Highway 11 (US 11), and U.S. Highway 90 (US 90) cross the levee. Roller-type floodgates are located at the US 11 and US 90 crossings.

Photograph 1. LPV 109 Levee; Photograph Taken Looking South

LPV 110 consists of a floodgate and supporting floodwalls where the CSX Railroad crosses the levee (see Figure 2), approximately 1 mile north of the GIWW (Photograph 2). The existing structure was replaced to an authorized height (but not to a 100-year level of risk reduction) after being damaged by Hurricane Katrina. A 33-foot long steel railroad floodgate closes an 18-foot opening located between two 30-foot long T-wall structures. Two 30-foot long I-walls are located on either side of the T-walls and tie into earthen levees.

Photograph 2. Floodwall, Floodgate and CSX Railroad at LPV 110

LPV 111 is 28,069 feet long and extends from the CSX Railroad gate (LPV 110) south to the GIWW, and then southwest along the north bank of the GIWW to a point just east of Michoud Canal, where it ties into Michoud Canal Floodwall (LPV 112; see Figure 2). LPV 111 is primarily earthen levee (Photograph 3), with the exception of a 653-foot long T-wall located at Pump Station No. 15. The T-wall was repaired after being damaged by Hurricane Katrina and raised to +22 feet NAVD 88. Three 72-inch discharge pipes from Pump Station No. 15 pass through the T-wall and outlet into a discharge basin on the T-wall's flood (GIWW) side. The Collins petroleum pipeline also extends through the T-wall stem. The current elevation of LPV 111 is +19.5 feet NAVD 88.

Key issues to be analyzed in IER #7 are the potential impacts that the construction and modification of levees, floodwalls, and floodgates to an elevation that meets the 100-year level of risk reduction would have on the human and natural environment. IER #7 would assist CEMVN in deciding among reasonable alternatives, deciding how best to implement the proposed action alternative, and determining the need for any appropriate mitigation measures.

Photograph 3. LPV 111 Levee Adjacent to the GIWW

NEPA requires that, in analyzing alternatives to the proposed action, a Federal agency consider an alternative of "No Action." Likewise, Section 73 of the WRDA of 1974 (P.L. 93-251) requires Federal agencies to give consideration to non-structural measures to reduce or prevent flood damage. The CEMVN project delivery team (PDT) considered a no action alternative and non-structural measures in this IER, discussed in sections 2.4 and 2.5.1, respectively.

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

Alternative Alignments:

- Existing alignment;
- Flood-side shift (all toe-to-toe growth occurs on flood side of levee or floodwall); and
- Protected-side shift (all toe-to-toe growth occurs on protected side of levee or floodwall).

Alternative Scales:

- Earthen levee;
- T-wall type floodwall;
- Modified T-wall straddling existing I-wall;
- Earthen levee with T-wall cap; and
- Earthen levee using deep soil mixing (DSM).

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

2.2. DESCRIPTION OF THE ALTERNATIVES

Although it is the CEMVN's intent to employ an integrated, comprehensive, and systems-based approach to hurricane and storm damage reduction in raising the HSDRRS to the 100-year level of risk reduction, each reach has its own range of alternatives. This approach allows for reach-by-reach decisions to be made in a manner cognizant of unique local circumstances. At the same time, alternatives analysis and selection remains integrated and comprehensive, considering reaches in relation to one another and to other past, current and reasonably foreseeable actions by the CEMVN and other entities within the project study area.

As such, the alternatives description below is organized by reach (*i.e.*, LPV 108, 109, 110 and 111), noting those actions that are common to all reaches. The alternatives description also states how each alternative relates to the range of alternatives for adjacent reaches, to insure awareness of the hurricane risk reduction system as a whole. As mentioned previously, LPV 108 would be improved to meet the previously authorized elevation. This would raise the LPV 108 levee and foreshore protection to a height that is equal to or greater than the 100-year level of risk reduction.

No Action. CEQ's regulations and CEMVN's ER 200-2-2 for implementing NEPA require that a no action alternative be evaluated. Under the no action alternative, the levees and floodwalls and foreshore protection in reach LPV 108 would be built to the previously authorized elevation utilizing current design criteria, as described above, (as authorized under the Flood Control Act of 1965, PL 89-288, Title II, Section 204) rather than the 100-year level of risk reduction.

Stability berms and seepage protection for levees and T-walls for floodwalls and floodgates would be included in these designs to meet current design criteria. The LPV 110 floodgate is currently at the previously authorized elevation; however, two 30-foot long I-walls would be modified or replaced. LPV 111 is at the previously authorized elevation and no further construction would be required except for some seepage protection improvements. Maintenance of all structures would continue. The level of risk reduction provided by this alternative would not protect New Orleans East from 100-year level hurricane or storm surge events.

LPV 108 Previously Authorized Action. LPV 108 consists of 32,840 linear feet of earthen levees along the Lake Pontchartrain shoreline, with the exception of a small section of I-wall at the Southern Natural Gas pipeline crossing and the Collins pipeline crossing. The existing levee height of LPV 108 is +18 feet NAVD 88. Foreshore protection consisting of a stone dike is located lakeside of the Norfolk Southern Railroad (NSRR) embankment. Approximately 2,800 linear feet of LPV 108, near the Little Woods area, lacks foreshore protection. The shoreline at

this location is sufficiently removed from the railroad embankment to protect the embankment from erosion due to wave action.

Previously authorized and 100-year levels of risk reduction are the same for LPV 108 (Figure 3) and range from +17.5 feet NAVD 88 (in the western portion of the LPV 108 alignment) to +18.5 feet NAVD 88 (in the eastern portion of the alignment). Therefore, the 100-year level of risk reduction is already provided by existing authorized levee improvements, and no further levee work is required.

Previously authorized and 100-year levels of risk reduction are the same for riprap foreshore protection along Lake Pontchartrain and would be raised to reduce erosion and wave impact on the LPV 108 levee (see Figure 3). Approximately 121,000 cubic yards of riprap would be required to raise levee foreshore protection to an elevation that would not settle below a net grade of approximately +9 feet NAVD 88 in 10 years (see Figure F1 in Appendix F for a typical cross-section). It is anticipated that riprap would be transported to the Lake Pontchartrain shoreline by barge and placed from equipment stationed on barges in the lake and from trucks and equipment accessing foreshore protection from the shoreline. The placement of foreshore protection would be located within a 48-foot wide right-of-way located along the shoreline of Lake Pontchartrain and permanently fill approximately 7.2 acres of Lake Pontchartrain. To provide barge access, channels would be dredged in Lake Pontchartrain perpendicular to the shoreline and laterally to perpendicular channels. It is proposed that five offshore to inshore access channels perpendicular to the Lake Pontchartrain shoreline and four lateral channels parallel to the shoreline would be constructed to allow the tug boat and barge to approach the construction area (see Figure 3). Perpendicular and lateral channel dimensions would be approximately 10 feet deep, 100 feet wide at the channel bottom with a 2:1 slope on both channel sides. Perpendicular channels would range from 764 to 1,126 feet long and parallel channels would be 2,000 feet long. The dredging operation would excavate approximately 243,000 cubic yards of material. Dredged material (tailings) would be placed within a 178-foot wide area located on one side of and parallel to the dredged channel. The channel width and dredged material placement area would create a 400-foot wide footprint, which includes the 140-foot wide channel (top width; 100 foot wide bottom), the 178-foot wide dredged material stock pile and the space between the stock pile and channel. Assuming these dimensions, the channel and excavated sediments are expected to temporarily impact approximately 118.1 acres of lakebed. After construction activities have been completed, dredged material from the access channels would be used to backfill the dredged channels. Pre-construction and post-construction bathymetric and SAV surveys would be conducted to document percent occurrences of aquatic plants in or near the construction area. If post construction surveys do not show a natural revegetation of the area occurring, plantings of SAV would be implemented to return the site to pre-construction conditions.

Because the previously authorized elevations for LPV 108 levee and foreshore protection also provide the 100-year level of risk reduction, no additional improvements beyond those previously authorized are required. Since the placement of foreshore protection was previously described in the Final EIS for the LPV Hurricane Protection Project and the original foreshore protection was placed within a larger 60 foot wide right-of-way, the impacts for this work will be discussed as part of the no action alternative and considered as part of the cumulative impacts of the proposed action alternative for this IER.

Proposed Action. The proposed action consists of realigning portions or reconstructing all levees, floodwalls and floodgates to a grade that would achieve the 100-year level of risk reduction for the New Orleans metropolitan area. The structural height and design to meet the 100-year level of risk reduction for each alternative was determined using a new, advanced process for estimating hurricane inundation probabilities called the Joint Probability Method with Optimal Sampling (JPM-OS) Process. The JPM-OS frequency analysis determined the one

percent surge elevations, one percent wave heights, and one percent wave characteristics for existing conditions, and then applied in the wave run-up and overtopping calculations. An additional analysis was performed to represent the conditions that may occur 50 years in the future (year 2057) as a result of changes in the surge levels and wave characteristics due to subsidence and sea level rise. The results from the JPM-OS hydraulic process have been incorporated into the Design Guidelines for the HSDRRS.

2.3. PROPOSED ACTION

2.3.1. LPV 109 Levee Section

The LPV 109 reach includes the use of stability berms, high strength geotextile and prefabricated vertical (PV) drains (*i.e.*, wick drains) for levee construction (Figure 4). A stability berm with a width of 120 feet would be constructed on the protected side from South Point to US 90, and a stability berm with a width of 175 feet on the protected side would be constructed from US 90 to LPV 110 (see Figure F2 in Appendix F for a typical cross-section). Two to three layers of high strength geotextile would be used, and the levee fill placed in five lifts between South Point and US 90 and in six lifts between US 90 and LPV 110. PV drains would be used to promote horizontal drainage in subsurface clay soils. Additionally, seepage analysis would be performed during levee design, and if additional seepage control measures are warranted, a cement-bentonite (CB) slurry wall would be constructed beneath the levee. The levee would be raised to an elevation that would vary with distance from Lake Pontchartrain, and would not settle below a net grade of between +17.0 feet NAVD 88 (from South Point to US 90) and +22.0 feet NAVD 88 (from US 90 to CSX Railroad) in 10 years. Flood side levee slopes would be 1:4 (vertical:horizontal) from South Point to US 90 and 1:5 (vertical:horizontal) from US 90 to LPV 110. Protected side levee slopes would be 1:4 (vertical:horizontal). The levee would be vegetated along both slopes along its entire length following construction. Levee reconstruction would impact two pump stations (Photograph 4) and four drainage control structures that provide water level management for Bayou Sauvage NWR. These structures would be redesigned and constructed to accommodate the new levee heights and footprints. The construction duration is estimated to be 24 months.

The protected-side shift, expanded levee and stability berm footprint would require the acquisition of right-of-way. The majority of the additional right-of-way needed for construction is located in Bayou Sauvage NWR. Additionally, a haul route for construction equipment access would be improved along an existing USFWS-owned road between the LPV 109 levee and US 90 (see Figure 4).

Flood protection for three highway crossings (Interstate 10 [I-10], U.S. Highway 90 [US 90] and U.S. Highway 11[US 11]) is incorporated into the proposed design for LPV 109.

2.3.2. LPV 109 I-10 Crossing

The existing I-10 roadway that crosses the HSDRRS levee is a six-lane, controlled access, divided interstate highway (three lanes east bound and three lanes west bound), with shoulders which are supported on an elevated embankment. I-10 passes over the levee by way of an earthen ramp. The proposed I-10 crossing includes the raising of the existing levee structure and highway earthen ramp to the 100-year level of risk reduction, with a minimum net elevation of +19.0 feet NAVD 88. There would be sufficient overbuild in the crossing to accommodate natural compaction and subsidence in order to maintain the 100-year level of risk reduction for 10 years (see Figure F4 in Appendix F for typical cross-section). The ramp construction includes a temporary traffic control plan that provides a minimum of three traffic lanes in each direction continuously through the life of the construction project. The construction of the ramp occurs within existing Louisiana Department of Transportation and Development (DOTD) right-of-way. The construction duration is estimated to take 14 months.

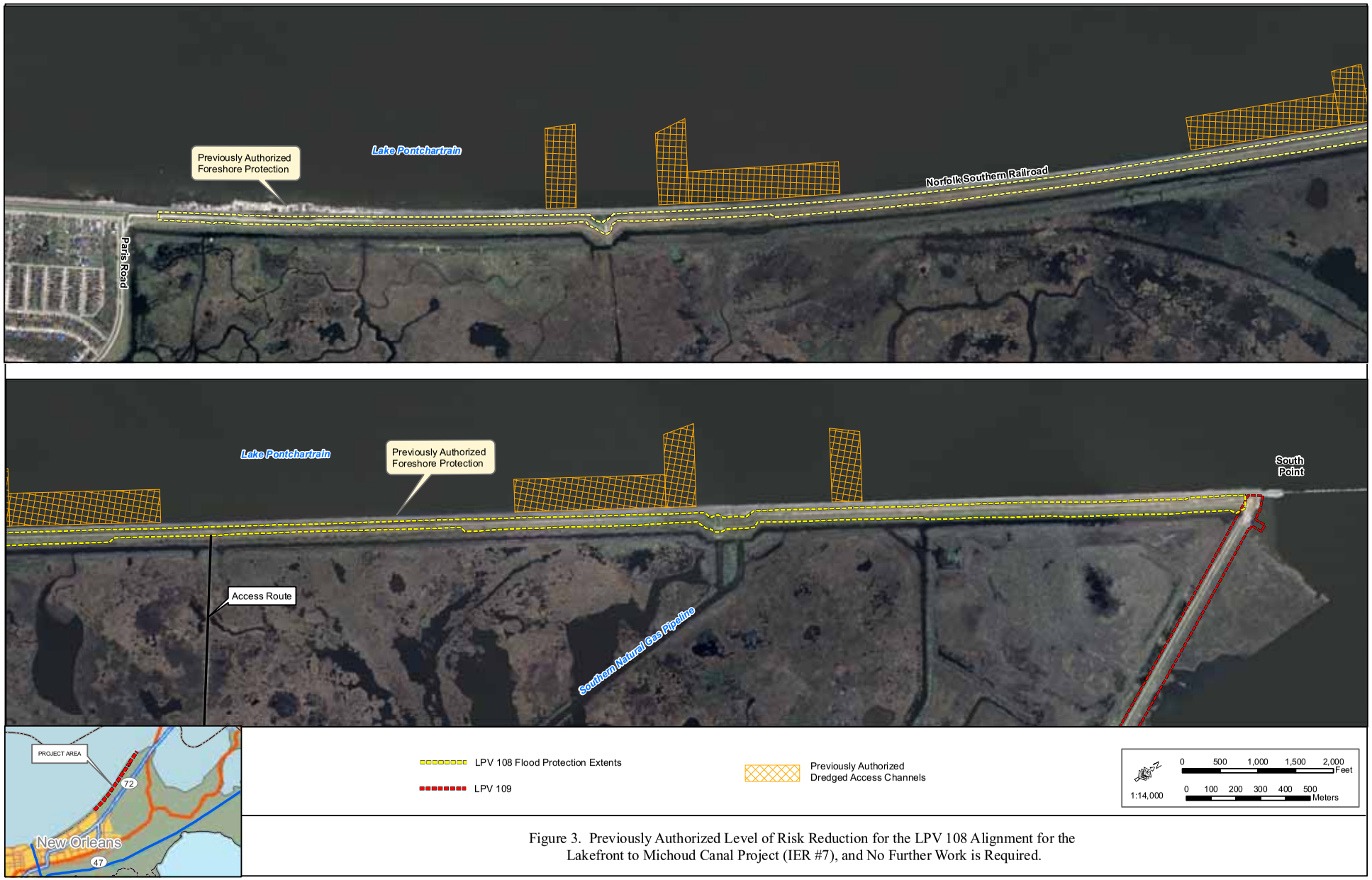

Figure 3. Previously Authorized Level of Risk Reduction for the LPV 108 Alignment for the Lakefront to Michoud Canal Project (IER #7), and No Further Work is Required.

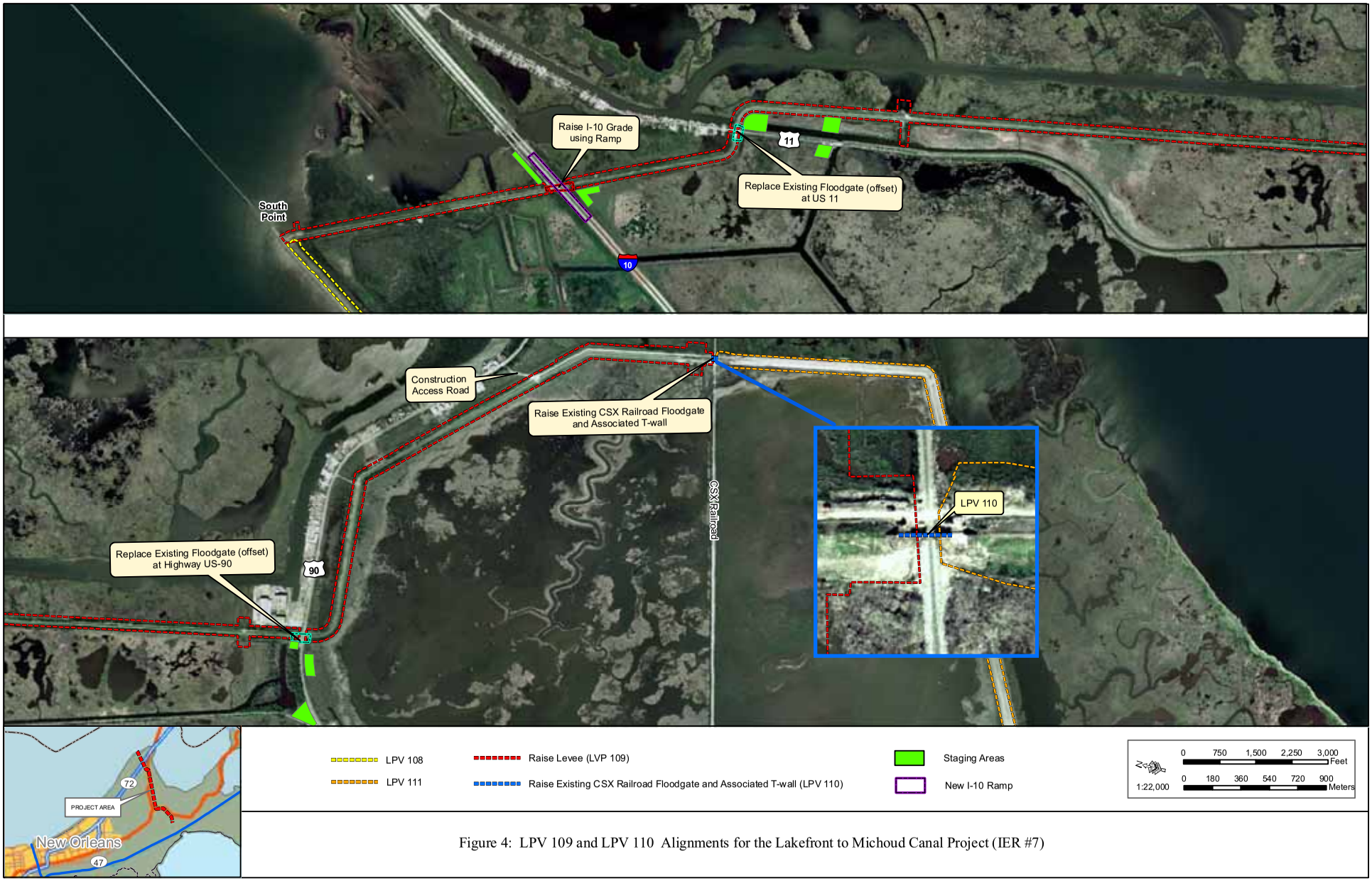

Figure 4: LPV 109 and LPV 110 Alignments for the Lakefront to Michoud Canal Project (IER #7)

Photograph 4. Bayou Sauvage NWR Pump Station

2.3.3. LPV 109 US 90 and US 11 Crossings

Risk reduction for the US 90 and US 11 crossings are incorporated into the proposed design for LPV 109 (see Figure 4). The US 90 (a four-lane undivided highway), and US 11 (a two-lane highway) crossings would each incorporate the construction of a new floodgate supported on both sides by a T-wall that transitions into the LPV 109 levee. The height of the US 11 floodgate and T-wall would be +18.5 feet NAVD 88 and the height of the US 90 floodgate and T-wall would be +22.0 feet NAVD 88. It is estimated that the new floodgate construction would take 23 months to complete.

2.3.4. LPV 110

The existing CSX Railroad floodgate and associated T-wall at LPV 110 (see Figure 4) would be raised to an elevation that would not settle below a net grade of approximately +30 feet NAVD 88 in 10 years. The proposed work would include the replacement of the gate monolith and adjacent T-walls and I-walls with T-wall type floodwalls. Because the LPV 110 floodgate would be slightly offset from the centerline of the adjacent levees, the new T-walls would be constructed to tie into the LPV 109 and LPV 111 levees. The CSX Railroad would remain in service during the floodgate and floodwall construction and no additional right-of-way would be required. The total length of time for construction is estimated to be 20 months.

2.3.5. LPV 111

The LPV 111 levee would be raised to an elevation that would not settle below a net grade ranging from +25.0 feet NAVD 88 (closest to the CSX Railroad crossing) to +29.0 feet NAVD 88 (closest to the Michoud Canal floodwall) in 10 years (Figure 5). Ground improvement techniques to strengthen the foundation soils would be needed to raise the 5.3 miles of levee to the design elevation by June 2011 (see Figure F5 in Appendix F for a typical cross-section). DSM, which is a process that modifies the physical and chemical characteristics of the soil without excavating, would be required for the entire length of the levee to improve the foundation soil strength. DSM does not require degrading of the levee surface for installation. Shifting of the center of the levee to the protected side as much as 61 feet would be required to allow the wave berm slope to roughly match the flood side slope of the existing levee, thereby reducing the amount of fill added to the flood side slope. After raising the LPV 111 levee to the 100-year elevation, concrete slope protection would be placed from toe-to-toe on both sides of the levee to prevent scouring. Cement for DSM and slope protection would be delivered to the project area by barge from the GIWW. It is anticipated that the cement would be pumped from barges in the GIWW over the wetlands located at the toe of the LPV 111 levee to the LPV 111 levee construction site. Additional right-of-way would be required for the expanded LPV 111 levee, and most of that right-of-way occurs in Bayou Sauvage NWR.

A new reinforced concrete T-wall would be constructed to replace the existing T-wall at Pump Station No. 15 (Photograph 5). The T-wall contains three 72-inch pipes that discharge into a basin on the flood side of the T-wall. The top of the T-wall fronting Pump Station No. 15 would be +34.0 feet NAVD 88 with the adjacent levee tie-in section raised to +32 feet NAVD 88. The new T-wall would transition into levee on both sides. During T-wall demolition, temporary flood protection would be constructed in the discharge basin adjacent to the GIWW. The three

Photograph 5. T-wall and Pump Station No. 15 at LPV 111; Photograph Taken Looking West towards Paris Road

Figure 5: LPV 111 Alignment for the Lakefront to Michoud Canal Project (IER #7)

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72-inch pipes would be extended through the temporary flood protection to discharge into the GIWW. The temporary flood protection in the discharge basin would also be used as a cofferdam to dewater the discharge basin during T-wall construction. A temporary bridge for access during levee and T-wall construction would be placed across Maxent Canal just north of Pump Station No. 15 (see Figure 5). The estimated duration of construction is 19 months.

2.3.6. General Considerations For All Reaches

As part of construction, numerous utilities, including electrical services, gas lines, telephone poles and lines, storm drainpipes, and water control structures and pump stations for Bayou Sauvage NWR, would be avoided or relocated. Soil borings for geotechnical analysis would be conducted along the alignments of all reaches. All staging and laydown areas would be located either within the project construction corridor, or within previously developed areas immediately adjacent to the project corridor (*e.g.*, adjacent to highway rights-of-way). Construction of all three reaches is anticipated to require approximately 2 years.

All T-walls would be approximately 2 feet wide, supported by an approximately 12- to 17-foot wide and 3-foot high concrete slab connected to H-piles (driven to a depth of approximately 85 feet below the ground surface) and a continuous sheet pile cutoff wall (constructed to depths ranging from 50 to 60 feet below the ground surface) for further stabilization and seepage protection (Figure 6). It is anticipated that T-walls would be cast-in-place; however, consideration would be given to using precast concrete for T-wall foundations and wall stems.

Materials (*e.g.*, sheetpile, H-pile, concrete, soil) for the construction of T-walls and earthen levees would be transported from staging areas located adjacent to the project corridor, from borrow pits, and from contractors in the region to the active construction areas. Trucks delivering materials would travel along I-10, US 11, US 90, Intracoastal Drive, Industrial Parkway and the Maxent Canal access road and offload at specific points where construction is occurring. Existing access roads from US 11 to LPV 109 would be used as construction access routes. Heavy equipment that would likely be used during demolition and construction activities includes haulers, excavators, pile drivers (vibratory and hammer), dozers, graders, cranes, backhoes, and water trucks. Construction activities could occur 24 hours daily and 7 days a week during the construction period.

2.4. ALTERNATIVES TO THE PROPOSED ACTION

Including the no action alternative, five alternatives were considered in detail for the LPV 109 Levee Section, two alternatives were considered in detail for the LPV 109 I-10 Crossing, and four alternatives were considered in detail for the LPV 109 US 90 and US 11 Crossings. Two alternatives were considered in detail for LPV 110 and four alternatives were considered in detail for LPV 111, including a no action alternative for each reach.

2.4.1. LPV 109 Levee Section

No Action. Under the no action alternative, floodwalls would be replaced and levee heights increased to meet previously authorized elevations. Levee and floodwall improvements would occur within the existing right-of-way. Maintenance of levees and floodwalls would continue.

Alternative 1: Raise Levee by Placing Stability Berms on Both Sides and Using PV Drains. Design elevations would be reached by placing levee fill in five stages from South Point to US 90 and in six stages along US 90 to LPV 110. It is anticipated that levee construction would need to be conducted in stages to prevent bearing capacity failure. It is estimated that each stage would need approximately 4 months to substantially complete primary consolidation and associated strength gain in the clay soils. Stability berms would be added to meet slope stability

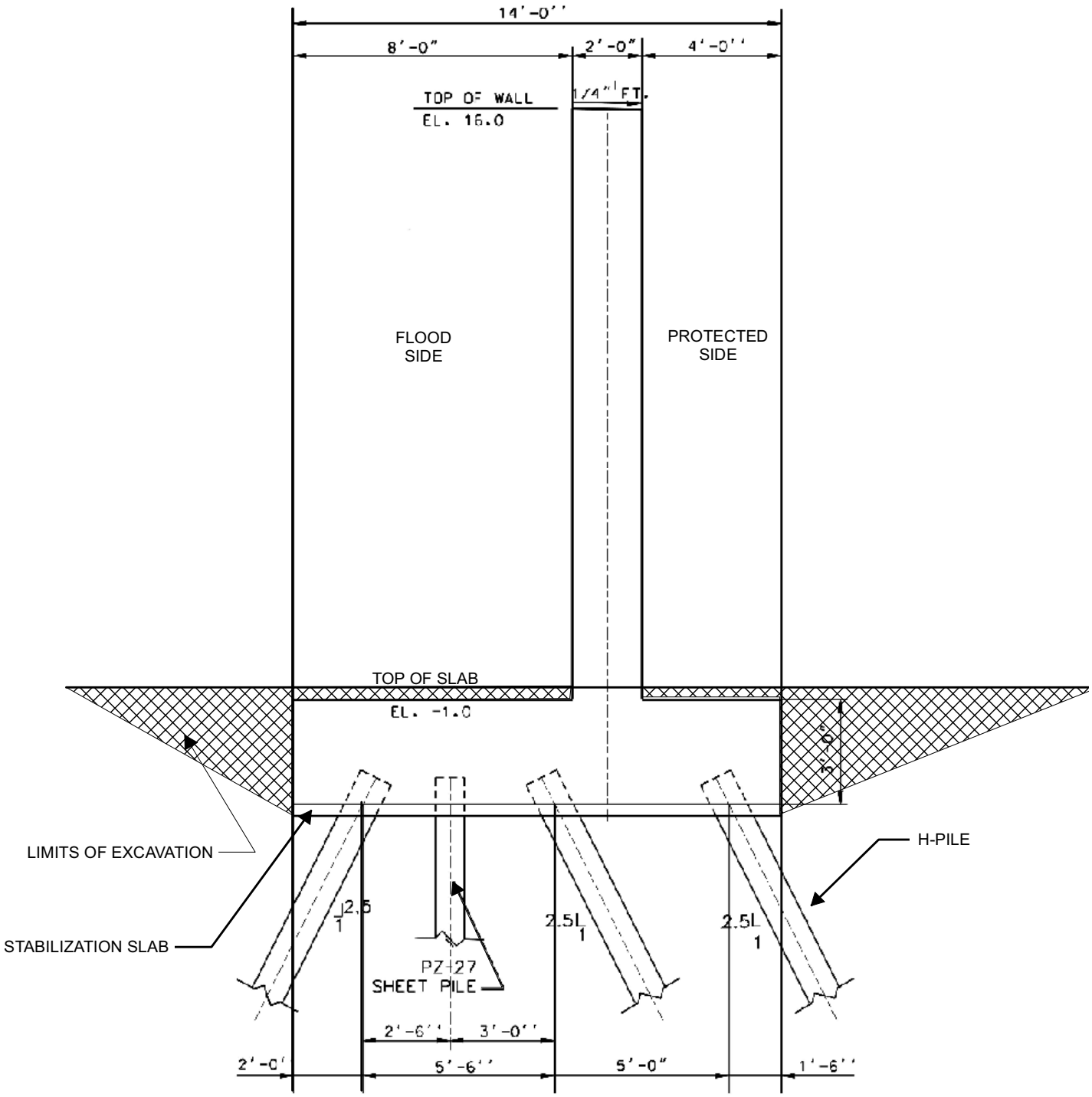

Figure 6. All T-walls would be approximately 2-feet wide supported by a 12- to 17-foot wide and 3-foot high concrete slab connected to battered H-piles (driven to a depth of approximately -85 feet below the ground surface) and a continuous sheetpile cutoff wall (constructed to depths ranging from -50 to -60 feet below the ground surface) for further stabilization and seepage protection.

factors of safety requirements. Levee side slopes would be the same as LPV 109 proposed action. PV drains would be utilized in levee construction to achieve strength gain in the underlying soft clay stratum. A stability berm width would be approximately 160 feet on the protected side between South Point and US 90, and a stability berm width of approximately 225 feet on the protected side and 90 feet on the flood side would be required between US 90 and LPV 110. A seepage analysis would be performed during the design phase, and if additional seepage control measures are recommended, a CB slurry wall underneath the levee would be constructed. The construction duration is estimated to be 36 months.

Alternative 2: Raise Levee by Using Geotextile and PV Drains. Levee construction with two types of ground improvements, high strength geotextile and the incorporation of PV drains to increase the rate of consolidation, would be used to reach the design elevations by June 2011. Three to four layers of high strength geotextile would be used, with the levee fill being placed in five stages from South Point to US 90 and in six stages from US 90 to LPV 110. It is estimated that each stage would need approximately 4 months to substantially complete primary consolidation and achieve adequate strength gain in clay soils. Flood side levee slopes would be the same as LPV 109 proposed action; however, protected side levee slopes would be 1:3 (vertical:horizontal). A seepage analysis would be performed during the design phase and if additional seepage control measures are recommended, a CB slurry wall underneath the levee would be constructed. It is estimated that 36 months would be required to complete construction.

Alternative 3: Raise Levee Using DSM. DSM would be used to provide foundational support for raising the levee to the 100-year level of risk reduction elevation. DSM introduces engineered grout or reagent into the underlying soils to modify their physical and chemical characteristics without excavation. DSM provides soil stabilization and minimizes levee width, and allows for levees to be constructed in fewer lifts (*i.e.*, shorter period of time). Construction is estimated to require 24 months for completion.

Alternative 4: Raise Levee Using Lightweight Fill. The use of lightweight fill materials such as geofoam, expanded clay and Elastizell to raise the LPV 109 levee to the 100-year level of risk reduction elevation were evaluated. These materials result in small loads being imposed on the levee. The existing levee surface would be partially degraded to create a working platform. Lightweight materials would then be used to raise the levee elevation. Because of the risk of breaches in the levee dislodging lightweight materials, erosion protection would be placed along the slopes of the levee. The construction duration for this alternative is estimated to be 30 months.

2.4.2. LPV 109 I-10 Crossing

No Action. Under the no action alternative, the I-10 crossing of LPV 109 would be replaced to meet previously authorized elevations. Improvements would occur within the existing right-of-way. I-10 would be raised using an abutment or bridge to allow for a higher elevation T-wall or levee to be constructed at the I-10 crossing to meet the previously authorized elevation. Maintenance of structures would continue.

Alternative 1. Construct Levee and Raise I-10 with a Bridge. A 3,095-foot long, 40-foot high bridge would be constructed over the LPV 109 levee and would meet DOTD's design criteria. Because of the length of this bridge, the existing I-10 bridges located 1,300 feet east of the LPV 109 crossing would also be reconstructed. The bridge would meet CEMVN design criteria by providing 15 feet of vertical clearance over the proposed LPV 109 levee. The maximum allowable grade of 3 percent would used to minimize the length of the bridges and the amount of reconstruction of the existing bridges. A construction duration of 36 months is estimated for completion of this bridge.

2.4.3. LPV 109 US 90 and US 11 Crossings

No Action. Under the no action alternative, floodgates and floodwalls would be replaced to meet previously authorized elevations. Floodgate improvements would occur within the existing right-of-way. Maintenance of structures would continue.

Alternative 1. Raise Highways Using a Ramp. A ramp over the LPV 109 levee would be constructed for the two crossings similar to the method described for I-10 crossing proposed action. Because of right-of-way limitations that do not allow for adequate side slopes, retaining walls would be used on both sides of the US 90 and US 11 ramps. Also, right-of-way limitations would likely require complete closure of these two highways for a period of time during construction. A construction duration of 24 months is estimated for this alternative.

Alternative 2. Raise Highways Using a Bridge. A bridge over the LPV 109 levee would be constructed for the two highway crossings similar to the method described for I-10 crossing Alternative 1. The bridges would be approximately 3,095-feet long and 40 feet high, providing 15 feet of vertical clearance over the LPV 109 levee. Right-of-way limitations would likely require complete closure of these two highways for a portion of the construction period. Raising the two highways using a bridge is estimated to require 24 months to complete.

Alternative 3. Retrofit Existing Floodgate. The existing floodgate structures would be raised to the design elevation and adjacent I-walls and levee structures would also be increased in elevation, retrofitted to meet design criteria and sloped to meet the flood protection in the adjacent levee section. Additionally, because the centerline of the LPV 109 levee would shift 73 feet to the west, the existing floodgate would be offset and new T-walls would be constructed at angles to connect the existing floodgate to LPV 109 levee reaches. Retrofitting the existing floodgates has an estimated construction duration of 24 months.

2.4.4. LPV 110

No Action. Under the no action alternative, the 60 feet of I-wall type floodwall would be improved or replaced to meet previously authorized elevations. Maintenance of T-walls and the floodgates that are currently at the previously authorized elevation would continue.

Alternative 1. Retrofit Existing Floodgate. The existing LPV 110 floodgate and floodwalls would be raised 10 feet to meet design elevation. Adjacent I-walls and levees would be raised and retrofitted to meet current design standards. All floodwalls and levee structures would be sloped to meet the flood protection in adjacent reaches. The construction duration for this alternative is estimated to be 20 months.

2.4.5. LPV 111

No Action. Under the no action alternative, levees along the GIWW and the floodwall at Pump Station No. 15 would be maintained at previously authorized elevations. Some additional seepage protection may be required to meet design criteria.

Alternative 1. Raise Levee with PV Drains and Geotextile. Levees would be constructed utilizing two types of ground improvements, high strength geotextile and the incorporation of PV drains to increase the rate of consolidation. Three to four layers of high strength geotextile would be used, with the levee fill being placed in five to seven stages to allow for sufficient consolidation of material. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action. The construction duration for this alternative is estimated to be 42 months, not including the time required for levee settlement and consolidation following the final fill stage.

Alternative 2. Raise Levee with Lightweight Fill. Using lightweight fill materials such as geofoam, shredded and baled tires, expanded clay and Elastizell were evaluated. These materials

result in small loads being imposed on the levee to raise the elevation to the 100-year risk reduction elevation. The existing levee surface would be partially degraded to create a working platform. Lightweight materials would then be used to raise the levee elevation. Because of the risk of breaches in the levee dislodging lightweight materials, erosion protection would be placed along the slopes of the levee. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action. The estimated construction duration for this alternative is 20 months.

Alternative 3. T-wall Cap. The existing levee would be degraded to create a working platform and a T-wall would be constructed on top of the existing levee to an elevation of +31.0 feet NAVD 88. The T-wall would be approximately 27,330 feet long and would require construction precautions to meet vessel loading design criteria, since the LPV 111 T-wall cap would be adjacent to a navigable waterway. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action. Construction of a T-wall cap is estimated to take 24 months to complete.

2.5. ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

2.5.1. Non-structural

Section 73 of the WRDA of 1974 requires that non-structural alternatives be evaluated in flood damage reduction studies. ER 1105-2-100 provides planning guidance on applicable non-structural measures. Non-structural flood damage reduction measures typically include permanent relocation, evacuation, or demolition of structures in the floodplain; floodproofing of structures; flood warning systems; and regulation of floodplain uses. Flood warning systems and evacuation plans are already in place for all of Orleans Parish.

2.5.1.1. Structure Relocation

The mandatory public acquisition of properties and relocation of structures subject to flooding is a non-structural alternative. This would be done pursuant to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S. Code Section 4601, *et seq*., as amended) for financial assistance for subject properties. A non-structural program for acquisition of 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 Relocation Assistance and Real Property Acquisition Policies Act for the displacement of individuals, families, businesses, farms and non-profit organizations. Two options are available under the structure relocation alternative: 1) relocation of the structure to a comparable site outside of the area of flooding; and 2) acquisition of the structure and site by the local sponsor for demolition and relocation. Neither of the options is viable for New Orleans East. A number of industries are located in the New Orleans East area due to its proximity to the GIWW and IHNC, and acquisition and relocation would be very costly. Additionally, these industries are marine related, and the protection provided by the levee system and the proximity of New Orleans East to these waterways are the reasons these industries are located in New Orleans East. Additionally, it has been estimated using 2006 aerial photography that 30,000 residences are located in New Orleans East, and all of these homes would require acquisition and relocation.

2.5.1.2. Raise in Place

Floodproofing of structures by raising the ground floor elevation above the 100-year flood level in their existing location is another non-structural alternative, and the primary floodproofing method available for structure modification as a collective action. The average cost of elevating residential structures in New Orleans has been estimated at $95 per square foot (USACE 2007). Thus, the cost of raising an 1,800 square foot residence would be approximately $171,000. Because the Lakefront to Michoud Canal project is a component of the LPV project that provides

protection to New Orleans East, all structures in New Orleans East below the 100-year flood level would need to be raised in elevation. Assuming each residence is 1,800 square feet, the cost of elevating 30,000 residences is approximately $5.1 billion. In addition, apartment buildings, businesses and critical infrastructure, such as utilities, roadways and public buildings, would also need to be elevated above the 100-year flood level. The cost of elevating these structures is likely equivalent to the cost of elevating residences in the area. Therefore, it is estimated that the cost of raising the elevation of structures and critical infrastructure above the 100-year flood level in New Orleans East would exceed $10 billion. This cost does not include the loss of future development opportunities in New Orleans East due to the increased cost of building structures at a higher elevation. The cost of raising the Lakefront to Michoud Canal project levees and floodwalls to the 100-year level of risk reduction is estimated at approximately $926 million. Therefore, raising the elevation of residential and commercial structures at their current location is not a viable alternative.

2.5.1.3. Rezoning

Regulation of floodplain use can be used to preclude or limit development in flood prone areas. This alternative would minimize future damages on new development in flood-prone areas; however, it would not provide the 100-year level of risk reduction for existing structures. Further, rezoning is not within the authority of CEMVN as provided by the 4th Emergency Supplemental Appropriations Act.

2.5.2. Flood Side Shift of Existing Levee Section

Shifting of the levees and floodwalls, towards the flood side was considered. Relocation of levees and floodwalls to the flood side would place the alignment across the NSRR and within Lake Pontchartrain into tidal marsh near Irish Bayou and into the GIWW. Given stability issues associated with constructing a levee in the lake or tidal marsh, relocation of the NSRR, and environmental impacts, shifting the alignment to the flood side was eliminated from further consideration.

2.5.3. Alternative Scales within Existing Alignment

Several options for raising flood risk reduction elevation within the existing alignments were considered. Constructing a T-wall cap in place of raising levee elevations was considered for LPV 109, but was eliminated due to prohibitive costs, the length of time required for construction and a footprint similar to the LPV 109 proposed action due to the need for stability berms.. Raising levees in LPV 109 and LPV 111 without ground improvements was also considered, but due to the length of time required for material consolidation, design heights could not be reached by June 2011 and therefore failed to meet the project purpose. Additionally, constructing bridges or abutments for US 90 and US 11 crossings, a T-wall or levee was evaluated, but due to increased costs, impacts to wetlands and disruption of traffic, these alternatives were determined to be infeasible.

2.5.4. Hollow Core Levee

A hollow concrete levee is constructed so that the structure fills with water from the bottom as storm surge rises. The combined weight of the concrete frame and its water filled voids inside the frame result in a gravity structure that is designed to resist hydrostatic forces and impact forces from vessel collision. Hollow concrete levees are comprised of trapezoidal shapes similar to that of earthen levees. The levee superstructure sections are comprised of sloped side walls and a flat bottom slab with access to the interior via steel grating or manholes in the crest. Water inlets or ports are incorporated into the cross section near the levee base on the flood side to allow the section to flood with water to contribute to the overall weight for stability purposes. Shear keys in the base are designed to protect against sliding under design loading conditions. The substructure consists of a concrete base slab or pad that is supported by steel piles. A hollow concrete levee was considered for LPV 109 and LPV 111, but was eliminated from further consideration because the existing levee can be raised by June 2011 using earthen fill at a

much lower cost. Therefore, degrading an existing levee and replacing with a hollow core levee section would not be cost effective or reduce environmental impacts.

2.5.5. Alternative Alignments

Four other alignments were evaluated (Figure 7) to provide the 100-year level of risk reduction for New Orleans East. These four new alignments would not improve portions of existing alignments of LPV 109, 110 and 111, and would leave the elevation of the existing sections at or below the previously authorized elevation.

An alignment that would construct a hurricane and storm damage risk reduction structure from Lake Pontchartrain to the GIWW on top of an existing low elevation levee on the east bank of Maxent Canal, which is an interior drainage canal located on the west boundary of Bayou Sauvage NWR, was considered (Lake Pontchartrain - Maxent Canal – GIWW alignment). Another similar alignment would construct LPV 108 along the eastern side of Paris Road and north side of I-10 to the east side of the Maxent Canal, instead of along Lake Pontchartrain to the east side of Maxent Canal (Paris Road - I-10 -Maxent Canal – GIWW alignment).

Another alternative alignment considered follows the east side of Paris Road to the existing non-Federal levee located on north of the Village de l'Est neighborhood, crossing US 90 and the CSX Railroad to the Michoud Canal floodwall and then to Industrial Parkway. The alignment crosses Industrial Parkway, and follows the north and east sides of Industrial Parkway to the west bank of Maxent Canal, and then follows Maxent Canal south to GIWW (Paris Road – Village de l'Est – Industrial Parkway – GIWW alignment). This alternative would leave 38 buildings in an apartment complex, approximately 420 single family residences, Six Flags New Orleans Amusement Park (which is vacant with no plans to re-open), and numerous commercial and industrial facilities with inadequate protection.

Another alternative alignment considered is the same as that previously described, except, instead of following Industrial Parkway, this alignment would cross the CSX Railroad and follow the south side of the CSX Railroad to the west bank of Maxent Canal, and then south to the GIWW (Paris Road – Village de l'Est – CSX Railroad – GIWW alignment). This alternative would leave a similar number of residential, commercial and industrial facilities with inadequate protection as the previous alternative.

These four alternative alignments do not meet the project purpose and need because they would not include five commercial businesses and three residential properties and portions of the transportation infrastructure (I-10, US 11, US 90 and the CSX railroad) between the existing authorized alignment and their crossing of alternative alignments within the 100-year level of risk reduction. The Maxent alignments do not allow the commercial businesses and residential properties to participate in the National Flood Insurance Program, since these facilities would not be offered 100-year level of risk reduction, and alternative alignments reduce the protected area that was previously included in the HSDRRS with the original authorized project. Further, internal drainage improvements, including new drainage canals and pump stations, would likely be required to manage local drainage and discharge to Maxent Canal.

The alternative alignments were determined to not provide adequate flood risk reduction for a substantial amount of infrastructure (including I-10) and would require raising the elevation of approximately 5 miles of I-10 from Maxent Canal to the existing LPV 109 crossing. It is estimated that the cost of raising the elevation of I-10 from Maxent Canal to the existing I-10 Twin Span Bridge over Lake Pontchartrain would exceed $500 million, which exceeds the total cost estimate for all components of LPV 109 proposed action (estimated to be $494 million). This cost is in addition to the construction of structures necessary to meet the 100-year level of risk reduction along these alternative alignments. Although, exact cost estimates for each of the alternative alignments have not been prepared, it is likely that the cost for each alignment

evaluated would exceed $1 billion (which includes the cost of raising I-10 and new levee, floodwall and floodgate construction). Further, because I-10 is a hurricane evacuation route, all lanes of I-10 would need to be serviceable for traffic while construction occurred during hurricane season.

The existing levee alignments provide hurricane and storm damage risk reduction to much of Bayou Sauvage NWR that is located well below sea level and relies upon the LPV 108, 109 and 111 levees, water control structures and pumps to manage water levels and salinity. The alternative alignments, which are located west of the Refuge, would not reduce the risk of flooding in managed areas of Bayou Sauvage NWR.

Because the Maxent alternative alignments would detract from the previously protected area, would require providing separate protection for properties outside of the alignments, and costs of alternative alignments greatly exceeded the costs for improvements to the existing alignment, it was determined that these four alignments were not viable alternatives and, therefore, would be eliminated from further consideration.

2.6. SUMMARY

Table 1 provides a summary of the preliminary alternative screening results.

Table 1. Alternative Screening Results

Alternative	LPV 109	LPV 110	LPV 111
No-Action	☑	☑	☑
Non-Structural	X	X	X
Existing Alignment			
• Earthen Levee	☑	X	☑
• T-wall Floodwall	X	☑	X
• Modified T-wall straddling existing I-wall	X	X	X
• Earthen Levee with T-wall Floodwall cap	X	X	☑
• Earthen Levee using Deep Soil Mixing	☑	N/A	X
Flood-side Shift			
• Earthen Levee	X	X	X
• T-wall Floodwall	X	X	X
• Earthen Levee with T-wall Floodwall cap	X	X	X
• Earthen Levee using Deep Soil Mixing	X	X	X
Protected-side Shift			
• Earthen Levee	☑	X	X
• T-wall Floodwall	X	X	X
• Earthen Levee with T-wall Floodwall cap	X	X	X
• Earthen Levee using Deep Soil Mixing	X	X	☑
New Alignment	X	X	X

X = Eliminated from further study ☑ = Considered in detail
N/A = Not applicable; this alternative was not formulated for this reach

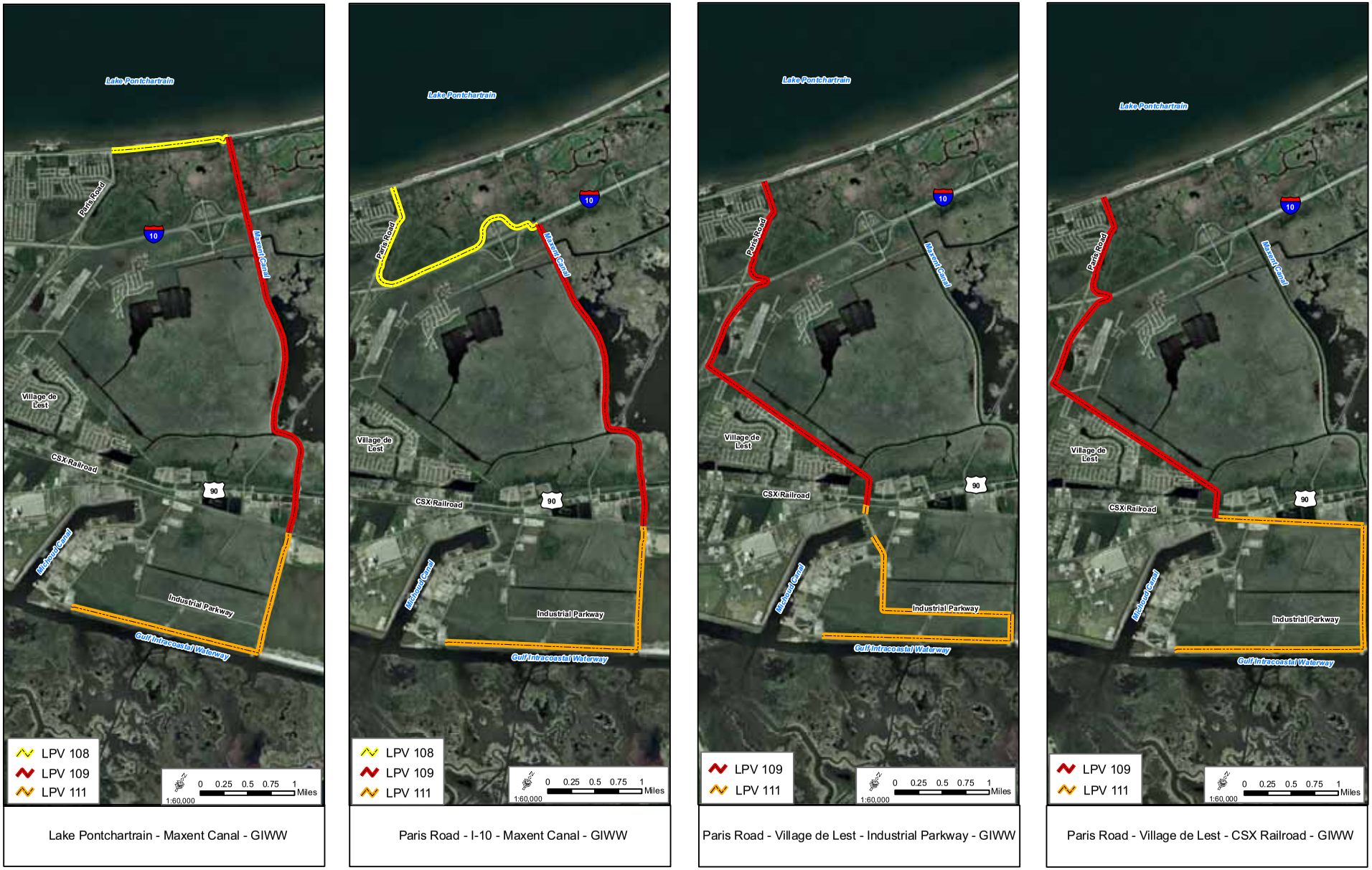

Figure 7: New Orleans East Lakefront to Michoud Canal Alternative Project Alignment Configurations (IER #7)

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3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1. ENVIRONMENTAL SETTING

The project is located along the Lake Pontchartrain shoreline, north of the GIWW and within Bayou Sauvage NWR (Photograph 6). The project corridor includes two railroad crossings (CSX Railroad and the NSRR) and three highway crossings. The eastern end of the project corridor abuts tidal marshes near Lakes Pontchartrain and Borgne and the southern reach is located along the GIWW. North of the project corridor, beyond the NSRR railroad tracks, is the southern shore of Lake Pontchartrain.

Tropical storm events typically produce the highest wind speeds and greatest rainfall events along the Gulf Coast. Category 5 hurricanes, such as Hurricane Camille which made landfall just east of New Orleans on August 17, 1969, generate the highest sustained wind speeds in the region (greater than 155 miles per hour). High winds are typically accompanied by massive storm surge, and in the case of Category 5 storms, storm surge can exceed 18 feet in height (National Hurricane Center 2007). Between 1926 and 2005 a total of 10 hurricanes have struck Orleans Parish (National Hurricane Center 2007). The frequency of hurricanes is greatest between August and October; however, hurricane season extends from June through November (National Hurricane Center 2007). Prior to Hurricane Katrina in 2005, Hurricane Betsy, on September 9, 1965, was the most damaging tropical storm in the New Orleans metropolitan area. Hurricane Betsy caused a storm surge of 10 feet, flooding large parts of the city, claiming 81 lives and causing $1 billion (1965 dollars) in damage (National Oceanographic and Atmospheric Administration [NOAA] 2007).

Photograph 6. Managed Marsh in the Bayou Sauvage NWR; Photograph taken from the LPV 111 Levee

The near-surface geology of the area surrounding the Lakefront to Michoud Canal project can best be explained as the result of a subsiding Mississippi River delta lobe that has been drained, diked and filled with various types and vintages of dredged material derived from Lake Pontchartrain and adjacent drainage canals. The deepest formations investigated in the area are Pleistocene deposits, consisting of somewhat hardened fluvial sands, silts and muds at a depth of 40 to 60 feet below the ground surface (bgs) to depths around 180 feet bgs. These sediments were exposed and weathered during low sea level stands as a result of Pleistocene glaciations, resulting in relatively higher cohesive strengths than would normally be expected. Above the Pleistocene, Holocene deposits are the result of gradual deposition of organic peat mixed with fluvial silt and mud deposited as overbank deposits and interdistributary bay deposits of the Mississippi River in cypress swamps around Lake Pontchartrain (Kolb *et al*. 1975).

Much of the project corridor was formerly wetlands (cypress swamps and marshes). As the New Orleans metropolitan area grew and the constructed levees were built ever higher, water was drained from swamps and marshes by canals and pumping, and dredged material, including peat and mud, was used to elevate the area for habitation. Resulting surface soils are classified as dredged material or muck (Natural Resources Conservation Service 2007). Land inside the levees is continually subsiding due to dewatering of peat deposits, resulting in surface elevations below sea level. Water content in soils is generally high, and increases with depth. The near-surface groundwater table is connected to the water level in Lake Pontchartrain, hence the need for numerous drainage canals and pumps to remove constant inflow.

Due to high water content and plasticity in the clays and silts of surface soils and deeper Holocene sediments, soil cohesive strengths are much lower in near surface Holocene and dredge deposits than in deeper more consolidated and weathered Pleistocene formations (Kolb *et al.* 1975). Thus, compressive activities, such as pile driving in these materials, would translate easily into lateral compression and displacement of adjacent material.

Seismicity is generally not a factor in the New Orleans area. There are numerous small normal growth faults located beneath the city and Lake Pontchartrain, but sudden failure of these faults is not likely. Instead, a gradual slippage has been documented, resulting in general land subsidence on the down side (Gulf of Mexico side) of the faults. The Michoud Fault, located east of the project area is thought to be responsible for higher land subsidence rates in the area around Michoud and New Orleans East (Dokka 2006).

3.2. SIGNIFICANT RESOURCES

This section contains a list of the significant resources located in the vicinity of the proposed action, and describes in detail those resources that would be impacted, directly or indirectly, by the alternatives. Direct impacts are those that are caused by the action taken and occur at the same time and place (40 CFR §1508.8(a)). Indirect impacts are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). Cumulative impacts are discussed in Section 4.

The resources described in this section are those recognized as significant by laws, executive orders (E.O.), regulations, and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. Further detail on the significance of each of these resources can be found by contacting the CEMVN, or on www.nolaenvironmental.gov, which offers information on the ecological and human value of these resources, as well as the laws and regulations governing each resource. Search for "Significant Resources Background Material" in the website's digital library for additional information. Table 2 shows those significant resources found within the project area, and notes whether they would be impacted by the proposed alternative.

Table 2. Significant Resources in Project Study Area

Significant Resources	Impacted	Not Impacted
Water Resources	X	
Wetlands	X	
Non-wetlands/uplands	X	
Fisheries	X	
Wildlife	X	
Essential Fish Habitat	X	
Endangered or threatened species	X	
Cultural resources		X
Recreational resources	X	
Aesthetics	X	
Air quality	X	
Noise	X	

The assumption has been made that under the no action alternative, each levee reach would be raised to the originally authorized grade rather than the 100-year level of risk reduction.

3.2.1. Water Resources

Existing Conditions

Lake Pontchartrain, a large, brackish shallow estuary located in southeast Louisiana, receives fresh water from various lakes, rivers, bayous, and canals, while receiving salt water from the Gulf of Mexico (Environmental Atlas of the Lake Pontchartrain Basin 2002). The project corridor includes portions of the shoreline of Lake Pontchartrain along LPV 108 and LPV 109 north of I-10. Water quality in Lake Pontchartrain is impaired by high concentrations of copper and fecal coliform bacteria. The lake is included on the Louisiana Department of Environmental Quality's (LDEQ) list of impaired waters (*i.e.*, the 303(d) list), but a total maximum daily load (TMDL) report has not been developed. An alluvial aquifer underlies the project corridor 30 to 40 feet below the soil surface. The aquifer is confined by silt and clay layers and is in hydraulic connection with Lake Pontchartrain (LDEQ 2006). The aquifer's water is brackish and not used for water supply.

Principal SAV in Lake Pontchartrain includes wild celery (*Vallisneria americana*), widgeongrass (*Ruppia maritima*), slender pondweed (*Potamogeton perfoliatus*), Eurasian milfoil (*Myriophyllum spicatum*; a non-native, invasive species) and Southern naiad (*Najas guadalupensis*) (Duffy and Baltz 1998). Historically, SAV was abundant on all shores of Lake Pontchartrain; however, the total area of SAV within Lake Pontchartrain has decreased by approximately 90 percent between 1954 and 1998 (Suttkus *et al.* 1954, Darnell 1961, Montz 1978, Turner *et al.* 1980, Mayer 1986, Burns *et al.* 1993, Duffy and Baltz 1998). Shoreline modification, increased water turbidity, and algal overgrowth have contributed to this decline (Cho and Poirrier 2000).

Salinity in the Lake Pontchartrain estuary ranges from 0.5 to 15 parts per thousand (ppt). The highest salinities are found near the Rigolets and Chef Menteur passes just east of the project area, as high salinity water is pushed from the passes into Lake Pontchartrain. The freshwater sources discharging into Lake Pontchartrain vary seasonally, and this is reflected by fluctuations in salinity. Generally, the high-inflow/low-salinity periods are from late winter to late spring. The low-inflow/high-salinity periods are typically from late spring to late fall. Lake Pontchartrain sediments in the project area contain a higher percentage of sand-size material than sediments in the lake's deeper basin (Manheim and Hayes 2002). Grain size data, extracted from

the U.S. Geological Survey (USGS) database, for three near shore surface sediment samples in the project vicinity had percentages of sand ranging from 24 to 87 percent.

The GIWW extends along the Gulf Coast of the U.S. and is a navigable inland waterway running approximately 1,050 miles from Carrabelle, Florida, to Brownsville, Texas. The GIWW is located along the LPV 111 corridor, and is authorized as a shallow-draft navigation channel with a controlling depth of 12 feet (designed primarily for barge transportation) and a width of 150 feet east of the Mississippi River Gulf Outlet (MRGO). The GIWW is tidally influenced and directly connected to Lake Borgne southeast of the project area. Water quality is monitored in this section of the GIWW by LDEQ, and the GIWW is not meeting designated uses for the propagation of oysters (LDEQ 2006). Suspected causes of impairment include high levels of fecal coliforms. While this section of the GIWW is not meeting oyster propagation standards, it does meet criteria for primary contact (swimming) and secondary contact (boating) recreation standards (LDEQ 2006).

Tidal salt marsh fringes the north bank of the GIWW between the GIWW and LPV 111 levee toe. Tidal salt marshes are located south of the GIWW between the GIWW and the northwest shoreline of Lake Borgne. Bayou Sauvage NWR bisects the LPV 109 levee north of the US 90 and flows east to Chef Menteur Pass, which connects Lakes Borgne and Pontchartrain. LDEQ water quality monitoring indicates that Bayou Sauvage NWR is meeting LDEQ water quality attainment criteria (LDEQ 2006).

Discussion of Impacts

Future Conditions with No Action for LPV 108

Direct Impacts to Water Resources

The no action for LPV 108 would consist of completing the previously authorized action. Dredging activities associated with riprap placement for additional foreshore protection would suspend and redistribute lakebed sediments. The Lake Pontchartrain watershed rests on an alluvial plain where soils are composed of silty loams and clays. Organic matter attaches to clay and silts and depletes oxygen levels in aquatic environments as the organic materials decompose. This organic material creates what is commonly referred to as sediment oxygen demand (SOD). Nutrients in sediments encourage growth of algae and nitrifying bacteria. Respiration by these organisms consumes dissolved oxygen (DO) and decomposition of organisms contributes to SOD and eutrophication. Both winter and summer fish-kills in natural systems, caused by oxygen depletion, can be attributed to SOD. Dredging would temporarily increase SOD in the immediate vicinity of dredging operations, but oxygen levels would soon return to ambient conditions when dredging and channel backfilling activities are completed, and best management practices (BMPs) and a storm water pollution prevention plan (SWPPP) would be implemented to minimize impacts.

Dredging of access channels and side-casting of dredged material would temporarily impact 118.1 acres of lake bottom. Because no SAV was observed in the project area, likely due to high wave energy, no direct impacts to SAV are anticipated. However, the placement of riprap for foreshore protection would permanently fill 7.2 acres of lake bottom all of which is in a shallow water environment that is suitable for supporting SAV. A pre-construction SAV survey would be conducted to document pre-construction conditions and relative population density of SAV.

Indirect Impacts to Water Resources

The reduction of light available to SAV due to increased turbidity would indirectly and temporarily impact suitable SAV habitat in the vicinity of the project corridor. Dredged

channels would preclude SAV establishment during foreshore protection construction activities. Following completion of foreshore protection construction activities, the access channels would be backfilled utilizing sidecast materials, and plantings of SAV may occur to return the site to pre-construction conditions.

Cumulative Impacts to Water Resources

Construction of the proposed IHNC closure structure at Seabrook, potential construction of structures and/or pump stations at the 17th Street, London Avenue and Orleans Avenue Canals, dredging of access channels for foreshore protection and pump station fronting protection in Jefferson Parish, and dredging of channels for placement of foreshore protection along the Citrus Lakefront Levee would have cumulative impacts to water quality in the near shore environment of Lake Pontchartrain. Although the area of impacts of all other HSDRRS projects has not been determined, it is anticipated that the cumulative impacts to water quality of Lake Pontchartrain from the construction, operation and maintenance of these structures would be temporary. The MRGO closure structure located at Bayou LaLoutre would cause a reduction in the salinity gradient of Lake Pontchartrain, and models of these changes indicate that salinities would be reduced between 4.6 and 6.9 parts per thousand in the Little Woods area (near Paris Road and Hayne Boulevard) of Lake Pontchartrain (Tate *et al*. 2002). No substantial changes in Lake Pontchartrain salinities are anticipated from the construction of the Seabrook gate risk reduction structure as described in IER #11.

Future Conditions with No Action for LPV 109, 110, and 111

Temporary impacts to water quality, habitat for fisheries, and recreational opportunities in Lake Pontchartrain would occur with levee and floodwall construction to raise all structures to the previously authorized risk reduction elevations. Regular pumping of storm water from New Orleans East into Lake Pontchartrain and GIWW by the Sewerage and Water Board in response to rainfall events would continue. With the previously authorized level of risk reduction, there would be a greater risk of future flooding of New Orleans East from overtopping of the hurricane risk reduction system.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Water Resources

Levee, T-wall and floodgate construction activities would have minimal direct impacts to water quality. Disturbed soils and hazardous substances (*i.e.,* anti-freeze, fuels, oils and lubricants) could directly impact water quality during construction activities. A General Stormwater Permit would be obtained prior to construction, and this would require approval of a site-specific SWPPP and Notice of Intent. A site-specific Spill Prevention Control and Countermeasures Plan (SPCCP) would also be in place prior to the start of construction. BMPs outlined in these plans would reduce potential migration of soils, oil and grease, and construction debris into Lake Pontchartrain and GIWW.

Indirect Impacts to Water Resources

No indirect impacts to water quality in Lake Pontchartrain would occur.

Cumulative Impacts to Water Resources

Construction of the proposed IHNC closure structure at Seabrook; potential construction of structures and/or pump stations at the 17th Street, London Avenue and Orleans Avenue Canals; dredging of access channels for foreshore protection and pump station fronting protection in Jefferson Parish; dredging of channels for placement of previously authorized foreshore protection in New Orleans East for LPV 106 and as described in the no action alternative for LPV 108; and ongoing construction of the I-10 Twin Span Bridge replacement over Lake Pontchartrain would have cumulative impacts to water quality in the near shore environment of Lake Pontchartrain. Although the area of impacts of all other HSDRRS projects has not been determined, it is anticipated that the cumulative impacts to water quality of Lake Pontchartrain from the construction, operation and maintenance of these structures would be temporary. The MRGO closure structure located at Bayou LaLoutre would cause a reduction in the salinity gradient of Lake Pontchartrain, and models of these changes indicate that salinities would be reduced between 4.6 and 6.9 ppt in the Little Woods area (near Paris Road and Hayne Boulevard) of Lake Pontchartrain (Tate *et al*. 2002). No substantial changes in Lake Pontchartrain salinities are anticipated from the construction of the Seabrook gate risk reduction structure as described in IER #11 or the improved protection on the IHNC (IER #11 Tier 2 Borgne; USACE 2008).

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Water Resources

The footprint of the stability berm would be larger than the LPV 109 Levee Section proposed action and would have a greater impact to wetlands and shallow open water bodies along the toe of the levee. However, indirect and cumulative impacts to water resources resulting from LPV 109 Alternative 1 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 Alternative 2 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 Alternative 3 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 Alternative 4 would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 I-10 Crossing proposed action would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 I-10 Crossing Alternative 1 would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 US 90 and US 11 Crossings proposed action would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 1 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 2 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 3 would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Water Resources

No direct, indirect or cumulative impacts to Lake Pontchartrain are anticipated from the LPV 110 proposed action. The implementation of BMPs, as described in the project's SWPPP, would greatly reduce impacts to water quality of adjacent wetlands, canals and Bayou Sauvage.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 110 Alternative 1 would be similar to those occurring under the LPV 110 proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Water Resources

No direct, indirect or cumulative impacts to Lake Pontchartrain are anticipated from the LPV 111 proposed action. The implementation of BMPs, as described in the project's SWPPP, would greatly reduce impacts to water quality of adjacent wetlands and the GIWW. Dewatering activities at the Pump Station No. 15 discharge basin would have short-term impacts to water quality in the GIWW due to increased turbidity. However, water quality would return to preconstruction conditions immediately following dewatering activities.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 111 Alternative 1 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 111 Alternative 2 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Water Resources

Direct, indirect and cumulative impacts to water resources resulting from LPV 111 Alternative 3 would be similar to those occurring under the LPV 111 proposed action.

3.2.2. Wetlands

Existing Conditions

The proposed project corridor is located adjacent to wetlands in Bayou Sauvage NWR and includes the submerged shallow water habitat along the south shore of Lake Pontchartrain. The majority of the project corridor is surrounded by coastal wetlands, with the exception of a portion of Lake Pontchartrain along LPV 108 and LPV 109 north of I-10 where there is little to no marsh present on the flood side of the levee. Managed marshes and bottomland hardwood forest fringe the protected side of the levees, and intertidal marshes are present on the flood side of the levees.

Intertidal emergent marsh is present within the project corridor on the flood side of the LPV 111 levee toe adjacent to the GIWW, and east of the LPV 109 levee. Some woody vegetation (bottomland hardwood wetland habitat) is located at the toe of the levee as the levee transitions into the lower elevation marshes. The predominant plant species at the toe of the levee and in the intertidal marshes on the flood side of the LPV 111 levee is smooth cordgrass (*Spartina alterniflora*). East of the LPV 109 levee, smooth cordgrass is present, but is intermixed at higher elevations closer to the levee toe with black willow (*Salix nigra*), rattlebox (*Sesbania drummondii*), Chinese tallow (*Sapium sebiferum*), Roseau cane (*Phragmites australis*), groundsel tree (*Baccharis halimifolia*), sugarberry (*Celtis laevigata*) and broom sedge (*Andropogon* sp.).

Wetlands located on the protected side of the LPV 109 and LPV 111 levees primarily consist of forested wetlands and marshes with highly managed hydrology. The wetland areas adjacent to the toe of the levees are dominated by live oak (*Quercus virginiana*), black willow, sugarberry, cottonwood (*Populus deltoides*), yaupon (*Ilex vomitoria*), Roseau cane, Chinese tallow, groundsel tree, rattlebox, broom sedge and cattail (*Typha* sp.).

Lake Pontchartrain, wetlands on either side of the levees, the GIWW, and smaller bayous (*e.g.*, Bayou Sauvage) are all classified as jurisdictional waters of the U.S. Any dredging or deposition of fill material within Lake Pontchartrain or wetland areas would be in compliance with Clean Water Act (CWA) Section 404 authorization from the CEMVN and Section 401 authorization from LDEQ. Further, all mitigation for lost wetland Average Annual Habitat Units (AAHUs) as calculated through a Wetland Value Assessment (WVA) will be discussed in a separate mitigation IER.

Discussion of Impacts

Future Conditions with No Acton for LPV 108

Direct Impacts to Wetlands

The LPV 108 no action alternative would consist of completing the previously authorized action, which requires dredging temporary perpendicular and lateral access channels in Lake Pontchartrain to raise the foreshore protection to the previously authorized elevation. The total area of temporary disturbance of lake bottom within Lake Pontchartrain would be 118.1 acres. However, BMPs and a SWPPP would be implemented to minimize impacts. The placement of riprap along the shoreline for foreshore protection would permanently impact 7.2 acres of shallow water habitat which is jurisdictional waters of the U.S. in Lake Pontchartrain.

No intertidal marsh would be directly impacted during dredging operations. Topography of the lake bottom would be restored to near pre-project conditions following construction by backfilling dredged channels with previously sidecast materials. If post construction surveys do not show natural revegetation of the area occurring, plantings of SAV would be implemented to return the site to pre-construction conditions.

Indirect Impacts to Wetlands

Indirect impacts from suspended sediments during dredging activities would be minimized by the use of silt curtains. All impacts to waters of the U.S. would be evaluated under Sections 404 and 401 of the CWA and appropriate mitigation would be implemented and evaluated under separate mitigation IERs. Therefore, no long-term indirect impacts to waters of the U.S., including wetlands, are anticipated under the proposed action.

Cumulative Impacts to Wetlands

Construction activities associated with other HSDRRS projects, such as the gated structure at Seabrook; MRGO, GIWW, Bayou Bienvenue and Golden Triangle Marsh floodwall/gated system; permanent pump stations at the 17th, London, and Orleans Avenue Canals; dredging of access channels for foreshore protection improvements in the Citrus Lakefront Levee project; dredging of access channels for foreshore protection and pump station fronting protection in Jefferson Parish; as well as dredged material placement from the IHNC Lock Replacement project; would contribute to the cumulative impacts to wetlands and other waters of the U.S in the project area. However, CWA Section 404 evaluations, Section 401 permitting activities and the implementation of appropriate mitigation measures would minimize long-term cumulative impacts to wetlands and waters of the U.S. in the project area.

Future Conditions with No Action for LPV 109, 110, and 111

Waters of the U.S., including wetlands, would be impacted by mechanized activities under the no action alternative through the improvement of levees, floodwalls and floodgates to meet the previously authorized elevation and new design standards. These impacts to wetlands would be concentrated along the LPV 109 corridor, since LPV 110 and LPV 111 have been reconstructed to the previously authorized elevation since Hurricane Katrina. Impacts would include filling of wetlands and shallow water bodies for the creation of stability berms and increasing the levee footprint. Impacts would occur to both the intertidal marshes on the flood side of the levee and to intermediate marshes and bottomland hardwood wetlands on the protected side of the levee.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Wetlands

CEMVN Regulatory Branch used 2006 aerial imagery to estimate impacts to wetlands from the increased levee and floodwall footprints under the proposed action. USGS used existing habitat maps to estimate impacts to wetlands from the increased levee and floodwall footprints under the proposed action and alternatives to the proposed action. Habitat maps from various years were evaluated by USGS, and it was determined that the 2000 habitat maps provided the best resolution for determining project impacts.

The LPV 109 Levee Section proposed action would fill bottomland hardwood wetlands and intermediate marsh on the protected side of the levee and forested wetland, intermediate marsh and brackish marsh on the flood side of the levee. Wetland fill would occur as a result of an expanded levee footprint associated with the increase in levee height. The total area of wetlands impacted by the LPV 109 proposed action is 337.3 acres. Of that total, 236.3 acres of wetlands would be permanently impacted on the protected side and 101.0 acres would be permanently impacted on the flood side of the LPV 109 levee.

Indirect Impacts to Wetlands

There is the potential for indirect impacts to wetlands from suspended sediments transported in stormwater during construction activities. However, BMPs as part of the project's SWPPP would mitigate any indirect impacts to nearby wetlands from suspended sediment transport in stormwater.

Levee reconstruction along LPV 109 would impact two pump stations and four drainage structures. Drainage structures would be reconstructed to allow for continued management of water levels in portions of Bayou Sauvage NWR. The pump stations are owned and operated by the USFWS. Discussions are ongoing with the USFWS to ascertain the responsible party for reconstruction of the pump stations. The inability to pump excess water from the marsh if the pumps and drainage structures were not reconstructed properly could impact water management of the marsh, and cause further wetland degradation through increased depth and duration of flooding.

Cumulative Impacts to Wetlands

Construction activities associated with other HSDRRS projects, such as the gated structure at Seabrook, MRGO, GIWW, Bayou Bienvenue and Golden Triangle Marsh floodwall/gated system, permanent pump stations at the 17th, London, and Orleans Avenue Canals, dredging of access channels for foreshore protection and pump station fronting protection in Jefferson Parish and dredging of access channels for previously authorized foreshore protection placement in LPV 106 and LPV 108 in New Orleans East, would contribute to the temporary cumulative impacts to wetlands and other waters of the U.S. in the project area. Furthermore, some permanent impacts to wetlands, such as the use of a proposed graving site and confined disposal facility for the IHNC Lock construction project, would occur from other projects in the area. However, CWA Section 404 evaluations, permitting activities, and the implementation of appropriate mitigation measures would minimize long-term cumulative impacts to wetlands and waters of the U.S. in the project area.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 Levee Section Alternative 1 would be 306.2 acres. Of that total, it is estimated that 214.3 acres of wetlands would be permanently impacted on the protected side and 91.9 acres would be permanently impacted on the flood side of the LPV 109 levee. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 Levee Section Alternative 2 would be 139.7 acres, and it is estimated that 97.8 acres of wetlands would be permanently impacted on the protected side and 41.9 acres permanently impacted on the flood side of the LPV 109 levee. Indirect and cumulative impacts to wetlands resulting from implementation of LPV 109 Levee Section Alternative 2 would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 Levee Section Alternative 3 would be 129.2 acres. Of that total, it is estimated that 90.4 acres of wetlands would be permanently impacted on the protected side and 38.8 acres of wetlands permanently impacted on the flood side of the LPV 109 levee. Indirect and cumulative impacts to wetlands resulting from implementation of LPV 109 Alternative 3 would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 Levee Section Alternative 4 would be 144.0 acres, with 100.8 acres of those impacts to wetlands occurring on the protected side and 43.2 acres of impacts occurring on the flood side. Indirect and cumulative impacts to wetlands resulting from implementation of LPV 109 Alternative 4 would be the same as described for the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wetlands

There would be no impacts to wetlands from LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wetlands

There would be no impacts to wetlands from LPV 109 I-10 Crossing Alternative 1.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 US 90 and US 11 Crossings proposed action would be 0.3 acres, all on the protected side. Indirect and cumulative impacts to wetlands resulting from implementation of LPV 109 US 90 and US 11 Crossings proposed action would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 US 90 and US 11 Crossings Alternative 1 would be 5.5 acres. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 109 US 90 and US 11 Crossings Alternative 2 would be 2.7 acres. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wetlands

There would be no impacts to wetlands from LPV 109 US 90 and US 11 Crossings Alternative 3 LPV 110.

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wetlands

There would be no direct, indirect or cumulative impacts to wetlands from replacing the floodwalls and floodgate at LPV 110.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wetlands

There would be no direct, indirect or cumulative impacts to wetlands from retrofitting the existing floodwalls and floodgate at LPV 110.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 111 proposed action would be 16.0 acres. This includes 10.9 acres of permanent impacts to wetlands on the protected side of the levee and 5.1 acres of permanent impacts to wetlands on the flood side of the levee. Indirect and cumulative impacts to wetlands resulting from implementation of LPV 111 proposed action would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 111 Alternative 1 would be 26.6 acres. Of this total, it is estimated that 18.1 acres of permanent impacts to wetlands would occur on the protected side and 8.5 acres of permanent impacts to wetlands would occur on the flood side. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 111 Alternative 2 would be 26.6 acres; 18.1 acres of permanent impact on the protected side and 8.5 acres of permanent impacts on the flood side. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wetlands

The direct impacts to wetlands from LPV 111 Alternative 3 would be 7 acres. It is estimated that 4.8 acres of permanent impacts to wetlands would occur on the protected side of the levee and 2.2 acres of permanent impacts to wetlands would occur on the flood side of the levee. Indirect and cumulative impacts to wetlands would be the same as described for the LPV 109 Levee Section proposed action.

3.2.3. Non-Wetland Resources / Upland Resources

Existing Conditions

Upland vegetation within the project corridor and at staging areas located along LPV 109 is primarily maintained turf grasses (see Photograph 1), such as Bahia grass (*Paspalum notatum*), with scattered live oaks and other trees along the levee toe and prerimeter of staging areas. Common vines observed include grape (*Vitus* sp.), poison ivy (*Toxicodendron radicans*), and trumpet creeper (*Campsis radicans*). Roseau cane and wax myrtle (*Myrica cerifera*) were also common along the toe of levees. Besides the LPV 109 and LPV 111 levees, there are no other upland areas in the project corridor. Nearby uplands include developed areas along Bayou Sauvage, such as Venetian Isles, located east of LPV 109 and industrial development north of LPV 111, east of Michoud Canal and west of Maxent Canal.

Discussion of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 consists of completing the previously authorized action. There would be no impacts to upland resources from the placement of riprap and improvements to foreshore protection.

Future Conditions with No Action for LPV 109, 110, and 111

Under the no action alternative levee slopes in LPV 109 would be temporarily impacted as the levees are raised to the previously authorized elevation. Periodic maintenance of structures to maintain the previously authorized elevation would have long-term impacts to upland resources. With the previously authorized levels of risk reduction, large tropical storms could flood much of New Orleans East in the future and cause numerous upland areas to be temporarily impacted due to inundation with brackish estuarine waters. Inundation would result in temporary degradation of upland herbaceous species and less salt and flood tolerant trees, and result in a long-term reduction in the cover of woody species.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Uplands

Maintained turf grass along levee slopes would be temporarily impacted during construction activities. Following the completion of construction, the levee slopes would be revegetated and turf grasses maintained similar to pre-construction conditions. Within the three staging areas, 10.1 acres of upland habitat would be temporarily affected, and would be returned to pre-construction conditions following levee improvements.

Indirect Impacts to Uplands

Upland areas in New Orleans East would receive an indirect benefit from the LPV 109 Levee Section proposed action. The risk of flooding in upland areas within the HSDRRS would be reduced under the proposed action.

Cumulative Impacts to Uplands

All proposed 100-year HSDRRS projects, including the excavation of borrow material for levee construction, would have impacts to upland resources. However, the total area of impacts to upland resources from all proposed risk reduction projects, as well as projects proposed by others during the rebuilding efforts in metropolitan New Orleans, cannot be quantified at this time. Cumulative impacts to upland resources from components of the HSDRRS, including all borrow locations in New Orleans East approved under Task Force Guardian and IERs 18, 19, 25 and 26, would be adverse and long-term. However, because of the urban and developed nature of much of New Orleans East, and upland areas impacted by modifications to the HSDRRS and borrow areas, the cumulative impacts to relatively undisturbed native upland resources would be minor.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources resulting from LPV 109 Levee Section Alternative 1 would be similar to, but slightly greater because of a larger footprint, than those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Uplands

Developed areas along I-10 would also be temporarily impacted during construction of an I-10 ramp and temporary lanes to maintain traffic. Following construction, these transportation corridors would continue to be developed upland areas and there would be no long term changes in their condition. Indirect and cumulative impacts would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources resulting from LPV 109 I-10 Crossing Alternative 1 would be similar to those occurring under the LPV 110 proposed action. The construction of a bridge over a levee would be completed within the existing DOTD right-of-way and no additional upland areas would be impacted.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Uplands

Developed areas along US 90 and US 11 would be temporarily impacted during construction of new floodgates and floodwalls. Following construction, these transportation corridors would continue to be developed upland areas and there would be no long term changes in their condition. Indirect and cumulative impacts would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Uplands

Existing vegetated upland areas along US 90 and US 11 would be buried beneath an embankment supporting a ramp over the LPV 109 levee. Following construction, undeveloped upland areas would be allowed to revegetate. Indirect and cumulative impacts would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Uplands

Vegetated areas along the shoulders of US 90 and US 11 would be permanently impacted by the construction of a bridge crossing LPV 109. Following construction, these transportation corridors would continue to be developed upland areas and there would be no long term changes in their condition. Indirect and cumulative impacts would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Uplands

Retrofitting of the existing US 90 and US 11 floodgates would have no direct, indirect, or cumulative impacts to uplands.

LPV 110

Future Conditions with Proposed Action

Direct Impacts to Uplands

The LPV 110 proposed action would primarily impact existing floodwalls and a floodgate. Adjacent upland levee slopes disturbed during the floodwall and floodgate replacement would be revegetated with grasses following construction, and no permanent loss would occur.

Indirect and Cumulative Impacts to Uplands

Indirect and cumulative impacts would be similar to those described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Uplands

The retrofitting of the existing floodgate and floodwalls would impact previously developed areas. However, new floodwalls constructed at right angles to the LPV 110 floodgate to tie into LPV 109 and LPV 111 would permanently impact vegetated uplands.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those described for the LPV 109 Levee Section proposed action. No temporary impacts to uplands are anticipated because all staging for levee and floodwall improvements would occur in previously developed areas (*i.e.*, adjacent to Pump Station No. 15) or along the toe of the existing LPV 111 levee.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Uplands

Direct, indirect and cumulative impacts to non-wetland resources would be similar to those described for the LPV 109 Levee Section proposed action.

3.2.4. Fisheries

Existing Conditions

Lake Pontchartrain contains diverse habitats and a wide-range of salinities, making the estuary suitable for a variety of fish and crustaceans throughout the year. Over 125 species of fish have been recorded from Lake Pontchartrain. The fauna is dominated by sciaenids (sea trout, drum and croaker) in the saltier mid and eastern regions of the basin and by centrarchids (bass and bream) where freshwater streams and swamps drain into the lake (University of New Orleans Nekton Research Laboratory 2008). Some common species include bay anchovy (*Anchoa mitchilli*), Atlantic croaker (*Micropogonias undulatus*), Gulf menhaden (*Brevoortia patronus*), and members of the silverside family (Atherinidae) (Stone *et al.* 1980). Fish populations in Lake Pontchartrain also include a number of important gamefish, such as spotted seatrout (*Cynoscion nebulous*) and red drum (*Sciaenops ocellatus*). The estuarine habitat produces many species of fish that serve as prey for predatory fish. Common prey species include rainwater killifish (*Lucania parva*), naked goby (*Gobiosoma bosc*), Gulf pipefish (*Syngnathus scovelli*), clown goby (*Microgobius gulosus*), pinfish (*Lagodon rhomboides*), bay anchovy, and speckled worm eel (*Myrophis punctatus*) (Duffy and Baltz 1998).

Lake Pontchartrain's substratum constitutes a major nursery ground for commercially valuable species harvested in Louisiana's coastal waters (NOAA National Marine Fisheries Service [NOAA Fisheries] 2007a). Post-larval, juvenile, and adult white shrimp (*Litopenaeus setiferus*) and brown shrimp (*Farfantepenaeus aztecus*) are abundant in Lake Pontchartrain year-round. White and brown shrimp landings represent large portions of the total harvest, constituting 33 and 21 percent of the total value of annual fish landings in Louisiana. Across the State of Louisiana, white and brown shrimp, blue crab (*Callinectes sapidus*), and Gulf menhaden fisheries produce $250 million annually, which constitutes 80 percent of the total value of landings in the state (NOAA Fisheries 2007a).

The prey organisms found in Lake Pontchartrain provide food for large finfish harvested both commercially and recreationally along the Louisiana coast and continental shelf (NOAA Fisheries 2007b). Commercial landings for all finfish combined constitute 7 percent of value of Louisiana's annual total landings. The large Federally-managed finfish species, such as grouper (family Serranidae), snapper (family Lutjanidae), and mackerel (family Scombridae), represent

$5.2 million and 2 percent of the total value of the annual landings in Louisiana (NOAA Fisheries 2007a).

Commercial fisheries create $2.8 billion annually in economic benefits for the Louisiana economy (Southwick 1997). Approximately 3,300 commercial vessels are licensed to fish in Louisiana coastal and estuarine waters. The commercial fishing vessels directly provide 31,400 jobs and economic benefits of commercial fishing support several other fishery sectors, such as boat building and repairs, net construction, and value added seafood items (Southwick 1997). In Louisiana, coastal and offshore recreational fishing generates $745 million in local revenue and creates 7,786 jobs (American Sportfishing Association 2002). Lake Pontchartrain is an important estuarine component of the coastal fisheries in Louisiana, and contributes to these benefits directly through active commercial fishing, and indirectly by providing nursery grounds and prey organisms for commercial fish.

The brackish aquatic habitats of other waterways adjacent to the project area, such as the GIWW, also support a similar group of commercial and recreational fish. These fish species include Atlantic croaker, red drum, southern flounder (*Paralichthys lethostigma*), black drum (*Pogonias cromis*), spotted seatrout and sheepshead (*Archosargus probatocephalus*). Other commercial fisheries such as blue crab, brown shrimp, white shrimp and oyster (*Crassostrea virginica*) are also important in the GIWW, bayous and canals, and nearby Lake Borgne.

The marshes along Lakes Pontchartrain and Borgne within Bayou Sauvage NWR serve as estuarine nurseries for commercial and recreational finfish, as well as shrimp and crabs. Freshwater lagoons, bayous and ponds within managed wetlands behind the HSDRRS levees support recreational and commercial freshwater species such as largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), catfish, and crawfish (*Procambarus clarkii*).

Discussion of Impacts

Future Conditions with No Action for LPV 108

Direct Impacts to Fisheries

The no action for LPV 108 would consist of implementing the previously authorized action. Channel dredging in Lake Pontchartrain associated with the construction of foreshore protection would directly impact 118.1 acres of lake bottom. Dredging activities could cause the loss of some individuals and impacts to lake bottom habitat would cause a loss of forage for finfish. However, BMPs and a SWPPP would be implemented to minimize impacts. Placement of riprap for foreshore protection would cause the permanent loss of 7.2 acres of lake bottom which would decrease the availability of forage for finfish; however, the permanently submerged portions of the riprap would provide habitat for small forage fishes like killifish and gobies. Topography of the lake bottom would be restored to near pre-project conditions following construction by backfilling dredged channels with previously sidecast materials. If post construction surveys do not indicate natural revegetation of the area occurring, plantings of SAV would be implemented to return the site to pre-construction conditions.

Indirect Impacts to Fisheries

Dredging could suspend sediments, resulting in increased turbidity and potentially creating an absence of DO (*i.e.*, anoxic conditions). Increased turbidity and the settling of sediments on SAV at nearby locations in Lake Pontchartrain could result in reduced photosynthesis and degradation of SAV. The settling of sediments could also blanket sessile organisms and fish eggs and could clog the gills of filter feeding fish (*e.g.* Gulf menhaden*)*. Increases in turbidity

would change the density of the water column and affect the buoyancy of fish eggs which could reduce the opportunities for successful recruitment into the fishery. Noise and disturbance from dredging activities could cause temporary behavioral changes to fishes. Adult phases of commercial and recreational fisheries species are mobile and able to navigate away from anoxic and toxic conditions. Indirect impacts to SAV habitats, juveniles, and prey species supported by these habitats would be temporary and would not permanently alter populations of commercial and recreational fisheries species.

Cumulative Impacts to Fisheries

Proposed construction of other HSDRRS projects, such as dredging channels for foreshore protection placement at the Citrus Lakefront Levee project and the Jefferson Parish Lakefront Levee project (located west of LPV 108); a gated structure at Seabrook; MRGO, GIWW, Bayou Bienvenue and Golden Triangle Marsh floodwall/gated system; and permanent pump stations at the 17th, London and Orleans Avenue Canals would have cumulative impacts to fisheries in Lake Pontchartrain through a loss of individuals, increased turbidity and loss of forage. Changes in salinities in Lake Pontchartrain as a result of the construction of the MRGO closure structure could cause some cumulative changes to fisheries distribution and prevalence, including increasing the presence of low-salinity dependent fish species in the western portions of Lake Pontchartrain.

Future Conditions with No Action for LPV 109, 110 and 111

Raising the LPV 109 levee to the previously authorized elevation and including new design criteria in the project construction features would have temporary impacts to wetlands and lake bottom, causing a loss of forage habitat for finfish.

Stormwater would continue to be pumped into Lake Pontchartrain following typical rainfall events. With the previously authorized level of risk reduction, future flooding of urban areas following the passage of a major tropical storm would require dewatering by pumping of flood waters into Lake Pontchartrain. The urban flood waters discharged into Lake Pontchartrain would contain higher levels of suspended sediments and pollutants than normal discharges and be low in DO, resulting in fish mortalities. The indirect impacts of discharged flood waters from extreme flood events would be temporary, and would not permanently impact Lake Pontchartrain fish populations.

Storm surge topping the previously authorized level of risk reduction levees surrounding managed marshes in Bayou Sauvage NWR would increase salinities and water levels for a period of months or years. Increased salinities could lead to stress on freshwater fish species and potentially increased mortality.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct and Indirect Impacts to Fisheries

Approximately 236 acres of wetlands on the flood side of the LPV 109 levee would be lost during levee construction. Intertidal wetlands located near channels, such as tributaries to Bayou Sauvage provide habitat for fish prey items and areas for juvenile fish to hide from predators; the loss of these wetlands would be a major impact to fisheries. The construction of floodgates and levee improvements would have no direct impacts to fish populations or fish habitats.

A total of 101 acres of wetlands on the protected side of the LPV 109 levee, which provide habitat for forage fish, potential fish spawning sites, and areas for juvenile fish to hide from predators would be lost. Although much of the impacts to wetlands on the protected side occur to bottomland hardwood wetlands and are not accessible to juvenile or adult fish, these bottomland hardwood wetlands provide structure for prey for fish species and aid in improving water quality in stormwater runoff from levee slopes.

Implementation of BMPs as described by the project's SWPPP would minimize temporary indirect impacts to fish populations and fish habitats resulting from potential soil erosion and consequent degradation of water quality.

The construction of floodgates and levee improvements could result in a temporary increase in suspended sediments discharged to adjacent water bodies during construction activities. Additional temporary impairment may occur to freshwater fishery habitats if there is a major rain event during construction of the levee. Disturbed soils from access roads and construction site may migrate during rain events and affect the benthos of the freshwater bayous, lagoons and ponds adjacent to the project corridor. Construction equipment and operations may create miscellaneous operational pollution such as oil leaks, mud spatters, and discards from human activities. Implementation of BMPs as described by the project's SWPPP would minimize temporary indirect impacts to fish populations and fish habitats resulting from potential soil erosion and consequent degradation of water quality.

Cumulative Impacts to Fisheries

Short-term cumulative impacts to fisheries would occur from other HSDRRS projects that alter estuarine habitats during construction activities, such as dredging of Lake Pontchartrain for foreshore protection and filling of wetlands for expansion of levee footprints. Additionally, other construction projects, such as the I-10 Twin Span Bridge replacement, alter fisheries habitat through increased turbidity and disturbance of lake bottom. However, in the long-term, providing the 100-year level of risk reduction for the metropolitan New Orleans area reduces the risk of overtopping and urban flooding, which results in temporary water quality impacts from pumping of floodwaters into adjacent estuaries. Because direct and indirect impacts to fisheries would be minimized or eliminated, no additional cumulative impacts to fisheries from this project are anticipated.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Fisheries

A greater impact to wetlands and shallow open water, which provides habitat for forage fish and spawning sites, would occur because of the larger footprint of the levee and stability berms. Indirect and cumulative impacts would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Fisheries

No direct impacts to fisheries would occur from the replacement of the LPV 109 I-10 Crossing. Indirect and cumulative impacts to fisheries would be similar to those described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts to fisheries would be the same as the LPV 109 I-10 Crossing proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts to fisheries would be the same as the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts to fisheries would be the same as the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts to fisheries would be the same as the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Fisheries

Retrofitting of the existing US 90 and US 11 floodgates would have no impact on fisheries.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts resulting from LPV 110 proposed action would be similar to those occurring under the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts resulting from LPV 110 Alternative 1 would be similar to those occurring under the LPV 109 I-10 Crossing proposed action.

LPV 111

Future Conditions with Proposed Action

Direct Impacts to Fisheries

Dewatering activities at the Pump Station No. 15 discharge basin would cause mortality to any fish trapped behind the temporary flood protection. Most finfish would escape during the placement of the temporary flood protection; however, juvenile finfish and shrimp, crabs and oysters may be killed during dewatering if not able to move from the area. Levee construction would cause the loss of 10.9 acres of wetlands on the protected side of the levee and 5.1 acres of wetlands on the flood side of the levee. Wetlands on the protected side are primarily bottomland hardwood and provide habitat that supports prey items for some fish species. Wetlands that would be impacted on the flood side are primarily brackish and salt marsh habitats and directly support juvenile finfish.

Indirect Impacts to Fisheries

Short-term increased turbidity would occur in the GIWW from dewatering of the Pump Station No. 15 discharge basin. The resulting increased turbidity potentially creates an absence of dissolved oxygen (*i.e.*, anoxic conditions) if dewatering occurred during periods of high water temperatures (*e.g.*, summer months). The settling of sediments could also blanket sessile organisms and fish eggs and could clog the gills of filter feeding fish (*e.g.* Gulf menhaden*)*. Increases in turbidity would change the density of the water column and affect the buoyancy of fish eggs, which could reduce the opportunities for successful recruitment into the fishery.

Noise and disturbance from dewatering and construction activities could cause temporary behavioral changes to fishes. Adult phases of commercial and recreational fisheries species are mobile and able to navigate away from anoxic conditions. Indirect impacts to open water, and mud bottom habitats in the GIWW, as well as juveniles, and prey species supported by these habitats, would be temporary and would not permanently alter populations of commercial and recreational fisheries species.

Cumulative Impacts to Fisheries

Proposed construction of other HSDRRS projects, such as dredging channels for foreshore protection placement at the Citrus Lakefront Levee project and the Jefferson Parish Lakefront Levee project (located west of LPV 108), a gated structure and along LPV 108 at Seabrook, MRGO, GIWW, Bayou Bienvenue and Golden Triangle Marsh floodwall/gated system, and permanent pump stations at the 17th, London and Orleans Avenue Canals, would have cumulative impacts to fisheries in Lake Pontchartrain through a loss of individuals, increased turbidity and loss of forage. Changes in salinities in Lake Pontchartrain as a result of the construction of the MRGO closure structure could cause some cumulative changes to fisheries distribution and prevalence, including increasing the presence of low-salinity dependent fish species in the western portions of Lake Pontchartrain. Additional hard structure as a result of these projects could have long term benefit to prey species by providing refuge and protection for juveniles, increased populations, and thus provide more food for larger fish.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts resulting from LPV 111 Alternative 1 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts resulting from LPV 111 Alternative 2 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Fisheries

Direct, indirect and cumulative impacts resulting from LPV 111 Alternative 3 would be similar to those occurring under the LPV 111 proposed action.

3.2.5. Wildlife

Existing Conditions

The Lakefront to Michoud Canal project area provides habitat for birds and mammals that are utilized for hunting and other recreational uses, such as bird watching. Species that would be found in the areas surrounding Lake Pontchartrain and in Bayou Sauvage NWR, such as white-tailed deer (*Odoccoileus virginianus*), American alligator (*Alligator mississippiensis*), wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*), canvasback (*Aythya valisineria*), and redhead (*Aythya americana*), provide state income in the form of hunting license fees. The Lake Pontchartrain Basin and adjacent Bayou Sauvage NWR are popular areas for viewing American alligator and various migratory bird species and have rich wildlife diversity. Bayou Sauvage NWR provides habitat for 340 bird species, including the bald eagle (*Haliaeetus leucocephalus*), and peak waterfowl populations number approximately 75,000 individuals during the fall, winter and early spring (Bayou Sauvage NWR 2007). Bird species that are common in Bayou Sauvage NWR include great egret (*Ardea alba*), snowy egret (*Egretta thula*), white ibis (*Eudocimus albus*), green heron (*Butorides virescens*), great blue heron (*Ardea herodias*), anhinga (*Anhinga anhinga*), red-winged blackbird (*Agelaius phoeniceus*) and barred owl (*Strix varia*).

Although much of the Bayou Sauvage NWR provides habitat for a variety of important wildlife species, the project corridor is mostly comprised of upland levees, floodwalls and developed areas, and species that are common to the area are those that are most adapted to development, such as nutria (*Myocaster coypus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), nine-banded armadillo (*Dasypus novemcinctus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), cattle egret (*Bulbulcus ibis*), common grackle (*Quiscalus quiscula*), and American crow (*Corvus brachyrhynchos*).

Marine mammals would only rarely occur in inland waterways (*e.g.,* GIWW) adjacent to the project corridor. The primary marine mammal found in waterways and shallow estuarine water bodies near the project corridor is the bottlenose dolphin (*Tursiops truncatus*).

Discussion of Impacts

Future Conditions with No Action for LPV 108

Direct, Indirect and Cumulative Impacts to Wildlife

The no action for LPV 108 would consist of completing the previously authorized action which includes dredging in Lake Pontchartrain. This would not directly affect terrestrial wildlife, but would temporarily degrade foraging habitat for some ducks and wading birds, and could temporarily preclude the movement of common wildlife along the Lake Pontchartrain shoreline. No cumulative impacts to wildlife are anticipated from dredging access channels or placing foreshore protection in Lake Pontchartrain.

Future Conditions with No Action for LPV 109, 110 and 111

The no action alternative would temporarily degrade foraging habitat for some ducks and wading birds in Lake Pontchartrain, and could temporarily preclude the movement of common wildlife along the Lake Pontchartrain shoreline during construction projects necessary to meet the previously authorized HSDRRS elevation. Wildlife using the LPV 109 levee corridor would be temporarily disturbed during construction activities necessary to raise the levee to the previously authorized elevation. With the previously authorized level of risk reduction, the greater risk of flooding associated with a large tropical storm event could cause the direct loss of less mobile wildlife species that would not be able to escape floodwaters within urban areas of New Orleans.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Wildlife

Wildlife utilizing habitats along the LPV 109 levee corridor and the staging areas near I-10 and US 11 would be temporarily disturbed by construction activities. Mobile species, such as birds and mammals, would utilize nearby habitats in Bayou Sauvage NWR or open space adjacent to the Lake Pontchartrain shoreline during construction and would be able to return to habitats along the LPV 109 levee following construction. The LPV 109 proposed action would result in a substantial loss of forested wetland, intermediate and brackish marsh habitat causing a permanent loss of habitat in Bayou Sauvage NWR that supports a diversity of bird species.

Although birds are highly mobile and able to move to other habitats in the vicinity, local populations of species that nest in colonies could be adversely affected if construction activities caused abandonment of nesting sites. The reproductive capacity of local or regional populations

of one or more species may depend on a given nesting colony, so disturbance of a colony could adversely affect these populations. The levees of the project area are not known to be utilized for colonial nesting by wading birds, such as herons, egrets, and ibises, or water birds such as the anhinga and double-crested cormorant. These birds nest in trees and potentially could nest in the forested wetland habitats on the protected side of the levee within the Bayou Sauvage NWR. In order to minimize the potential for the proposed action to disturb colonial-nesting wading birds should they become established in the area, procedures recommended by USFWS would be followed (Appendix D). Prior to construction, the project area would be inspected by USFWS or other qualified personnel for the presence of nesting colonies during the nesting season (typically February 15 through September 1 in south Louisiana, depending on the species). Construction-related activities that would occur within 1,000 feet of a colony would be restricted to the non-nesting period. The 1,000-foot buffer would be maintained during the nesting season (Appendix D).

Bald eagles may nest in mature trees near marshes and open water habitat; however, eagle nests have not been recorded in the vicinity of the project area. USFWS has provided recommendations as described by the National Bald Eagle Management Guidelines for compliance with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. CEMVN will fully comply with the guidelines provided by USFWS to avoid impacts to nesting bald eagles (Appendix D).

Indirect Impacts to Wildlife

The loss of forested (bottomland hardwood) wetlands would potentially reduce local bird breeding through the loss of nesting and foraging habitat. Although no wading bird rookeries have been observed in forested wetlands along the LPV 109 levee, rookeries are present in Bayou Sauvage NWR, and the loss of forested wetlands would reduce available loafing habitat for wading birds in the project area.

Cumulative Impacts to Wildlife

Most HSDRRS projects, as well as projects proposed by others in the New Orleans metropolitan area, would occur in urbanized areas where there is little wildlife habitat present. Few direct cumulative impacts to wildlife are anticipated from these projects. The loss of habitat for some species that are adapted to urban environments due to the borrow projects would be an indirect cumulative impact to wildlife. The implementation of dredging for foreshore protection along Lake Pontchartrain, the dredged material disposal and graving site construction from the IHNC Lock Replacement project and the Improved Protection on the IHNC project in combination with development projects in the region would cause the temporary disturbance and displacement of wildlife species, especially avian species, along the perimeter of Bayou Sauvage NWR. The construction of a gated structure at Seabrook; the construction of the MRGO, GIWW, Bayou Bienvenue and Golden Triangle Marsh floodwall/gated system; and dredging activities in Lake Pontchartrain could have short-term cumulative impacts to bottlenose dolphin foraging and travel through disturbed areas of estuarine environments.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wildlife

Relative to the proposed action, the larger footprint associated with bigger stability berms would adversely impact a greater area of wetlands that provide habitat for wildlife. Indirect and cumulative impacts to wildlife would be similar those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative *2*

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wildlife

There would be no direct, indirect or cumulative impacts to wildlife from the reconstruction of the LPV 109 I-10 crossing. The I-10 right-of-way has been previously disturbed and existing noise from I-10 traffic would be an equivalent level of disturbance as construction noise.

Future Conditions with Alternative 1

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 109 I-10 Crossing proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be the similar to the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 109 I-10 Crossing proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 109 I-10 Crossing proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wildlife

There would be no long-term direct, indirect or cumulative impacts to wildlife from the construction of a floodwall and floodgate, because most of the construction would occur in previously disturbed areas. Some temporary impacts to wildlife from construction noise would occur.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wildlife

Retrofitting of the existing floodgate and floodwalls would have similar direct, indirect and cumulative impacts to wildlife as the LPV 110 proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Wildlife

Impacts to wildlife resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action; however, there would be a smaller permanent loss of forested wetland habitat supporting wading and neotropical migrant bird species. Egrets have been observed utilizing trees along Maxent Canal for loafing and potentially colonial nesting. USFWS procedures for avoidance of nesting birds would be followed for construction of the T-wall at Pump Station No. 15 and placement of a temporary bridge in Maxent Canal for construction access.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Wildlife

Direct, indirect and cumulative impacts to wildlife would be similar to the LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Wildlife

Direct and cumulative impacts to wildlife would be similar to the LPV 111 proposed action. The construction of a T-wall cap instead of a levee would have long-term adverse indirect impacts on small mammals and reptiles by disrupting movement between intertidal marshes along the GIWW and managed areas of Bayou Sauvage NWR.

3.2.6. Essential Fish Habitat

Existing Conditions

Designated Essential Fish Habitat (EFH) substrate in the estuarine regions of the Gulf of Mexico consists of oyster reefs, SAV, wetlands, water bottom, and artificial structures (Gulf of Mexico Fisheries Management Council [GMFMC] 2004). Each of these habitats can be found in the shallow waters of Lake Pontchartrain. Therefore, Lake Pontchartrain provides EFH within the project area and includes EFH for the following Federally managed species: brown shrimp, white shrimp, gulf stone crab (*Menippe adina)* and red drum.

Wetlands in Bayou Sauvage NWR, which are located on the protected side of the LPV 109 project corridor, are managed wetland systems separated by levees from the waters of Lakes Pontchartrain and Borgne, and are not EFH. However, wetlands located on the flood side of the LPV 109 and LPV 111 levees are intertidal and are EFH. Oyster reefs are not common in Lake Pontchartrain due to the low salinity levels, but oyster leases are present in nearby Lake Borgne.

Rangia clams (*Rangia cuneata*) are abundant in Lake Pontchartrain. They are prey species for many lake predators, including white shrimp, blue crab and benthic feeding fishes. The remains of deceased rangia clams introduce hard substrate to the lake bottom that is composed largely of clays and silts. The rangia clam hard substrata provide surface area for a wide range of benthic copepods, polychaetes, benthic algae, mollusks, bryozoans, amphipods, and other zooplankton to feed and reproduce. Ichthyoplankton feed over the reefs. The rangia clam is a keystone species in Lake Pontchartrain. They suffer mortality due to a reduction in dissolved oxygen associated with dredging, severe weather events, high salinity levels and stratification, and non-point source pollution (Poirrier *et al.* in press). Hurricane Katrina resulted in low dissolved oxygen in the bottom layer of Lake Pontchartrain, which reduced the abundance of rangia clams in Lake Pontchartrain. Rangia clams and other community dominants were lost from 50 percent of the lake bottom, and have been slow to recover (Poirrier and Spalding 2007).

In early 2000, the Lake Pontchartrain Artificial Reef Working Group, a partnership of the Lake Pontchartrain Basin Foundation, sportsmen, private groups, and local and state agencies, initiated the creation of artificial reefs in Lake Pontchartrain. From 2001 to 2004, five artificial reef sites were developed and donated to the Louisiana Department of Wildlife and Fisheries (LDWF). One of the artificial reef sites is located 3 miles offshore of the project corridor. This reef is a series of crushed limestone rubble mounds. The mounds are spread over a 2 acre site to create a large area of varied relief (Lake Pontchartrain Basin Foundation 2007). Table 3 presents the Federally managed species found in Lakes Pontchartrain and Borgne and their preferred habitats.

Table 3. List of Federally Managed Species and Their Habitat and Relative Abundance

Managed Species	Life Stages	Designated EFH (1)	Relative Abundance (2)
Brown shrimp (*Farfantepenaeus aztecus*)	Eggs	Sand, shell and soft bottom	Common
	Larvae	SAV, emergent marsh and oyster reef	Abundant
	Adult	SAV, emergent marsh, oyster reef and sand , shell and soft bottom	Rare
White shrimp (*Litopenaeus setiferus*)	Eggs	Sand, shell and soft bottom	Common
	Larvae	SAV, soft bottom and emergent marsh	Abundant
	Adult	SAV, emergent marsh, oyster reef and sand , shell and soft bottom	Abundant
Pink Shrimp (*Farfantepenaeus duorarum*)	Eggs	Sand and shell bottom	Common
	Larvae	SAV and sand and shell bottom	Common
	Adult	Sand and shell substrate	Rare
Gulf stone crab (*Menippe adina*)	Eggs	Sand, shell and soft bottom	Not Present
	Larvae	Oyster reefs and soft bottom	Not Present
	Adult	Sand, shell and soft bottom and oyster reefs	Rare
Red drum (*Sciaenops ocellatus*)	Eggs	SAV, emergent marsh, oyster reef and sand , shell and soft bottom	Common
	Larvae	SAV, emergent marsh, oyster reef and sand , shell and soft bottom	Common
	Adult	SAV, emergent marsh, oyster reef and sand , shell and soft bottom	Common
Spanish mackerel (*Scomberomorus maculatus*)	Juvenile	Water column	Rare
	Adult	Water column	Not Present

Source: 1. NOAA Fisheries 2007b. 2. GMFMC 2004.

Discussion of Impacts

Future Conditions with No Action for LPV 108

Direct and Indirect Impacts to EFH

The no action for LPV 108 consists of implementing the previously authorized action, which includes dredging of access channels and placement of foreshore protection in Lake Pontchartrain. Several of the less mobile Federally managed species occurring in Lake Pontchartrain, such as shrimp, could be directly impacted by dredging activities through the loss of individuals. However, BMPs and a SWPPP would be implemented to minimize impacts. Other more mobile Federally managed species in Lake Pontchartrain, such as red drum, are able to navigate away from anoxic conditions associated with dredging activities; however, their habitat, such as SAV, and some of their prey species are not mobile, and may be directly affected by dredging activities. Channel dredging in Lake Pontchartrain for the placement of additional foreshore protection would disturb 118.1 acres of lake bottom. SOD and suspended sediments associated with dredging activities could indirectly affect populations of Federally managed fish and their prey species by temporarily reducing DO in the water column and burying sessile organisms utilized as a food source. Increases in turbidity can change the density of the water column and affect the buoyancy of fish eggs, which could reduce the opportunities for successful recruitment into the fishery.

Dredging suspends sediments in the water column, increasing turbidity and affecting the ability of light to penetrate the water. Cho and Poirrier (2005) reported that light availability is the

principle driver in the distribution and abundance of SAV. SAV in the project corridor is EFH and is utilized for foraging by several Federally managed species. Dredging and backfilling activities along the shoreline of Lake Pontchartrain may indirectly impact suitable SAV habitat through increased turbidity, and foreshore protection placement would permanently impact 7.2 acres of shallow lake bottom habitat. Additionally, dredging can suspend fertilizers and pesticides associated with the sediments. The process disturbs benthic organisms, such as rangia clams, by covering portions of the lakebed with sediments. However, because of higher salinities in the project corridor, the rangia clam populations in the project vicinity are small. Therefore, impacts to rangia clams from dredging activities would be minor. The topography of the lake bottom would be restored to near pre-project conditions following construction by backfilling dredged channels with previously sidecast materials. If post construction surveys do not indicate that a natural revegetation of the area is occurring, plantings of SAV would occur to return the site to pre-construction conditions.

The artificial reef located 3 miles offshore of the project corridor would not be impacted by either construction or dredging activities. It is located far enough offshore to avoid the plume of migrating sediments. Additionally, submerged riprap from foreshore protection provides habitat for small and cryptic fish and potentially stone crab juveniles.

Cumulative Impacts to EFH

Cumulative impacts to EFH would occur from direct disturbance of Lake Pontchartrain bottom area and shoreline interface. Dredging activities for foreshore protection improvements on LPV 108 and dredging activities proposed for foreshore protection improvements on LPV 106 and Jefferson Parish Lakefront Levee project, located west of the proposed action, as well as construction activities associated with the gated risk reduction structure at Seabrook and outfalls from proposed pump station construction at the 17th, London and Orleans Avenue Canals would increase turbidity in the area adjacent to the project corridor.

Future Conditions with No Action for LPV 109, 110 and 111

The loss of wetlands on the flood side of LPV 109 as a result of levee improvements necessary to raise the levee to the previously authorized elevation and meet new design criteria would adversely affect habitats for Federally managed fish, their prey species, or their habitats (*i.e.*,EFH).

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct and Indirect Impacts to EFH

There would be a permanent loss of approximately 101 acres of wetlands on the flood side of the levee, most of which is intertidal marsh (intermediate and brackish marsh), and is EFH. All stormwater pollution would be controlled by implementation of the BMPs described by the project's SWPPP. Construction activities associated with floodgate and levee improvements under LPV 109 Levee Section proposed action would not indirectly affect EFH. There would be no impact to the artificial reefs located in Lake Pontchartrain.

Cumulative Impacts to EFH

Cumulative impacts to EFH would occur from direct disturbance of Lake Pontchartrain bottom area and shoreline interface. Dredging activities for foreshore protection improvements in New Orleans East; dredging activities proposed for foreshore protection improvements on LPV 106,

LPV 108 and Jefferson Parish Lakefront Levee project, located west of the proposed action; construction activities associated with the gated risk reduction structure at Seabrook and outfalls from proposed pump station construction at the 17th, London and Orleans Avenue Canals; and the construction of the replacement I-10 Twin Span Bridge across Lake Pontchartrain would increase turbidity in the area adjacent to the project corridor. All HSDRRS projects and projects implemented by others that are greater than 1 acre would require the implementation of BMPs protecting water quality.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to EFH

The direct impacts to EFH from LPV 109 Levee Section Alternative 1 would result in the loss of approximately 92 acres of wetlands, most of which is intertidal intermediate and brackish marsh, and is EFH. Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to EFH

Direct impacts to EFH from LPV 109 Levee Section Alternative 2 would result in the loss of approximately 42 acres of wetlands on the flood side of the levee primarily comprised of intertidal intermediate and brackish marsh, which is EFH. Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to EFH

Direct impacts to EFH from LPV 109 Levee Section Alternative 3 would result in the loss of approximately 39 acres of wetlands on the flood side of the levee, mostly intertidal intermediate and brackish marsh, which is EFH. Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to EFH

Direct impacts to EFH from LPV 109 Levee Section Alternative 4 would result in the loss of approximately 43 acres of wetlands on the flood side of the levee comprising primarily intertidal intermediate and brackish marsh, which is EFH. Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to EFH

There would be no impacts to EFH from the proposed I-10 ramp crossing of LPV 109.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to EFH

There would be no impacts to EFH from the proposed I-10 bridge crossing of the LPV 109 levee.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to EFH

There would be no impacts to EFH from US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to EFH

Direct impacts to EFH from the US 90 and US 11 Crossings Alternative 1 would result in the loss of 4.1 acres of intertidal marsh (2.3 acres of intermediate marsh and 1.8 acres of brackish marsh). Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to EFH

Direct impacts to EFH from the US 90 and US 11 Crossings Alternative 2 would result in the loss of 1 acre of intertidal marsh (0.9 acre of intermediate marsh and 0.1 acre of brackish marsh). Indirect and cumulative impacts to EFH would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to EFH

There would be no impacts to EFH from retrofitting of the US 90 and US 11 floodgates.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to EFH

There would be no impacts to EFH from the LPV 110 proposed action.

Future Conditions with Alternative 1

There would be no impacts to EFH from retrofitting of the LPV 110 floodgate.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to EFH

The increase in levee footprint would directly impact EFH through the loss of approximately 5 acres of brackish marsh on the flood side of the LPV 111 levee. Dewatering of the discharge basin at Pump Station No. 15 would temporarily impact 0.4 acres of EFH. Several of the less mobile Federally managed species occurring in GIWW, such as shrimp, could be directly impacted by dewatering activities through mortality. Other more mobile Federally managed species in GIWW, such as red drum, are able to navigate away from construction activities and anoxic conditions associated with dewatering; however, their habitat, such as water bottom and marsh interface, and some of their prey species are not mobile, and may be directly affected by increased turbidity during dewatering activities. Increased SOD and suspended sediments associated with dewatering activities could indirectly affect populations of Federally managed fish and their prey species by temporarily reducing DO in the water column at the discharge point and burying sessile organisms utilized as a food source. Increases in turbidity can change the density of the water column and affect the buoyancy of fish eggs, which could reduce the opportunities for successful recruitment into the fishery.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to EFH

The increase in levee footprint would directly impact EFH through the loss of 8.5 acres of brackish marsh on the flood side of the levee. Dewatering of the discharge basin at Pump Station No. 15 would have the same direct and indirect impacts as the LPV 111 proposed action. Indirect and cumulative impacts to EFH resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to EFH

The increase in levee footprint would directly impact EFH through the loss of 8.5 acres of brackish marsh on the flood side of the levee. Dewatering of the discharge basin at Pump Station No. 15 would have the same direct and indirect impacts as the LPV 111 proposed action. Indirect and cumulative impacts to EFH resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to EFH

The increase in levee footprint would directly impact EFH through the loss of approximately 2 acres of brackish marsh on the flood side of the levee. Dewatering of the discharge basin at Pump Station No. 15 would have the same direct and indirect impacts as the LPV 111 proposed action. Indirect and cumulative impacts to EFH resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

3.2.7. Endangered or Threatened Species

Existing Conditions

Several species listed as threatened (T) or endangered (E) could occur in the Lakefront to Michoud Canal project corridor (USFWS 2007a). These species are brown pelican (*Pelecanus occidnetalis*) (E), Gulf sturgeon (*Acipenser oxyrhynchus desotoi*) (T), and West Indian manatee (*Trichechus manatus*) (E). Additionally, the project corridor is located within Gulf sturgeon critical habitat.

The project corridor and adjacent coastal waters provide low quality habitat for protected species. The brown pelican is more likely to use these waters for foraging due to the availability of spits and off-shore sandbars which provide resting and roosting areas for this species. No brown pelican breeding or nesting areas occur in the vicinity of the project corridor (LDWF 2006). Gulf sturgeon greater than 2 years of age could forage in the project corridor from November until March. Manatees are occasionally observed in Lake Pontchartrain from June through September, and could pass through the project corridor or forage on any available grass beds. Each of these species is described in more detail below.

Three listed species of sea turtles may occur at the project site: the Kemp's ridley (*Lepidochelys kempii*) (E), the green (*Chelonia mydas*) (T), and the loggerhead (*Caretta caretta*) (T). All three of these sea turtle species are known to forage as juveniles and adults in nearshore waters, including estuaries, in Louisiana and may be more likely to occur there in months when the waters are warmer. None of these species have designated critical habitat in Lake Pontchartrain or the region. NOAA Fisheries (Section 7 consultation letter dated 13 March 2009, Appendix D) determined that the project would not likely impact these species and they are not considered further. However, should a sea turtle(s) be observed in the project area then the mitigation measures outlined below would be followed.

Brown Pelican

Federally listed as an endangered species, brown pelicans feed along the U.S. coast in shallow estuarine waters, using sand spits and offshore sand bars as daily resting and nocturnal roosting areas (USFWS 1995). Brown pelican nesting colonies are found on small, off-shore islands protected from mammalian predators, where nests are built in mangrove trees or other shrubby vegetation. The brown pelican was extirpated from Louisiana in 1963 as a result of exposure to pesticides and was reintroduced between 1968 and 1980 (LDWF 2006). Population productivity peaked in Louisiana in 2004, when 16,501 nesting pairs produced 39,021 fledglings. During 2005, an oil spill, tropical storms, and hurricanes resulted in reduced productivity and substantial loss of habitat, especially east of the Mississippi River. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance (USFWS 1995).

Gulf Sturgeon

The Gulf sturgeon, Federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida (USFWS 2003). In Louisiana, the Gulf sturgeon has been reported at Rigolets Pass, rivers and lakes of the Pontchartrain Basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (*i.e.*, March to May). Adults and sub-adults may be found in coastal rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Gulf sturgeon that are less than 2 years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations, such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing, have negatively affected this species.

Critical habitat for the Gulf sturgeon occurs in Louisiana, Mississippi, Alabama, and Florida (USFWS 2003). Unit 1 of this critical habitat includes portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, the Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana (USFWS 2003). The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components. The primary constituent elements for Gulf sturgeon critical habitat in estuarine areas include:

- abundant prey items for juvenile, sub-adult, and adult life stages;
- water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability;
- sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability; and
- safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats.

West Indian Manatee
Federally listed as an endangered species, West Indian manatees can be found in shallow, slow-moving rivers, estuaries, salt-water bays, canals, and coastal areas (LDWF 2007). West Indian manatees are typically found in waters with dense submerged aquatic beds or floating vegetation where the species grazes on a variety of aquatic plants. West Indian manatees occasionally enter Lake Pontchartrain and Lake Maurepas, and associated coastal waters and streams, during the summer months (*i.e.*, June through September) (USACE 2006). Manatees have been reported in the Amite, Blind, Tchefuncte, and Tickfaw rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf Coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution (USFWS 2007b).

Discussion of Impacts

Future Conditions with No Action for LPV 108

Direct Impacts to Endangered or Threatened Species

The no action for LPV 108 would consist of completing the previously authorized action. Dredging activities may affect, but are not likely to adversely affect, the Gulf sturgeon or West Indian manatee because protective measures for the manatee and sturgeon would be included in CEMVN's dredging contracts. NOAA Fisheries and USFWS have concurred with this determination (NOAA Fisheries 2009, USFWS 2007d; Appendix D). In order to minimize the potential for construction activities under the previously authorized action, standard manatee protection measures would be followed, as well as BMPs and a SWPPP would be implemented. These procedures have been recommended by USFWS (USFWS 2007c, USFWS 2007d) and adopted by USACE (2005) for use in situations where in-water construction activities potentially could occur where manatees may be present. These procedures include the following:

> All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction or dredging activities to remind personnel to be observant for manatees during active

> construction/dredging operations or within vessel movement zones (*i.e.*, the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 feet of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the LDWF, Natural Heritage Program (225/765-2821). These procedures have been recommended by the USFWS (2007c) and adopted by the USACE (2005) for use in situations where in-water construction activities potentially could occur when manatees may be present.

The previously authorized action would temporarily modify 118.1 acres of Gulf sturgeon critical habitat due to dredging activities, but no permanent modifications would occur because the foreshore protection would be placed in water too shallow to support Gulf sturgeon or manatee.

In order to minimize the potential for construction activities under the previously authorized action to cause impacts to sea turtles, construction conditions recommended by NOAA Fisheries would be followed. These conditions include the following:

> All personnel associated with the project would be instructed of the potential presence of sea turtles and the need to avoid collisions with sea turtles. All construction personnel would be responsible for observing water-related activities for the presence of these species. All construction personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing sea turtles, which are protected under the Endangered Species Act of 1973. Siltation barriers would be made of materials in which sea turtles cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers would not block sea turtle entry to or exit from designated critical habitat without prior agreement from the NOAA Fisheries Protected Resources Division, St. Petersburg, Florida. All vessels associated with the construction project would operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels would preferentially follow deep-water routes (*e.g.* marked channels) whenever possible. If a sea turtle is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions would be implemented to ensure its protection. These precautions would include the cessation of operation of any moving equipment closer than 50 feet of a sea turtle. Operation of any mechanical construction equipment would cease immediately if a sea turtle is seen within a 50 foot radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition. Any collision with and/or injury to a sea turtle would be reported immediately to the NOAA Fisheries Protected Resources Division (727/824-5312) and the local authorized sea turtle stranding/rescue organization.

Indirect Impacts to Endangered or Threatened Species

Dredging associated with the LPV 108 proposed action would result in disturbance of substrates and would temporarily increase turbidity in the shallow estuarine waters adjacent to the project area. Dredging could temporarily reduce the availability of Gulf sturgeon and West Indian manatee forage items through the loss or damage of invertebrates, small fish, and SAV.

Protected species would forage and rest in unaffected areas; thus, the temporary displacement may affect, but would not likely adversely affect, the Gulf sturgeon and West Indian manatee (Appendix D).

Cumulative Impacts to Endangered or Threatened Species

Dredging activities for foreshore protection placement are also proposed for LPV 106 and in Jefferson Parish, and construction activities for a gated structure at Seabrook and pump stations at the Orleans Avenue, London Avenue and 17th Street canals would have cumulative indirect effects to the West Indian manatee and Gulf sturgeon. These activities would temporarily increased turbidity in Lake Pontchartrain and could disturb SAV and would cumulatively adversely modify Gulf sturgeon critical habitat.

Future Conditions with No Action for LPV 109, 110 and 111

By only raising the floodwalls, levees, or floodgates associated with Lakefront to Michoud Canal project to the previously authorized elevation, the New Orleans East drainage area would be subject to a greater risk of flooding in the event of a large tropical storm event similar to Hurricane Katrina. The shallow estuarine waters adjacent to the project corridor would continue to provide potential foraging habitat for brown pelicans and Gulf sturgeon. West Indian manatees could still migrate through the area. Dewatering could result in minimal reduction of forage availability for brown pelicans, and Gulf sturgeon. Individuals would temporarily forage in unaffected areas, and would quickly return to the affected area once suitable water quality returns. No direct effects to any threatened or endangered species would occur under the no action alternative.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Endangered or Threatened Species

Implementation of the proposed action would result in increased noise and disturbance in the project area and could temporarily displace any brown pelicans resting or foraging in the area. Therefore, construction activities may affect, but are not likely to adversely affect, the brown pelican, and USFWS has concurred with this determination (Appendix D). Vibration and noise from slurry wall construction and transportation of borrow material to the LPV 109 segment between South Point and I-10 could temporarily displace Gulf sturgeon and West Indian manatees foraging near the project corridor; however, BMPs implemented as part of the SWPPP would protect the water quality of Lake Pontchartrain. Therefore, construction of levees would not adversely affect the Gulf sturgeon and West Indian manatee, and USFWS and NOAA Fisheries have concurred with this determination (NOAA Fisheries 2009, USFWS 2007d; Appendix D). There would be no modification of Gulf sturgeon critical habitat as a result of the LPV 109 proposed action.

Indirect Impacts to Endangered or Threatened Species

No indirect effects to the brown pelican, manatee or Gulf sturgeon would occur under the LPV 109 proposed action.

Cumulative Impacts to Endangered or Threatened Species

Dredging activities for foreshore protection placement is proposed for much of Lake Pontchartrain in New Orleans East and Jefferson Parish; construction activities for a gated

structure at Seabrook; construction of new pump stations at the Orleans Avenue, London Avenue and 17th Street canals; and replacement of the I-10 Twin Span Bridge across Lake Pontchartrain by DOTD would have cumulative indirect effects to the West Indian manatee and Gulf sturgeon. These activities would temporarily increased turbidity in Lake Pontchartrain and could disturb SAV and would cumulatively adversely modify Gulf sturgeon critical habitat. Other proposed projects in the vicinity of LPV 109, such as the construction of floodwalls, levees, and pump stations; a gated structure at Seabrook; the floodwall/gated system across the GIWW, Bayou Bienvenue, MRGO and the Golden Triangle marsh; and the IHNC Lock Replacement project would have similar impacts as those described by the proposed action, and would therefore contribute to the short-term cumulative effects to brown pelican, Gulf sturgeon and West Indian manatee. There would be no cumulative effects to these species from the implementation of borrow projects in New Orleans East.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species resulting from LPV 109 Levee Section Alternative 1 would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the construction of an I-10 ramp crossing of LPV 109.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the construction of an I-10 bridge crossing of LPV 109.
LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the construction of US 90 and US 11 crossings.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the construction of US 90 and US 11 crossings.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the construction of US 90 and US 11 crossings.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to endangered or threatened species resulting from the retrofit of US 90 and US 11 floodgates.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to protected species from floodwall and floodgate replacement at LPV 110, because no endangered or threatened species occur in the LPV 110 project area.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

There would be no direct, indirect or cumulative effects to protected species from the retrofit of the floodgate at LPV 110, because no endangered or threatened species occur in the LPV 110 project area.

LPV 111

Future Conditions with Proposed Action

Direct Impacts to Endangered or Threatened Species

Direct effects to endangered or threatened species resulting from the LPV 111 levee and floodwall improvements would be similar to those occurring under LPV 109 Levee Section proposed action.

Dewatering activities at the discharge basin of Pump Station No. 15 may affect, but are not likely to adversely affect, the Gulf sturgeon or West Indian manatee because protective measures for the manatee and sturgeon would be included in CEMVN's contracts for the placement of temporary flood protection (*i.e.*, sheetpile). NOAA Fisheries and USFWS have concurred with this determination (NOAA Fisheries 2009, USFWS 2007d; Appendix D). In order to minimize the potential for construction activities under the proposed action to impact the manatee, standard manatee protection measures would be followed. These procedures have been recommended by USFWS (USFWS 2007c, USFWS 2007d) and adopted by USACE (2005) for use in situations where in-water construction activities potentially could occur where manatees may be present. These procedures include the following:

> All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction or dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (*i.e.*, the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 feet of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the USFWS (337/291-3100) and the LDWF, Natural Heritage Program (225/765-2821). These procedures have been recommended by the USFWS (2007c) and adopted by the USACE (2005) for use in situations where in-water construction activities potentially could occur when manatees may be present.

Indirect Impacts to Endangered or Threatened Species

Installation of temporary flood protection and dewatering activities would result in disturbance of substrates and would temporarily increase turbidity in the shallow estuarine waters of the GIWW adjacent to the project area. The construction and dewatering activities would temporarily displace manatees and sturgeons, which would avoid the disturbance associated with these activities. Protected species would forage and rest in unaffected areas; thus, the temporary displacement may affect, but would not likely adversely affect, the Gulf sturgeon and West Indian manatee (Appendix D).

Cumulative Impacts to Endangered or Threatened Species

Cumulative impacts would be similar to those described for LPV 109 levee section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species would be similar to those occurring under LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species would be similar to those occurring under LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Endangered or Threatened Species

Direct, indirect and cumulative effects to endangered or threatened species would be similar to those occurring under LPV 111 proposed action.

3.2.8. Cultural Resources

Existing Conditions

Archaeological sites and historic properties have been previously recorded within the IER #7 study area and its immediate vicinity. Known prehistoric sites are primarily situated on the relatively high natural levee and shoreline deposits located adjacent to Lake Pontchartrain and along smaller waterways such as Rogers Lagoon, Turtle Bayou and Bayou Sauvage. Historic period archaeological sites, including those associated with recreational/residential properties, developed along the Lake Pontchartrain shoreline. Limited historic development later expanded into drained back swamp areas and along canal waterways. Historic period watercraft are recorded in Lake Pontchartrain as well as bayou and river channels in the region.

CEMVN contracted R. Christopher Goodwin and Associates, Inc. to conduct a cultural resources investigation of the IER #7 study area, including the proposed action, proposed action alternatives, and four additional proposed project alignments being considered at that time (Heller *et al.* 2008). The proposed action and alternatives were investigated for cultural resources within a much larger primary study corridor measuring approximately 1,500 to 1,750 feet wide and extending along the existing project levee center line. This study corridor begins at Paris Road on the Lake Pontchartrain shoreline and runs east to South Point. At South Point, the study corridor extends south to the GIWW, and then turns west along the GIWW to the Michoud Canal.

Researchers reviewed previous cultural resources investigations and site records, along with soil data and field reconnaissance information, to identify and selectively investigate previously recorded archaeological sites and high potential areas for archaeological resources. A general assessment of historic structures in the project area was also conducted to identify individual historic structures and historic districts that may be eligible for, or that are listed on, the National Register of Historic Places (NRHP). In addition, a submerged remote sensing survey was conducted in Lake Pontchartrain to identify targets exhibiting cultural resources characteristics.

Background research conducted at the Louisiana Division of Archaeology identified 14 previously conducted cultural resources surveys within or intersecting the IER #7 study area. Eight of these surveys were conducted by or on behalf of the USACE in conjunction with levee improvement projects, and three surveys were conducted for the U.S. Department of Transportation and/or the DOTD in conjunction with USFWS, the City of New Orleans and a private contractor. All previous surveys are briefly discussed in the management summary prepared by Heller *et al.* (2008).

Five previously recorded terrestrial prehistoric archaeological sites, including 16OR12 (South Point Site), 16OR28 (Little Woods), 16OR37 (DeMontluzin Camp), 16OR38 (Orleans Protection Levee) and 16OR70 (Bayou Sauvage) and several vacation/fishing camp sites shown on historic Lake Pontchartrain maps are located within, or immediately adjacent to, the project area boundaries. Soil and topographic analysis identified seven land parcels in the project area exhibiting a high potential for containing intact cultural resources. No previously recorded historic structures or properties listed on the NRHP database are located in the project area.

Field reconnaissance investigations did not identify any historic standing structures or intact historic fishing and vacation camp buildings in the IER #7 project area. Phase 1 and selected Phase 2 level field investigations were conducted in five of the seven high probability areas (Land Parcels 07-01, 07-02, 07-03, 07-04 and 07-06) and two of the seven proposed staging areas. Three previously unrecorded terrestrial archaeological sites were identified (16OR447, Locus 07-02-E-01 and Locus 07-06-01). The remaining high probability areas (Land Parcels 07-05 and 07-07), staging areas, and a proposed access road were not investigated because they will not be impacted by proposed construction or are not located in high probability areas.

Researchers also conducted Phase 1 nautical remote sensing survey and selected Phase 2 dive operations in the Lake Pontchartrain portion of the study area (Heller *et al.* 2008). The survey was designed to identify specific magnetic, acoustic, and sub-bottom anomalies that might represent significant submerged cultural resources. Phase 1 investigations were conducted within an approximate 1,250-foot wide corridor running parallel to the lake shoreline and within five proposed perpendicular floatation channel areas. This survey identified three targets exhibiting shipwreck characteristics and includes 16OR453 (Target 36-1 South Point 1 Shipwreck), Target 36-2 and Target 37-1.

Phase 2 dive operations were conducted at two of these target locations. The remains of an early to middle twentieth century wooden hulled work boat was identified at Site 16OR453 (Target 36-1 South Point 1 Shipwreck) and did not possess sufficient integrity or significant qualities necessary for listing on the NRHP. Data collection at Target 36-2 identified modern pipe segments and debris that clearly do not represent a significant cultural resource. The initial Phase 1 data collection at Target 37-1 identified the buried remains of a very strong magnetic anomaly that exhibits potential shipwreck characteristics. However, Target 37-1 was not investigated further because it is located outside of the proposed action boundaries.

CEMVN held meetings with State Historic Preservation Office (SHPO) staff and Tribal governments in 2007 to discuss the emergency alternative arrangements approved under NEPA for HSDRRS project review and the development of a Programmatic Agreement (PA) to tailor the Section 106 consultation process under these alternative arrangements. CEMVN formally initiated Section 106 consultation for the HSDRRS project (100-year), which includes IER #7, in a letter dated 9 April 2007 and emphasized that standard Section 106 consultation procedures would be followed during PA development. A public meeting was held on 18 July 2007 to discuss the working draft PA.

In letters to the SHPO and Indian Tribes dated 19 January 2009, CEMVN provided project documentation, an evaluation of cultural resources potential in the project area, the results of reconnaissance survey and Phase 1/Phase 2 investigations, and found that proposed construction activities within all reaches of the proposed action would have no adverse impacts on significant cultural resources. The SHPO concurred with CEMVN's "no adverse effect" finding in letters dated 17 February 2009 and 25 February 2009. The Seminole Tribe of Florida, Jena Band of Choctaw Indians, Choctaw Nation of Oklahoma, and the Alabama-Coushatta Tribe of Texas concurred with our effect determination on 26 January 2009, 27 January 2009, 5 February 2009, and 12 February 2009, respectively. No additional Indian Tribes responded to the requests for comment. Section 106 consultation for the proposed action is concluded. However, if any unrecorded cultural resources are determined to exist within the proposed action boundaries, then no work would proceed in the area containing the cultural resources until a CEMVN archaeologist has been notified and final coordination with the SHPO and Indian Tribes has been completed.

The following discussion of impacts is based on the information provided in the cultural resources investigation management summary prepared by R. Christopher Goodwin and Associates, Inc. (Heller *et al*. 2008).

Discussion of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 would consist of implementing the previously authorized action. Although six cultural resources have been recorded in the existing LPV 108 project right-of-way, recent Phase 1 and selected Phase 2 investigations did not identify any intact surface or subsurface features, midden deposits, or discrete concentrations of artifacts associated with terrestrial archaeological sites 16OR12 (South Point Site), 16OR28 (Little Woods), 16OR447 and Locus 07-02-E-01. Researchers found that these sites had been destroyed or severely impacted by previous railroad embankment, levee and highway construction, foreshore protection, and/or continuous shoreline wave action. Recent nautical investigations in the LPV 108 reach determined that Site 16OR453 and Target 36-2 do not represent significant submerged cultural resources. One potentially significant magnetic anomaly designated Target 37-1 was identified in an area outside of the LPV 108 reach and will not be impacted.

Future Conditions with No Action for LPV 109, 110 and 111

Without implementation of the proposed action, there would be no activities involving construction or modification of the existing levees, floodwalls, floodgates, and foreshore protection at the four LPV reaches beyond what is currently authorized for the HSDRRS. No cultural resources were identified in the No Action boundaries within the LPV 109, LPV 110, and LPV 111 reaches. Therefore, effects on cultural resources would not differ substantially from what was described in the Final EIS for the LPV Hurricane Protection Project (August 1974) and its supplements (Final Supplement I [July 1984] and Final Supplement II [August 1994]).

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Cultural Resources

Implementation of the proposed action for LPV 109 Levee Section would have no direct impacts on cultural resources. The proposed action boundaries, which includes existing and new project right-of-way, an existing access road, and two proposed staging areas located outside of the proposed action corridor, were examined for cultural resources as part of a larger study conducted in 2008 (Heller *et al*. 2008). No cultural resources were identified. The majority of the LPV 109 Levee Section proposed action, which is located between South Point and LPV 110, is situated in a low-lying, frequently flooded area that has been severely impacted by previous earthen levee construction. The likelihood for intact and significant cultural resources in these frequently flooded and disturbed areas is considered extremely minimal.

Background research did not identify any previously recorded cultural resources in the proposed action. Researchers identified only two land parcels exhibiting a high potential for containing intact cultural resources directly in the LPV 109 Levee Section reach, and they are located along the Lake Pontchartrain and Irish Bayou Lagoon shorelines (Land Parcels 07-03 and 07-04). Recent Phase 1 field investigations in these two areas did not identify any cultural resources.

Indirect Impacts to Cultural Resources

Implementation of the proposed action would provide an added level of flood protection to known and unknown cultural resources located on the protected side of the project area by reducing the damage caused by flood events.

Recent cultural resources investigations examined an area in the LPV 109 Levee Section reach that is much larger than the proposed action (Heller *et al*. 2008). This area included a 1,500-foot wide linear corridor extending approximately 1,000 feet on the flooded side and 500 feet on the protected side of the existing levee alignment center line. Background research and reconnaissance level field investigations identified three previously recorded archaeological sites and two land parcels exhibiting a high potential for containing intact cultural resources located immediately adjacent to, but outside of the LPV 109 Levee Section proposed action. These include Site 16OR37 (DeMontluzin Camp), Site 16OR38 (Orleans Protection Levee), Site 16OR70 (Bayou Sauvage), and Land Parcels 07-05 and 07-07.

First documented in 1959, Site 16OR37 (DeMontluzin Camp) and Site 16OR38 (Orleans Protection Levee) have been previously reported as destroyed. Recent field investigations at the two reported site locations confirmed that the shell scattered at Site 16OR37 did not represent a cultural resource and no remains of Site 1OR38 could be identified. Site 16OR70 (Bayou Sauvage) was described in 1986 as a prehistoric period earthen midden exhibiting ceramics and daub (clay) fragments. Although the site has not been evaluated for National Register of Historic Places eligibility and is located in the immediate vicinity of a project staging area, proposed project activities will have no indirect impact on the site. Subsurface testing at Land Parcels 07-05 (the reported location of Site 16OR38) and 07-07 (the reported location of Site 16OR37) did not identify any additional cultural resources.

These three cultural resources and associated high probability areas are located outside of the LPV 109 Levee Section proposed action boundaries and will not be indirectly impacted by proposed construction.

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the Greater New Orleans metropolitan area and surrounding locations. The combined effects from construction of the multiple projects underway and planned for the LPV portion of the HSDRRS would reduce flood risk and storm damage to cultural resources including archaeological sites, individual historic properties, engineering structures and historic districts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 Levee Section Alternative 1 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 Levee Section Alternative 2 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 Levee Section Alternative 3 would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 Levee Section Alternative 4 would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct Impacts to Cultural Resources

Implementation of the proposed action for LPV 109 I-10 Crossing would have no direct impacts on cultural resources. The proposed action boundaries were evaluated for cultural resources in 2008 (Heller *et al.* 2008). No previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources were identified in the proposed action boundaries and no field investigations were conducted. The proposed action is located entirely within the DOTD right-of-way and is situated in a low-lying, frequently flooded area. Previous bridge, highway and levee construction has severely impacted this frequently flooded area. The

likelihood for intact and significant cultural resources in the proposed action is considered extremely minimal.

Indirect Impacts to Cultural Resources

Implementation of the proposed action would provide an added level of flood protection to known and unknown cultural resources located on the protected side of the project area by reducing the damage caused by flood events.

Recent cultural resources investigations examined an area in the LPV 109 I-10 Crossing reach that is much larger than the proposed action (Heller *et al.* 2008). This area included a 1,500-foot wide linear corridor extending approximately 1,000 feet on the flooded side and 500 feet on the protected side of the existing levee alignment center line. Background research and soil/topographic analyses did not identify any previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources within the general vicinity of the proposed action. No significant cultural resources will be indirectly impacted by the proposed action.

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the Greater New Orleans metropolitan area and surrounding locations. The combined effects from construction of the multiple projects underway and planned for the HSDRRS would reduce flood risk and storm damage to cultural resources including archaeological sites, individual historic properties, engineering structures and historic districts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 I-10 Alternative 1 would be similar to those occurring under the LPV 109 I-10 proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct Impacts to Cultural Resources

Implementation of the proposed action for LPV 109 US 90 and US 11 Crossings would have no direct impacts on cultural resources. The proposed action boundaries for both crossings were evaluated for cultural resources as part of a larger study conducted in 2008 (Heller *et al.* 2008). No previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources were identified in the proposed action boundaries and no field investigation were conducted. The proposed actions at both crossings are located entirely within the DOTD right-of-way and are situated in low-lying, frequently flooded areas. Previous bridge, highway and levee construction has severely impacted these frequently flooded areas. The likelihood for intact and significant cultural resources in the proposed action is considered extremely minimal.

Indirect Impacts to Cultural Resources

Implementation of the proposed action would provide an added level of flood protection to known and unknown cultural resources located on the protected side of the project area by reducing the damage caused by flood events.

Recent cultural resources investigations examined an area in the LPV 109 US 90 and US 11 Crossing reaches that is much larger than the proposed action (Heller *et al.* 2008). This area included a 1,500-foot wide linear corridor extending approximately 1,000 feet on the flooded side and 500 feet on the protected side of the existing levee alignment center line. Background research identified two previously recorded archaeological sites within the general vicinity of the LPV 109 US 90 Crossing proposed action. As previously mentioned above, Site 16OR38 (Orleans Protection Levee) has been previously reported as destroyed and recent field investigations could not identify any cultural remains at the reported location. Site 16OR70 (Bayou Sauvage) was recorded in 1986 and has not been evaluated for NRHP eligibility. The site is located on opposite banks of Bayou Sauvage immediately west of the proposed action boundary and will not be indirectly impacted by proposed construction. No previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources sites are in the general vicinity of LPV 109 US 11 Crossing proposed action. No cultural resources would be indirectly impacted by the proposed actions.

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the Greater New Orleans metropolitan area and surrounding locations. The combined effects from construction of the multiple projects underway and planned for the HSDRRS would reduce flood risk and storm damage to cultural resources including archaeological sites, individual historic properties, engineering structures and historic districts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 1 would be similar to those occurring under the LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 2 would be similar to those occurring under the LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 109 US 90 and US 11 Crossings Alternative 3 would be similar to those occurring under the LPV 109 US 90 and US 11 Crossings proposed action.

LPV 110

Future Conditions with the Proposed Action

Direct Impacts to Cultural Resources

Implementation of the proposed action for LPV 110 would have no direct impacts on cultural resources. The proposed action boundaries were evaluated for cultural resources as part of a larger study conducted in 2008 (Heller *et al.* 2008). No previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources were identified in the proposed action boundaries and no field investigations were conducted. The proposed action is located entirely within the CSX Railroad and existing project rights-of-way and is situated in a low-lying, frequently flooded area. Previous railroad embankment, floodgate and levee construction has severely impacted the frequently flooded soil deposits. The likelihood for intact and significant cultural resources in the proposed action is considered extremely minimal.

Indirect Impacts to Cultural Resources

Implementation of the proposed action would provide an added level of flood protection to known and unknown cultural resources located on the protected side of the project area by reducing the damage caused by flood events.

Recent cultural resources investigations examined an area in the LPV 110 reach that is much larger than the proposed action (Heller *et al.* 2008). This area included a 1,500-foot wide linear corridor extending approximately 1,000 feet on the flooded side and 500 feet on the protected side of the existing levee alignment center line. Background research and soil/topographic analyses did not identify any previously recorded cultural resources or areas exhibiting a high potential for containing intact cultural resources within the general vicinity of the proposed action. No significant cultural resources would be indirectly impacted by the proposed action.

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the Greater New Orleans metropolitan area and surrounding locations. The combined effects from construction of the multiple projects underway and planned for the HSDRRS would reduce flood risk and storm damage to cultural resources including archaeological sites, individual historic properties, engineering structures and historic districts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 110 Alternative 1 would be similar to those occurring under the LPV 110 proposed action.

LPV 111

Future Conditions with Proposed Action

Direct Impacts to Cultural Resources

Implementation of the proposed action for LPV 111 would have no direct impacts on cultural resources. The proposed action boundaries were evaluated for cultural resources as part of a larger study conducted in 2008 (Heller *et al.* 2008). No previously recorded cultural resources

are located in the proposed action boundaries. Soil and topographic analyses identified one area exhibiting a high potential for containing intact cultural resources. This land parcel (07-06) was investigated, and one potential cultural resource was identified (Locus 07-06-01). Researchers determined that the site is a natural or disturbed shell deposit that does not represent a cultural resource. The majority of the proposed action has been previously impacted by levee construction and borrow material excavation and is mostly situated in low-lying, frequently flooded areas. The likelihood for intact and significant cultural resources in the proposed action is considered extremely minimal.

Indirect Impacts to Cultural Resources

Implementation of the proposed action would provide an added level of flood protection to known and unknown cultural resources located on the protected side of the project area by reducing the damage caused by flood events.

Recent cultural resources investigations examined an area in the LPV 111 reach that is much larger than the proposed action (Heller *et al*. 2008). This area included a 1,500-foot wide linear corridor extending approximately 1,000 feet on the flooded side and 500 feet on the protected side of the existing levee alignment center line. Background research did not identify any previously recorded cultural resources. Phase 1 investigation in one land parcel (07-06) did not identify any significant cultural resources. No significant cultural resources would be indirectly impacted by the proposed action.

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the Greater New Orleans metropolitan area and surrounding locations. The combined effects from construction of the multiple projects underway and planned for the Lake Pontchartrain Hurricane Protection System would reduce flood risk and storm damage to cultural resources including archaeological sites, individual historic properties, engineering structures and historic districts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 111 Alternative 1 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 111 Alternative 2 would be similar to those occurring under the LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Cultural Resources

Direct, indirect and cumulative impacts to cultural resources resulting from LPV 111 Alternative 3 would be similar to those occurring under the LPV 111 proposed action.

3.2.9. Recreational Resources

Existing Conditions

Recreational resources near the project area are identified in Figure 8. Lake Pontchartrain is an important recreational resource and provides boating and fishing opportunities for the Metropolitan New Orleans area. Levees along Lake Pontchartrain provide a trail system that is used by the public for walking, running, and bicycling. The Lake Pontchartrain levee along LPV 108 is connected to an I-10 exit ramp by a bike trail. The GIWW also is an important boating and fishing resource and provides access for recreational boaters and fisherman to coastal marshes and bays south and east of the project area. There are several boat launches in the project area, including those located at Bayou Sauvage and Chef Harbor.

Several parks administered by the City of New Orleans Recreation Department are located just west of the project corridor. The 187-acre Joe W. Brown Memorial Park, located about 2.5 miles southwest of the project corridor, was temporarily closed following Hurricane Katrina, but partially re-opened on 30 June 2007. The park includes an indoor swimming pool, a full-size soccer field, tennis courts, and several basketball hoops. Several smaller neighborhood parks, such as Goretti Playground, are located in developed areas west of the project corridor. Additionally, Eastover Golf Course, located in the Eastover gated community was comprised of two 18-hole courses. The Eastover Golf Course was severely damaged by Hurricane Katrina. The golf course partially re-opened for a period of time, but has since closed. A portion of the vacant golf course was discussed in IER 19 and is approved as a potential contractor-furnished borrow source for CEMVN projects.

Six Flags New Orleans amusement park is located in the vicinity of the project area (south of LPV 108 and east of Paris Road) and closed in 2005 after being destroyed by Hurricane Katrina, and is not scheduled to reopen. Lincoln Beach is located along the south shore of Lake Pontchartrain just west of LPV 108. It operated from 1939 through 1965 until other beaches and amusement parks in the New Orleans area were desegregated. The facilities included rides, games, a swimming pool, beach front swimming, and a venue for live music performances. Lincoln Beach has remained closed since 1965.

Bayou Sauvage NWR was established in 1990. The refuge is one of the last remaining tracts of contiguous marsh located adjacent to Lake Pontchartrain, and encompasses approximately 23,000 acres. The refuge contains a wide variety of habitat, including bottomland hardwoods, fresh and brackish water marshes, lagoons, canals, borrow pits, cheniers, and natural bayous. Much of the refuge is located within hurricane risk reduction levees (LPV 108 – 111) built to protect New Orleans East from storm surges and flooding. A network of pumps and flap-gated structures regulate water levels seasonally to encourage summer growth of emergent plants that, in turn, provide waterfowl food supplies in winter.

Discussion of Impacts

Future Conditions with No Action for LPV 108

The no action alternative for LPV 108 would complete the previously authorized action. Dredging activities and placement of foreshore protection would have temporary impacts to recreational uses of the Lake Pontchartrain shoreline in LPV 108. This could temporarily impact fishing and boating activities in the area.

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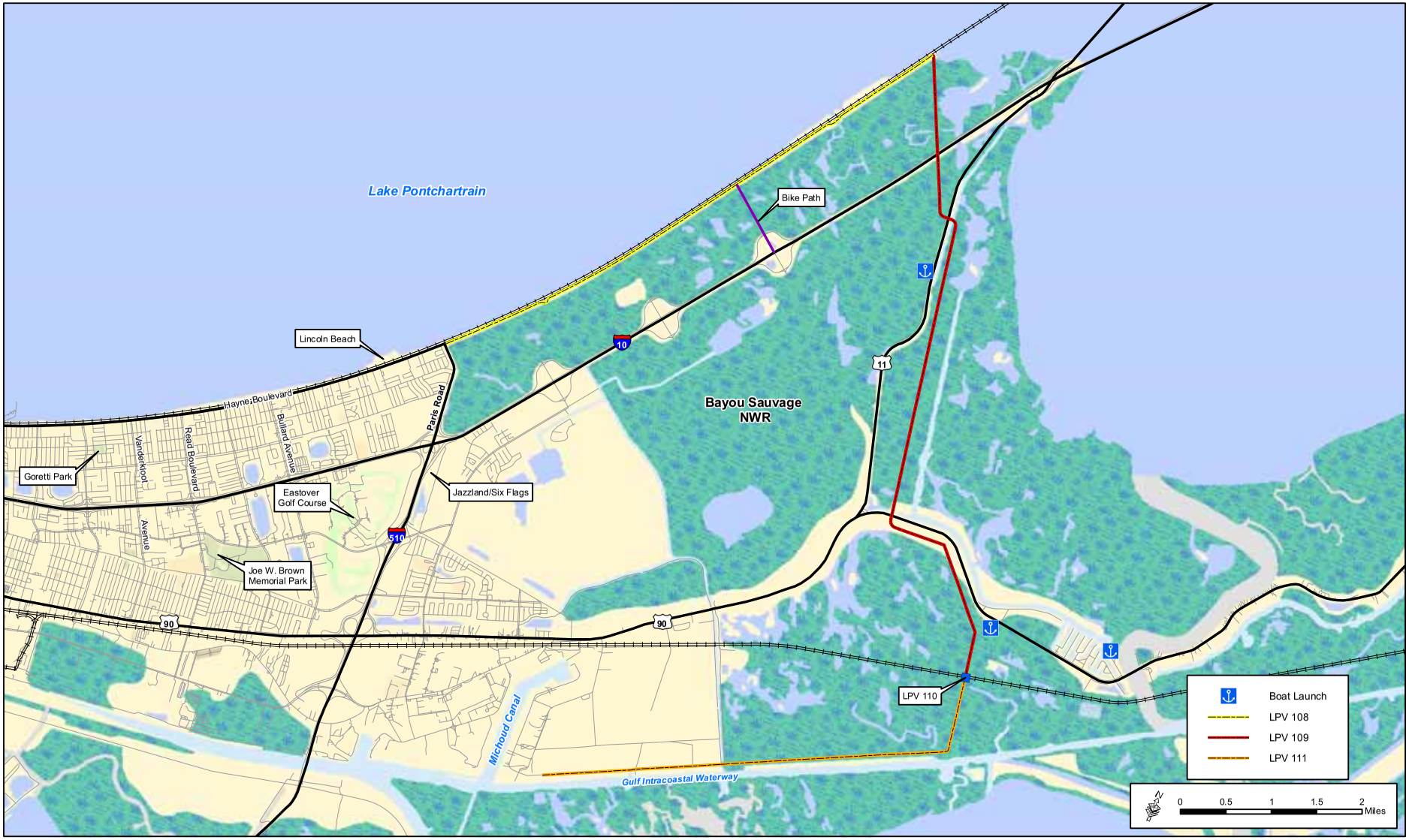

Figure 8: Recreational Resources near the Project Corridor

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Future Conditions with No Action for LPV 109, 110 and 111

Construction activities along LPV 109 to raise the levee to the previously authorized elevation and to meet current design criteria would temporarily disrupt recreational uses of the levee corridor and the bike trail connecting I-10 to the LPV 108 levee, and cause disturbance to fishing, hunting and bird watching activities in Bayou Sauvage NWR. Following completion of construction, the improved levee corridor would allow for pedestrian access by the public, except during periodic maintenance activities. With the previously authorized level of the HSDRRS, local parks managed by the City of New Orleans Recreation Department, and Bayou Sauvage NWR would be at greater risk from flooding during large tropical storms events.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Recreational Resources

The LPV 109 proposed action would result in temporary increased noise levels near construction activities. Increased noise levels during construction would impact recreation opportunities such as hunting, fishing and bird watching at Bayou Sauvage NWR. Noise levels would return to pre-construction levels following construction. A Special-Use Permit from Bayou Sauvage NWR would be required for all construction and maintenance activities. An existing bike trail that connects I-10 to Lake Pontchartrain and LPV 108 would be used for staging and would not be available for recreational use during construction activities. Following construction activities, the bike trail would be returned to use, and any damage to the bike trail from storage of heavy equipment would be repaired.

Indirect Impacts to Recreational Resources

Hurricane and storm damage risk reduction of recreational facilities in New Orleans East and managed areas of Bayou Sauvage NWR from flooding would provide long-term indirect benefits.

Cumulative Impacts to Recreational Resources

Dredging activities proposed for access to the Lake Pontchartrain shoreline for foreshore protection improvements along LPV 106 and LPV 108; the construction of a gated structure at Seabrook; and the construction of floodwall/gates system at the GIWW, MRGO, Bayou Bienvenue and the Golden Triangle marsh would contribute to the cumulative temporary impacts to fishing and recreational boating in Lake Pontchartrain. Regionally, other HSDRRS projects; the IHNC Lock Replacement project and construction of the I-10 Twin Span Bridge across Lake Pontchartrain would involve construction activities on levees and floodwalls, causing temporary cumulative impacts to recreational resources from noise and closures of facilities to allow for ingress and egress of construction equipment. However, following the completion of these construction projects, access and noise in the vicinity of recreational facilities would return to pre-construction levels. The reduced risk of hurricane and storm damage could provide incentive to rebuild damaged recreational facilities.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Recreational Resources

Although the footprint of the stability berms for levee under Alternative 1 would be greater than the proposed action, direct, indirect and cumulative impacts to recreational resources would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Recreational Resources

Constructing an I-10 ramp over LPV 109 would have no impacts to recreational resources.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Recreational Resources

Constructing an I-10 bridge over the LPV 109 levee would have no impacts to recreational resources.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Recreational Resources

The replacement of the US 90 and US 11 floodgates and floodwalls would not have any direct impacts to recreational resources. Temporary lane closures on US 90 and US 11 would reduce the accessibility of boat ramps and require boaters to travel around detours. Cumulative impacts

to recreational resources would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Recreational Resources

The direct, indirect and cumulative impacts to recreational resources would be the same as described for the LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Recreational Resources

The direct, indirect and cumulative impacts to recreational resources would be the same as described for the LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Recreational Resources

The direct, indirect and cumulative impacts to recreational resources would be the same as described for the LPV 109 US 90 and US 11 Crossings proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Recreational Resources

The replacement of the LPV 110 floodgate and floodwalls would have no impacts to recreational resources.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Recreational Resources

The retrofit of the LPV 110 floodgate and floodwalls would have no impacts to recreational resources.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources from construction noise would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources from construction noise would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Recreational Resources

Direct, indirect and cumulative impacts to recreational resources from construction noise would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Recreational Resources

A T-wall cap would reduce the width of the accessible portion of the levee top, and could restrict some types of recreational access, such as bicycling. Further, a T-wall cap would restrict views of the GIWW and adjacent coastal marshes from the levee top, impacting passive recreational uses of LPV 111 such as bird watching. Cumulative impacts to recreational resources from construction noise would be similar to those occurring under the LPV 109 Levee Section proposed action.

3.2.10. Aesthetics (Visual) Resources

Existing Conditions

Visually, the project area exhibits primarily a natural landscape altered by urban development that is surrounded by flood risk reduction measures. The project corridor is located within Bayou Sauvage NWR, but is bisected by numerous transportation corridors, including I-10, US 11 and US 90. Lake Pontchartrain is located at the northern portion of the project area, the GIWW at its southern portion and Bayou Sauvage NWR in the middle. Damages to infrastructure along US 90 and US 11 resulting from Hurricane Katrina and consequent rebuilding efforts continue to detract from the visual character of the project area's landscape. Large industrial facilities, such as the National Aeronautics and Space Administration's (NASA) assembly facility are visible from the western end of LPV 111. Bayou Sauvage NWR contains a wide variety of natural elements including bottomland hardwood covered cheniers, fresh and brackish water marshes, lagoons and bayous. Much of the refuge is located within flood risk reduction measures, including earthen berm levees, floodwalls, floodgates and pumping stations for forced drainage. Most of the project area is remote and visually inaccessible to most, as it is largely undeveloped.

Discussion of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 would consist of completing the previously authorized action. It is not anticipated that there would be any short-term or long-term impacts to visual resources from the placement of riprap and improvement to foreshore protection along the shoreline of Lake Pontchartrain, since foreshore protection is already in place, and the shoreline is located along the base of a railroad abutment.

Future Conditions with No Action for LPV 109, 110 and 111

Direct, Indirect and Impacts to Visual Resources

The visual attributes of the project corridor would be temporarily impacted by construction activities necessary to raise components of the project to the previously authorized elevation. In the long-term, maintenance activities, such as the transport of materials and equipment to and from the project corridor, would have periodic visual impacts. However, the project area is

remote and visually inaccessible to most, and any impacts would last only through the period when the replacements-in-kind are under construction or when the maintenance activities are occurring.

Cumulative Impacts to Visual Resources

Cumulatively, the visual impacts caused by risk reduction measures regionally and nationwide may be considered significant. Flood prone natural landscapes protected by unnatural visual conditions similar to the proposed project may be increasingly converted to developable land. Land development that may be considered visually distressing depending on the complexity of natural or cultural elements lost.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct and Indirect Impacts to Visual Resources

With implementation of the proposed action, the direct and indirect impacts to visual resources are minimal. Visually, the vast majority of the footprint of disturbance necessary to construct the proposed action is within the existing right-of-way in areas where similar risk reduction measures and other civil works infrastructure currently exists. The movement of material and construction of the risk reduction measures would also have minimal impacts to visual resources. The visual attributes of the project corridor would be temporarily impacted by construction activities at the project sites and by transport activities needed to move equipment and materials to and from the sites. However, the project area is remote and visually inaccessible to most area residents, and visual impacts would last only through the period when the risk reduction measures are under construction. The long-term impacts to visual resources would be minimal.

Cumulative Impacts to Visual Resources

Cumulatively, the visual impacts caused by risk reduction measures regionally and nationwide may be considered significant. Flood prone natural landscapes protected by unnatural visual conditions similar to the proposed project may be increasingly converted to developable land. Land development can be considered visually distressing depending on the complexity and type of lost natural or cultural elements.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be similar to those occurring under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be similar to those occurring under the LPV 109 Levee Section proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be similar to those impacts described for LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Visual Resources

Direct, indirect and cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Visual Resources

Although the LPV 111 project corridor is remote, a T-wall cap would have long-term direct impacts to visual resources. Much of the GIWW and adjacent coastal marshes would not be visible from the levee top, and visitors to Bayou Sauvage NWR and nearby developed areas would have views of the surrounding area interrupted by hard structure on top of the levee instead of vegetated levee slopes. Cumulative impacts to visual resources would be the similar to those described under the LPV 109 Levee Section proposed action.

3.2.11. Air Quality

Existing Conditions

The Federal Clean Air Act requires that all states comply with National Ambient Air Quality Standards (NAAQS). NAAQS have been developed for seven pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), and two forms of particulate matter (PM 10 – particulate matter with a diameter of 10 micrometers or less; and PM 2.5 - particulate matter with a diameter of 2.5 micrometers or less). Orleans Parish is classified as in attainment for all NAAQS pollutants (USEPA 2008).

Discussion of Impacts

Future Conditions with No Action for LPV 108

The LPV 108 no action would consist of completing the previously authorized action. Temporary impacts on air quality would occur from the operation of construction equipment and dredges. No long-term impacts to air quality would occur from foreshore protection improvement.

Future Conditions with No Action for LPV 109, 110 and 111

Temporary impacts on air quality would occur from the operation of equipment and disturbance of soils during the construction of levees, floodwalls and foreshore protection in order to meet the previously authorized elevation for risk reduction measures in the project area.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Air Quality

Temporary and minor increases in air pollution would occur from the operation of construction equipment and disturbance of soils from levee improvements. Operation of construction equipment and support vehicles would also generate volatile organic compounds (VOC), PM 10, PM 2.5, NO_2, CO, O_3 and SO_2 emissions from gasoline and diesel engine combustion. Particulate emissions (fugitive dust) would be generated by activities that disturb and suspend soils, such as equipment operating on disturbed soils, bulldozing, compacting, truck dumping, and grading operations, but would be minimized through best management practices such as watering of disturbed soils during construction activities.

Calculations were performed to estimate the total combustible air emissions from all construction activities. Calculations were made for tug boat and clamshell dredge (with the assumption that dredging at nearby locations such as LPV 108 would occur simultaneously with T-walls and levees in LPV 109, LPV 110, and LPV 111 proposed actions) and standard construction equipment, such as pile drivers, generators, cement trucks, back hoes, cranes, and bulldozers, using emission factors from the USEPA approved emission model NONROAD6.2. The emissions from supply trucks and workers commuting to work were also included in the analysis. Fugitive dust calculations were made for disturbing the soils while constructing T-walls, and were calculated using emission factors from Midwest Research Institute (1996). A summary of the total emissions for all three reaches (LPV 109, 110 and 111), assuming a worst case scenario, in which construction within all three reaches could occur simultaneously, is presented in Table 4. See Appendix E for model input variables and results.

Table 4. Total Air Emissions (tons/year) from Construction Activities

Pollutant	Total (tons/year)
CO	74.93
VOCs	16.42
NO_2	160.52
PM 10	80.87
PM 2.5	25.89
SO_2	20.19

Proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. Dust suppression methods would be implemented to minimize fugitive dust emissions. All impacts to ambient air quality are expected to be short-term and minor, and are not expected to cause or contribute to a violation of Federal or state ambient air quality standards.

Indirect Impacts to Air Quality

No indirect impacts to air quality in the region are anticipated from the implementation of LPV 109 proposed action.

Cumulative Impacts to Air Quality

Air emissions from other construction activities in the region would have adverse temporary cumulative impacts to air quality. Following the completion of levee construction there would be no further incremental contribution to air emissions until levee maintenance is required, which would cause additional short-term air emissions from construction equipment. Other HSDRRS projects, such as levee and floodwall improvements in New Orleans East and borrow projects, would cause soil disturbance and the potential for increases in fugitive dust. However, standard construction best management practices would be implemented in all HSDRRS projects, reducing these temporary cumulative impacts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality resulting would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.
LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Air Quality

Direct, indirect and cumulative impacts to air quality would be similar to those occurring under LPV 109 Levee Section proposed action.

3.2.12. Noise

Existing Conditions

Noise is generally described as unwanted sound, which can be based either on objective effects (*i.e.*, hearing loss, damage to structures) or subjective judgments (*e.g.*, community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). The threshold of human hearing is 0 dB, and the threshold of discomfort or pain is 120 dB. Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). Sounds occurring at night generally produce a greater annoyance than do the same sounds occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 A-weighted decibels (dBA; the relative loudness of sounds in air as perceived by the human ear) louder than the same level of noise during the day. DNL is the community noise metric recommended by the USEPA and has been adopted by most Federal agencies (EPA 1974). A DNL of 65 dBA is the impact threshold most commonly used for noise planning purposes, and represents a compromise between community impact and the need for activities like construction. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974).

The DNL in the project corridor is affected by traffic on I-10, and to a lesser extent by vehicles on US 90 and US 11. Trains utilizing the NSRR and CSX Railroad tracks also contribute to DNL in the project area. There are very few sensitive receptors (residences, schools, churches and day care centers) in the project area, since most of the project is located adjacent to Lake Pontchartrain or in Bayou Sauvage NWR. However, the project corridor approaches sensitive noise receptors (within 1,000 feet) in the following areas:

- Most of the LPV 109 reach is in the Bayou Sauvage NWR. However, near US 90 and US 11, the levee approaches commercial facilities and a few residential receptors.

- LPV 110 and LPV 111 are entirely located within the Bayou Sauvage NWR. There are no commercial or residential receptors in the area.

Description of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 would consist of completing the previously authorized action. No noise impacts from the placement of foreshore protection and dredging operations are anticipated. There are no sensitive receptors along the shoreline of Lake Pontchartrain in the LPV 108 reach, and all activities would occur on the lake side of the NSRR, where noise emissions from trains already exceed 65 dBA.

Future Conditions with No Action for LPV 109, 110 and 111

Under the no action alternative, noise receptors near the LPV 109 project corridor would experience additional noise associated with construction activities associated with raising structures to the previously authorized elevation. Noise-generating construction activities would primarily be pile driving, grading and movement of vehicles. Maintenance activities would also periodically involve noise-generating construction activities throughout the project area. The Lakefront to Michoud Canal project area would continue to experience noise emissions exceeding 65 dBA from trains on the NSRR and CSX Railroad, traffic along I-10, and continuing reconstruction efforts for the limited business and residences located along US 11 and US 90.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Noise

Table 5 presents noise emission levels for construction equipment expected to be used during the proposed construction activities. Anticipated sound levels at 50 feet range from 76 dBA to 91 dBA based on data from the Federal Highway Administration (FHWA; 2007).

Table 5. A-Weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances[1]

Noise Source	50 feet	100 feet	200 feet	500 feet	1,000 feet
Backhoe	78	72	68	58	52
Crane	81	75	69	61	55
Dump Truck	76	70	64	56	50
Excavator	81	75	69	61	55
Front end loader	79	73	67	59	53
Concrete mixer truck	79	73	67	59	53
Auger drill rig	84	78	72	64	58
Bull dozer	82	76	70	62	56
Pile driver	91	85	79	71	65

Source: FHWA 2007
1. The dBA at 50 feet is a measured noise emission. The 100- to 1,000-foot results are modeled estimates.

Depending upon the length of time of construction, and the number, type, and distribution of construction equipment being used, DNL in the project area could temporarily exceed 65 dBA up to 200 feet from the project area. However, no sensitive receptors are located near the levee sections of LPV 109.

Indirect Impacts to Noise

Indirect impacts from construction-related noise emissions include disruption to normal lifestyle activities, stress and other emotional responses. Additionally, noise emissions indirectly affect wildlife and recreational users.

Cumulative Impacts to Noise

Other construction activities associated with HSDRRS projects such as the Seabrook gate structure, foreshore protection and levee improvements along Lake Pontchartrain in New Orleans East, renovation and rebuilding activities, construction of the I-10 Twin Span Bridge replacement, and daily transportation-related noise emissions (*e.g.*, air traffic from takeoff and landing at New Orleans Lakefront Airport, NSRR, ship traffic in the IHNC and vehicular traffic on Hayne Boulevard and Paris Road) would collectively contribute to increased noise emissions during LPV 109 construction activities.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Noise

There are no residential or commercial receptors in the vicinity of the LPV 109 I-10 crossing, therefore no noise-related impacts would occur.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts would be the same as LPV 109 I-10 Crossing proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise resulting from LPV 109 US 90 and US 11 Crossings would be similar to those occurring under LPV 109 Levee Section proposed action. Six temporary residences (camps) located within 1,000 feet of the proposed US 11 floodwall and floodgate construction would be temporarily exposed to DNL greater than 65 dBA during construction activities. No other sensitive receptors are located near the LPV 109 project corridor.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts would be similar to those occurring under LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts would be similar to those occurring under LPV 109 US 90 and US 11 Crossings proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Noise

There are no sensitive receptors within 1,000 feet of LPV 110; therefore, there would be no direct noise impacts during construction activities. Indirect and cumulative impacts to noise resulting from LPV 110 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be the same as LPV 110 proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Noise

There are no sensitive receptors within 1,000 feet of LPV 111; therefore, there would be no direct noise impacts during construction activities. Indirect and cumulative impacts to noise resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be the same as LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be the same as LPV 111 proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Noise

Direct, indirect and cumulative impacts to noise would be the same as LPV 111 proposed action.

3.3. TRANSPORTATION

Existing Conditions

Regional transportation includes a series of connecting deep-draft ports extending from the mouth of the Mississippi River and the Gulf of Mexico to points north of the City of Baton Rouge, Louisiana, more than 200 miles upstream. This transportation network includes adjacent shallow-draft waterways, major rail lines, trucking companies, and limited access highways, as well as the streets and bridges supporting the urban center and evacuation routes needed in response to hurricanes that pass through the region. The metropolitan community also includes commercial airline services.

The New Orleans Transportation Plan (City of New Orleans 2004) lists several road segments in the vicinity of the project area as primary arterials and collectors. Bullard Avenue and Louisiana Highway 47 (LA 47; Paris Road) are perpendicular to the project corridor and carry traffic between I-10 and Lake Pontchartrain. Hayne Boulevard (Photograph 7) is located just west of LPV 108 and carries east- and west-bound, cross-town traffic along the Lake Pontchartrain shoreline between LA 47 and the Seabrook Bridge over IHNC. LA 47 begins in St. Bernard

Parish as Paris Road and runs concurrently with Interstate-510 to I-10. North of I-10, LA 47 continues as Paris Road and runs along the lakefront as Hayne Boulevard up to Downman Road.

Photograph 7. Hayne Boulevard at the Bullard Avenue Intersection Looking West

I-10 is the most southern of the east-west interstate highways in the Interstate Highway System, and links Jacksonville, Florida with Los Angeles, California. I-10 is a six-lane divided highway in New Orleans East and provides access from suburban areas in St. Tammany Parish and the Mississippi Gulf Coast to the New Orleans Central Business District. I-10 is also a hurricane evacuation route, providing access to other interstate highways, such as Interstate 59 that allows for evacuation to northeastern Mississippi and northwestern Alabama. The most recent average daily traffic count for I-10 at the US 11 intersection was conducted in 2004 (prior to Hurricane Katrina) and totaled 55,439 vehicles (DOTD 2008). This was less than half the average daily traffic count of I-10 at the high rise bridge over the IHNC (112,633 vehicles), located west of the project area.

US 90 (Chef Menteur Highway) is a four-lane undivided highway in New Orleans East and provides access to industrial and commercial areas in New Orleans, as well as access to the New Orleans Central Business District and suburban areas of St. Tammany Parish and the Mississippi Gulf Coast. The 2004 average daily traffic count for US 90 east of the US 11 intersection was 4,695 vehicles (DOTD 2008).

US 11 is a two-lane highway (Photograph 8) that originates in New Orleans East where it merges with US 90 just west of LPV 109. US 11 crosses Lake Pontchartrain to the east and continues through Slidell, Pearl River, Mississippi and follows the Interstate 59 corridor through Mississippi. The 2004 average daily traffic count for US 11 east of the US 90 intersection was 4,431 vehicles (DOTD 2008).

Photograph 8. US 11 Floodwall and Floodgate at LPV 109

The CSX Railroad, which bisects the LPV 109 levee, operates approximately 140 miles of track connecting New Orleans to Mississippi and other routes to the east. The CSX Railroad tracks connect to a major CSX rail yard in New Orleans (Gentilly), the CSX Intermodal Terminal in New Orleans, and the CSX Transflo Bulk Transfer Terminal in New Orleans. The CSX Railroad passing through the project area handles 220,000 rail carloads of freight annually (CSX Railroad 2008).

NSRR, which parallels Hayne Boulevard along the south shore of Lake Pontchartrain, is one of the six largest national railroads in New Orleans (City of New Orleans 2004). It controls the "back belt," a strategic segment of rail from City Park through Old Metairie to East Bridge Junction near Central Avenue in Jefferson Parish. This route is substantially shorter, quicker, and more cost effective for through rail traffic than the "front belt" along the crescent of the Mississippi River. NSRR services down river wharfs at Alabo Street, Domino Sugar Refinery, Chalmette Slip, Port of St. Bernard industrial area along the Mississippi River, and the east bank of Plaquemines Parish.

Description of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 would consist of implementing the previously authorized action. There would be no impacts to any transportation routes from the placement of riprap and improvement to foreshore protection.

Future Conditions with No Action for LPV 109, 110 and 111

Levee and floodwall segments in the New Orleans East drainage area, including LPV 109, would be raised to the previously authorized elevation, and the ingress and egress of construction equipment to these levee segments would temporarily impact traffic on adjacent roadways such as I-10, US 90 and US 11. After completion of raising levees, floodwalls and floodgates to the previously authorized elevation, all highways in New Orleans East would be at a greater risk of flooding in the event of a large tropical storm event similar to Hurricane Katrina. All roadway segments and the CSX Railroad in the project area are currently within the existing levee alignment, or cross into the protected portions of the project area, but would be inundated in the event of overtopping of authorized flood risk reduction measures. The majority of NSRR is on the lakeside of the existing levee alignment and would continue to be subject to flooding. In the event of a large-scale flood event, all road segments in the project corridor, including I-10, would be temporarily inaccessible.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Transportation

Construction easements and transport of equipment and materials along haul routes, which includes movement of construction equipment and trucks along nearby roads and highways would temporarily impede vehicle traffic on Hayne Boulevard, Paris Road, I-10, US 90 and US 11, and result in a temporary reduction of the level of service (LOS; a metric describing traffic volume relative to capacity) on these local road segments. Traffic on US 90 and US 11 is typically light compared to traffic on I-10, and construction equipment movement would have a minor temporary impact to traffic on these highways. Trucks and equipment accessing construction corridors would likely damage pavement on city streets and highways. Flagmen, signage, cones, barricades and detours would be used where required to facilitate movement of construction equipment, construction materials, and local traffic on these roadways. Construction servitude would be obtained to use the existing hike and bike trail asphalt road between the levee and I-10 as a staging area. The construction duration is estimated to take 14 months for the I-10 crossing and 20 to 24 months for US 90 and US 11 crossings.

Indirect Impacts to Transportation

Any temporary reduction in LOS on I-10 during T-wall and ramp construction would cause some commuters to look for an alternative route. US 90 and US 11 both provide alternative commuting routes from Slidell across Lake Pontchartrain to New Orleans. The temporary reduction in LOS from I-10 and T-wall construction would indirectly increase traffic during commute hours on US 90 and US 11.

Cumulative Impacts to Transportation

Increased truck traffic in the region would be anticipated with the implementation of other large construction projects such as the Seabrook gate structure, levee and floodwall improvements in New Orleans East (LPV 105 – LPV 108), borrow projects and the IHNC Lock Replacement project. This includes the transportation of large volumes of borrow material, and thousands of H-piles and sheetpiles to construction sites. A large lay-down yard in New Orleans East would be used for the construction of the IHNC surge barrier, and the access to construction areas of the GIWW would be along the existing GIWW and Michoud Canal levees. Borrow sites identified in New Orleans East would generate truck trips both locally to provide material for projects in New Orleans East, and regionally to other HSDRRS projects. The cumulative impacts of increased construction traffic include temporary traffic delays and damage to road surfaces. Furthermore, other HSDRRS projects, such as the Jefferson Parish Lakefront Levee project, in combination with ongoing road construction projects (replacement of the I-10 Twin Span Bridge over Lake Pontchartrain, improvements to the Huey P. Long Bridge widening, and I-10 expansion in Jefferson Parish) require temporary modifications of major arterials (*e.g.*, Causeway approach), causing short-term adverse impacts to vehicular traffic. Although some significant temporary cumulative traffic impacts would be realized, the LOS for most surface streets in New Orleans East is high and traffic volumes in these areas post-Katrina have decreased dramatically.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Transportation

The implementation of the LPV 109 Levee Section Alternative 1 would have greater direct impacts to transportation since construction activities would require a longer period of time than the proposed action. Indirect and cumulative impacts to transportation would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts to transportation would be similar to those described under the LPV 109 Levee Section Alternative 1.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts to transportation as would be similar to those described under the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts to transportation as would be similar to those described under the LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Transportation

To maintain traffic flow during the I-10 ramp construction activities, a temporary three-lane wide bridge would be constructed. Any lane closures of I-10 to reroute traffic to or from the temporary bridge would be scheduled to not occur during hurricane season so I-10 would continue to provide access as a hurricane evacuation route. Cumulative impacts would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Transportation

Because of the length and height of the bridge needed to cross an LPV 109 levee, and the required reconstruction of the western end of the existing I-10 Twin Span Bridge crossing Lake Pontchartrain, Alternative 1 would require extensive lane closures on I-10 while traffic is rerouted to sections of a temporary three-lane wide bridge. The estimated length of construction for this alternative is 1 year longer than the proposed action. Long-term impacts would occur to traffic because of the steepness of the grade necessary to minimize impacts to the existing I-10 Twin Span Bridge approaches. The 3 percent grade would cause heavy trucks to experience some speed loss on approach of the new LPV 109 crossing and slow traffic on I-10. Cumulative impacts would be the same as described for the LPV 109 Levee Section proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Transportation

Temporary lane closures would occur during the floodgate and floodwall replacement at US 90 and US 11. However, traffic would be maintained during construction. No long-term impacts are anticipated from the floodgate replacement. Cumulative impacts would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Transportation

Because of limited right-of-way, periodic temporary closures of US 90 and US 11 would occur during the construction of the embankment and ramp over the LPV 109 levee. It is likely that throughout the length of construction, traffic would be limited to only one lane, and speeds would be severely restricted or stopped for two-way traffic through a single lane. No long term traffic impacts are anticipated. Cumulative impacts would be the same as described for the LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts would be the same as the LPV 109 US 90 and US 11 Crossings proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Transportation

Construction access to the LPV 110 project area would occur from US 90. Ingress and egress to the construction area from US 90 could cause some temporary interruption in traffic flow on US 90 at the LPV 109 crossing. The LPV 110 proposed action would not cause the disruption of rail traffic on the CSX Railroad, and CEMVN would coordinate with CSX to insure that construction activities would be compatible with rail traffic and that CSX safety requirements would be included in construction contracts. Indirect and cumulative impacts to local road traffic would be similar to those described occurring under the LPV 109 Levee Section proposed action alternative.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts would be the same as the LPV 110 proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Transportation

The LPV 111 proposed action would result in direct, indirect and cumulative impacts to local road traffic similar to those described occurring under the LPV 110 proposed action. A crossing of the CSX Railroad would be needed for delivery of materials and construction equipment to the project site, and all CSX safety requirements for construction traffic would be included in LPV 110 construction contracts. Cumulative impacts to transportation would be the same as LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Transportation

Direct impacts to transportation from ingress and egress of construction traffic would occur for a longer duration (approximately 2 years longer) under LPV 111 Alternative 1 than under the proposed action. Indirect and cumulative impacts to transportation would be similar to the LPV 111 proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts would be similar to LPV 111 Alternative 1.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Transportation

Direct, indirect and cumulative impacts would be similar to LPV 111 Alternative 1.

3.4. SOCIAL AND ECONOMIC RESOURCES

Existing Conditions

Impacts of Hurricane Katrina included loss of life, destruction of homes and businesses, damage and disruption to public facilities and services, high unemployment, loss of income, disruption and closure of local institutions, and in many cases, the loss of neighborhood unity. The destruction of so many thousands of housing units has delayed the immediate return to the metropolitan area for many residents, whether or not employment has been available.

Land and Water, Minerals, Fisheries, Forestry, and Agriculture
The east bank section of New Orleans is highly urbanized and much of it was devastated by Hurricane Katrina. While some of the residential sections along the Lake Pontchartrain survived the impacts of the surge, wind damage, and levee breaks of the hurricane without severe damage, many more experienced severe damage and destruction and the creation of millions of cubic yards of debris. Efforts are underway to restore land and water developments. Economic activities in Orleans Parish are focused more on tourism, port activities, and industrial processing, rather than the production of minerals, fisheries, forestry, and agriculture.

Business and Industry, Employment and Income
The project area includes businesses, employment, and income opportunities in New Orleans East. Historically, New Orleans is one of the older urban centers in the U.S., developing from its natural waterways, port facilities and services, commercial fisheries, ship building, oil and gas production, NASA space programs, and its tourism, entertainment, and convention facilities. Tables 6 through 10 summarize selected information on business, industry, employment and income in the project area. Table 6 compares selected economic data within Orleans Parish and the state, with shipments and sales ranging from 2.5 percent (manufacturing shipments) to more than 16 percent (service employment). Table 7 shows employment data, comparing declines between July 2005 and July 2006 and 2007. The data in Table 8 indicate that total employment in Orleans Parish as of the fourth quarter of 2006 was 160,000, while employment as of the second quarter in 2005 was more than 244,000. Table 9 shows the sharp drop in per capita personal income in the parish between 2004 and 2005, largely due to hurricane damages. Table 10 shows a comparison of Orleans Parish and state data as of 2004; but comparable data following the hurricanes are not yet available. Note also that Table 10 data for 2004 are for "household income" rather than "family income."

Population and Housing
Tables 11, 12, and 13 summarize population and housing in Orleans Parish. As the economy and transportation systems of the Greater New Orleans metropolitan area evolved, population and housing increased until the 1960s. Due to the maturation of NASA programs, the development of limited access interstate highways, and construction of additional Mississippi River bridge crossings, the suburban population expanded and the population of Orleans Parish declined. Table 11 shows census population estimates from 1980 to 2006 and Table 12 shows provisional estimates between 2000 and 2006. Note that a sharp population decline occurred in Orleans Parish between 2005 and 2006 due to damage caused by Hurricane Katrina. The U.S. Census Bureau indicates that population in Orleans Parish has returned from less than 200,000 on January 2006 to 223,388 by July 2006. As of July 2007, GCR and Associates, Inc. has estimated that population in the City of New Orleans has increased to 273,598. Many of the people who have returned to the metropolitan area are still living in Federal Emergency Management Agency (FEMA) trailers while housing units are being repaired or reconstructed. Even if the housing units were not destroyed by the hurricane, but severely damaged, many people who lived in apartments or multi- and single-family units were unable to return following Hurricane Katrina. Table 13 shows historical trends of the housing units within parishes that include the project site.

Table 6. 2002 Economic Census Summary of Selected Data (Shipments and Sales at $1,000s)

	Manufacturing			Wholesale Trade			Retail Trade			Services	
	Units	Shipments	Employees	Units	Sales	Employees	Units	Sales	Employees	Units	Employees
Orleans	225	2,226,191	8,584	448	2,792,080	5,693	1,722	3,158,341	19,628	6,164	119,757
% of Louisiana	6.4	2.5	5.7	7.6	5.9	7.7	9.8	7.5	8.6	12.9	16.1
Louisiana	3,521	$ 89,540,799	150,401	5,904	$ 47,192,153	73,548	17,613	$ 41,885,192	228,290	47,791	741,738

* In some instances, data within individual parishes were withheld to avoid disclosure of individual companies and in some cases underestimate totals within the study area.

Source: U.S. Department of Commerce, Bureau of the Census, 2002 Economic Census. (Latest sources comparable)

Table 7. Labor Force, Employment, Unemployment, July 2005 through July 2007

Parish	July 2007 Civilian Labor Force	Employed	Unemployed Rate (%)		July 2006 Civilian Labor Force	Employed	Unemployment Rate (%)		July 2005 Civilian Labor Force	Employed	Unemployment Rate (%)
Orleans	152, 733	145,286	4.9		149,207	142,434	4.5		202,350	189,949	6.1
% of Louisiana	7.6	7.5	-		7.4	7.4	-		9.5	9.5	-
Louisiana	2,020,784	1,932,315	4.4		2,010,899	1,930,393	4.0		2,122,078	2,004,493	5.5

Source: State of Louisiana Department of Labor, Labor Market Statistics.

Table 8. Employment Subject to the Louisiana Employment Security Law Units by North American Industry Classification System Codes and Average Employment, Fourth Quarter 2006

		Orleans Parish, 2006 Fourth Quarter				Louisiana, 2006 Fourth Quarter		
	NAICS Code	Total Units	Average Employment	Quarter, Total Wages ($)	Average Weekly Wage ($)	Total Units	Average Employment	Average Weekly Wage ($)
Orleans/Louisiana Employment and Wages		11,771	160,069	1,958,474,097	941	123,654	1,843,779	748
Agriculture, forestry, fishing and hunting	11	13	55	486,923	681	1,569	11,349	566
Mining	21	78	3,669	108,664,372	2,278	1,659	47,606	1436
Utilities	22	26	1,063	13,851,121	1,002	841	14,203	967
Construction	23	619	6,046	83,356,819	1,061	11,788	140,896	879
Manufacturing	31-33	248	7,256	102,462,961	1,086	4,296	155,394	1036
Wholesale trade	42	688	4,524	74,883,078	1,273	7,986	73,709	1034
Retail trade	44-45	1,511	10,964	82,551,453	579	17,238	227,399	468
Transportation and warehousing	48-49	325	9,476	132,342,743	1,074	4,770	79,770	950
Information	51	207	3,085	36,650,292	914	1,765	29,066	797
Finance and insurance	52	622	6,065	115,932,542	1,470	8,342	58,886	979
Real estate and rental and leasing	53	491	2,314	23,937,267	796	5,301	34,968	831
Professional and technical services	54	1,796	13,290	285,153,242	1,650	13,067	80,358	1190
Management of companies and enterprises	55	52	3,444	53,421,422	1,193	592	21,912	1116
Administrative and waste services	56	687	10,568	97,872,728	712	6,325	98,901	577
Educational services	61	160	17,613	192,509,737	841	1,060	164,914	632
Health care and social assistance	62	970	15,547	182,394,836	902	11,714	258,450	725
Arts, entertainment, and recreation	71	190	6,302	42,313,711	516	1,555	40,261	513
Accommodation and food services	72	1,223	21,972	123,975,763	434	8,331	156,767	289
Other services, except public administration	81	1,349	4,896	39,087,636	614	10,260	49,626	561
Public administration	92	147	11,428	161,894,411	1,090	3,142	96,447	755

Source: Louisiana Department of Labor, employees subject to the Louisiana Employment Security Act.

Table 9. Per Capita Personal Income, from 1970 through 2005

Study Area	2005*	2004	2000	1995	1990	1985	1980	1970
Orleans	$12,837	$31,344	$25,523	$21,564	$17,657	$13,564	$9,599	$3,719
Louisiana	$24,664	$27,297	$ 23,079	$19,077	$15,173	$12,113	$ 8,777	$3,090
United States	$34,471	$33,050	$29,845	$23,076	$19,477	$14,758	$10,114	$4,085

* Note- As explained by U.S. Department of Commerce, Bureau of Economic Analysis (BEA), the data includes losses of personal income following Hurricane Katrina.
Source: BEA.

Table 10. Median Family and Household Incomes, 1959 through 1999, and 2004

Parishes	2004*	1999	1989	1979**	1969**	1959**
Orleans	$27,355	$32,338	$22,182	$25,140	$23,422	$18,863
Louisiana	$35,216	$39,774	$26,313	$30,310	$23,689	$16,764
United States	$44,334	$50,046	$35,225	$33,374	$30,169	$22,210

*The 2004 data available are for median household income rather than family income. ** Income estimates for 1979, 1969, and 1959 adjusted to 1989 CPI dollars.
Sources: U.S. Department of Commerce, Bureau of the Census; and U.S. Census Bureau QuickFacts (2004).

Table 11. Census Population of the Project Area, 1980 through 2006

PARISHES	2006	2000	1990	1980	1980-90 %Change	1990-00 %Change	2000-06 %Change
Orleans	223,338	484,674	496,938	557,515	-10.9	-2.5	-53.9
% of Louisiana	17.4	10.8	11.8	13.3	-	-	-
Louisiana Total	4,287,768	4,468,976	4,219,973	4,205,900	0.3	5.9	-4.1

Source: U.S. Bureau of the Census; Louisiana Tech University Provisional Population estimates of 2006. (Louisiana Health Public Institute 2006)

Table 12. Population Estimates, July 1, 2000 through July 1, 2006

Parishes	Population Estimates								
	July 1, 2006	July 1, 2005	July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000	July 1, 2000-2006	% Change
Orleans	223,338	454,863	461,115	467,592	472,409	477,632	483,560	-260,222	-53.8
% of Louisiana	17.4	23.3	23.5	23.7	23.8	24.0	24.2	-	-
Louisiana	4,287,768	4,523,628	4,506,685	4,490,380	4,475,003	4,465,258	4,469,495	-181,727	-8.1

Source: U.S. Department of Commerce, Bureau of the Census, Annual Estimates of the Population for Counties of Louisiana: April 1, 2000 to July 1, 2006 (CO-EST2005-01-22) (U.S. Census Bureau 2006)

Table 13. Housing Units in Project Area, 1980 through 2006

PARISHES	2006 Households	2005 (pre- Katrina)	2000	1990	1980	1980-2006 % change
Orleans	86,316	213,137	215,091	225,573	226,680	-38.0
% of Louisiana	N/A	-	11.6	13.1	14.6	-
Louisiana Total	N/A	1,940,399	1,847,181	1,716,229	1,548,523	-
% Change	-	5%	7.6%	10.8%		-

Sources: U.S. Bureau of the Census; provisional estimates of Enhancement of the U.S. Census Bureau
2006 Annual Population Estimates from the 2006 Louisiana Health and Population Survey (Louisiana Health Public Institute 2006)

The larger New Orleans Metropolitan Statistical Area (MSA) that includes the City of New Orleans (Orleans Parish) and Jefferson, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany Parishes totaled 1,124,000 in 1970, increasing to about 1,319,000 by July 2005, prior to Hurricane Katrina. The estimated population of the MSA as of July 1, 2006 was about 1,064,000, some 255,000 people less than the previous year. The American Red Cross estimated that about 135,000 housing units in the New Orleans MSA were destroyed by Katrina, while many more were severely damaged.

Property Values, Tax Revenue, Public Facilities and Services
The project area provides risk reduction for a highly urbanized area of the City of New Orleans, including a wide range of commercial and residential properties with a wide range of values, as well as public facilities and services, utilities, public transit, streets and bridges, police and fire protection facilities and services, schools and educational services, and hospitals and health care services dependent upon a local tax base. Many of these properties and services have been severely impacted from damages caused by Hurricane Katrina. The New Orleans metropolitan area is one of the largest market centers in the southeastern U.S., with unique resources discussed in the above paragraphs on economic developments, influencing property values. The 2000 census estimated that the owner-occupied housing units specified in Orleans Parish had a median value of $87,300, slightly greater than the $85,000 estimate for the state, and less than the median value of $98,700 for the larger New Orleans MSA. The effects of Hurricane Katrina have led to lower property values in neighborhoods adjacent to the proposed project right-of-way.

Community and Regional Growth
Generally desirable community and regional growth is considered to be growth supported by local and regional institutions through economic developments, social programs, and the human environment, including water resource development supported by neighborhoods and metropolitan areas as reflected by employment, income, and population trends. While total employment and population within the immediate area of the community adjacent to the project site have tended to decline in recent decades, the larger MSA has increased as adjacent suburban areas have expanded. As previously mentioned, the effects of Hurricane Katrina have included severe damage to communities immediately adjacent to the project area, the New Orleans MSA, and a larger region extending for about 200 miles along the Gulf coast. The Louisiana Recovery Authority (LRA) estimates that Hurricanes Katrina and Rita caused the destruction of 200,000 housing units and 18,000 businesses, many of which have not been restored, influencing community and regional growth. The Greater New Orleans Community Data Center and other reports have pointed out that some of the deepest flooding in New Orleans was adjacent to southeastern Lake Pontchartrain, and these areas are experiencing difficulty in recovery.

Health and Safety
The immediate project sites do not include health and safety facilities providing related services. One of the functions of the HSDRRS is to reduce the risk to health and safety created due to severe storms and hurricanes. The limitations of the existing systems and their costs when failures occur can be catastrophic, as in the case of Hurricane Katrina, and to some degree Hurricane Rita. The LRA estimated that 1,464 fatalities occurred from Hurricane Katrina, with 135 residents still missing. Some lived in areas of New Orleans East. Both Hurricanes Katrina and Rita reduced the availability of health facilities and services, and required additional fire and police protection. In addition to the damages to hospitals, police stations, and fire stations, many employees providing related services have lost their homes, reducing the staff needed to operate health and safety services. As many as 30 hospitals were initially closed following the hurricanes, with as many as 141 hospital/clinic/facilities damaged at various levels of impact. Some facilities remain closed, and dislocated employees may not have returned.

Community Cohesion

Community cohesion is the unifying force of conditions that provide commonality within a group. These characteristics may include such things as race, education, income, ethnicity, religion, language, and mutual economic and social benefits. Community cohesion has been described as the unifying force that bonds people 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. Conditions brought about by water resource development can impact community cohesion through changing a right-of-way that can divide a community, cause the dislocations of a significant number of residents, or require the relocation of an important local institution, such as a church or community center. In some cases, mitigation may be required; however, the basic objectives of water resource development have essentially been to provide additional security through flood control and hurricane risk reduction, improved navigation, environmental restoration, and recreation through civil works, as needed by the local community, region, and Nation. Public involvement with the community is part of this process. Many residents and businesses adjacent to the project area were destroyed by Hurricane Katrina, reducing the potential for community cohesion. Currently a number of Federal, state, and local organizations, businesses, schools, religious and other non-profit organizations, and other institutions have participated in the recovery of New Orleans following Hurricane Katrina, a reflection of social bond, community cohesion, and national support.

Environmental Justice

Based on two directives, E.O. 12898 ("Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations," 1994) and "Department of Defense's Strategy on Environmental Justice" (March 24, 1995), Environmental Justice analysis will identify and address, as appropriate, disproportionately high, and adverse human health or environmental effects of the Lakefront to Michoud Canal project on minority and low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the study area, as well as community outreach activities such as environmental justice stakeholder meetings

Census Block Group statistics from the 2000 Census and ESRI estimates were utilized for environmental justice data analysis. The proposed actions and alternatives were evaluated for potential disproportionately high, environmental effects on minority or low-income populations.

As the project planning process advances, environmental justice impacts will be analyzed further when additional project planning data become available. Aerial photos were utilized to confirm the presence of habitation in the various project areas, and to analyze potential environmental justice impacts.

The Lakefront to Michoud Canal project impacts many neighborhoods within all of New Orleans East by providing 100-year hurricane protection. The neighborhoods within New Orleans East include Little Woods, Pine Village, West Lake Forest, Read Boulevard East and West, Plum Orchard, Viavant/Venetian Isles, Village de l'Est, and Lake Catherine. According to the U.S. Census, New Orleans East in general was a minority, non-low income community in 2000. The low income and minority population changed little from 2000 to 2007 (Table 14). Therefore, it is probable New Orleans East remains a minority, non-low income community.

Table 14. Minority Population 2000 to 2007

	IER 7 Project Area		New Orleans East		Orleans Parish		Louisiana	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Minority Population, 2000	13,012	84.6%	85,029	89.0%	355,803	73.4%	1,689,422	37.8%
Estimated Monthly Population, 2007	3,805	89.0%	25,369	90.6%	168,017	63.4%	1,741,453	39.8%
Low Income Population, 2000	3,308	22.3%	19,315	20.5%	130,896	27.9%	851,113	19.6%
Estimated Low Income Population, 2007	268	20.0%	1,696	18.9%	24,726	24.4%	351,703	21.4%

Note: 2007 does not use the equivalent definition for "low income" due to the limited information available at the Block Group Level. In 2000, the definition is equivalent to all populations living below the poverty line, whereas in 2007, the definition uses all households earning less than $15,000 per year.

Description of Impacts

Future Conditions with No Action for LPV 108

The no action for LPV 108 would consist of completing the previously authorized action. There would be no adverse socioeconomic impacts from the placement of riprap and improvements to foreshore protection. Construction activities would provide a temporary socioeconomic benefit to the region from local spending and employment.

Future Conditions with No Action for LPV 109, 110 and 111

Construction activities associated with raising LPV 109 to the previously authorized elevation, and long term maintenance of LPV 109, 110 and 111 would provide a direct socioeconomic benefit through local spending and employment. Relative to providing the 100-year level of risk reduction, raising the HSDRRS to the previously authorized level of risk reduction would expose New Orleans East to a greater risk of flooding. With a greater risk of flooding, the potential for future development could be limited. This decline may eventually have the cumulative impact of higher demand for land in other, more protected areas. Impacts to mineral production, commercial fishing, forestry, and agriculture would be minor, since these resources are not currently contributing as much to the Orleans Parish economy as tourism, port activities, and other market forces. Recreational fishing and boating are important to the local economy, and may decline somewhat if previous levels of risk reduction are not restored.

Businesses and industries planning to maintain operations in the future without improvements to the HSDRRS would eventually experience additional costs for increasing levels of risk, adversely affecting adjacent businesses, employment and income. Those with marginal success may need to move to more protected areas further inland. Without adequate risk reduction, businesses, employment, and income could be subject to decline as the threat of flood damage continues. Furthermore, the increased risk may limit the demand for additional housing construction and associated residential population, or increase the cost of construction and flood insurance.

Without HSDRRS improvements, property values in the marginally protected areas may decline, while the value of more protected adjacent areas may gradually increase. Similarly, public facilities and services in the New Orleans metropolitan area, including those services for health and safety that depend on a local tax base, would decline on a relative basis within areas adjacent to the project corridor. Additionally, the potential for community and regional recovery in the

New Orleans area could decline as periodic threats from storms continue and residents tend to relocate elsewhere. The social bond of the adjacent community would have no additional risk reduction than previously authorized.

LPV 109 Levee Section

Future Conditions with Proposed Action

Direct Impacts to Social and Economic Resources

Although the proposed action is the least costly of all the alternatives evaluated for LPV 109 (with an estimated cost of $382.3 million), construction activities would provide a temporary direct socioeconomic benefit through local spending and employment. In the long-term, providing 100-year level of risk reduction would improve and maintain land area in the immediate vicinity of the Lakefront to Michoud Canal project in New Orleans East, contribute to improvements to eastern boundaries of LPV and allow FEMA certification of that level of risk reduction providing an economic benefit to the community. No significant adverse impacts to mineral or fisheries production have been identified. Orleans Parish does not produce quantities of forestry or agricultural products that would be impacted from floodwall and levee construction. No construction-related impacts to businesses and industries and related employment within the right-of-way would occur; however, many businesses, employment, and income have been severely impacted from Hurricane Katrina.

New right-of-way would be required for the improvements to the LPV 109 levee. Increased right-of-way would primarily be acquired from Bayou Sauvage NWR, and would have limited impacts to property tax revenues. Almost the entire length of the levee alignment of LPV 109 is away from inhabited areas. The LPV 109 work will not exert any direct or indirect environmental justice impacts because there will not be disproportionate impacts from other alternatives. .

Indirect Impacts to Social and Economic Resources

With the 100-year level of HSDRRS, the probability of residential destruction from a storm event would decline. The population of more of these neighborhoods, which are provided a greater level of risk reduction, may return. No changes in land use in the vicinity of the LPV 109 project corridor are anticipated as a result of the proposed action.

Cumulative Impacts to Social and Economic Resources

The proposed LPV 109 improvements are a part of the HSDRRS, and would add value for various purposes ranging from industrial, commercial, residential, institutional, and public immediately adjacent to the developments of Orleans Parish. The proposed structures would add to community and regional growth and recovery. Although the 100-year level of risk reduction would add to improvements for much of the New Orleans area, the potential for damages from hurricane storm surges would still exist, but with a reduced level of risk. Emergency procedures for evacuation would still be needed within the community and region.

The proposed LPV 109 project features risk reduction to highly populated communities in the City of New Orleans that have common bonds, with some dependent upon risk reduction adjacent to the levees and floodwalls. With respect to the larger metropolitan area, community cohesion may improve through improved flood and hurricane risk reduction, continued national economic development, and social well-being. The additional risk reduction would cover the entire parish, and would not disproportionately put a burden on minority or low-income populations.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct, indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct, indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

A substantially greater level of local expenditure would occur under this alternative since it is the most costly to build (with an estimated construction cost of $714.2 million). Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 4

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct, indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 109 I-10 Crossing

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

All improvements to I-10 would occur within the existing I-10 right-of-way and the total expenditure for the construction of the I-10 crossing is estimated to be $23 million. Therefore, the direct, indirect and cumulative impacts to socioeconomics and land use resulting from LPV 109 I-10 Crossing proposed action would be similar to those occurring under LPV 109 Levee Section proposed action. This I-10 crossing of LPV 109 is not located near any inhabited area. Therefore, the construction of an I-10 ramp crossing would not cause any direct or indirect environmental justice impacts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

The local expenditures for construction of Alternative 1 would be substantially greater than the proposed action. The construction cost is estimated to be $46 million. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 I-10 Crossing proposed action.

LPV 109 US 90 and US 11 Crossings

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

All improvements to US 90 and US 11 would occur within the existing DOTD rights-of-way. The total construction cost is estimated to be $65.9 million and would have a short-term beneficial impact locally in the form of expenditures for supplies and equipment and job creation. Indirect and cumulative impacts to socioeconomics and land use resulting from LPV 109 US 90 and US 11 Crossings proposed action would be similar to those occurring under LPV 109 Levee section proposed action. The US 11 crossing is located away from inhabited areas, while the US 90 crossing is in close proximity to a large commercial establishment at the northeast corner of the intersection. The improvements at either crossing would not exert direct or indirect environmental justice impacts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

The total local expenditures would be greater than the proposed action because construction costs for Alternative 1 are estimated to be substantially greater ($95.5 million). Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct impacts to socioeconomics and land use would be similar to Alternative 1. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 US 90 and US 11 Crossings proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct impacts to socioeconomics and land use would be similar to Alternative 1. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 US 90 and US 11 Crossings proposed action.

LPV 110

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Local spending and job creation would occur from construction activities, which are estimated to cost $6.5 million. Indirect and cumulative impacts to socioeconomics and land use resulting from LPV 110 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

The direct, indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

LPV 111

Future Conditions with Proposed Action

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Local expenditures and short-term job creation would occur from construction activities, which are estimated to cost $558.3 million. Indirect and cumulative impacts to socioeconomics and land use resulting from LPV 111 proposed action would be similar to those occurring under LPV 109 Levee Section proposed action. The LPV 111 corridor is not located near any residential area. Therefore, the LPV 111 levee improvements and T-wall replacement at Pump Station No. 15 would not exert any direct or indirect environmental justice impacts.

Future Conditions with Alternative 1

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Local expenditures would be less than the proposed action because the estimated cost of construction for LPV 109 Levee Section Alternative 1 is $361 million. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 2

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct impacts to socioeconomics and land use would be similar to Alternative 1. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

Future Conditions with Alternative 3

Direct, Indirect and Cumulative Impacts to Social and Economic Resources

Direct impacts to socioeconomics and land use would be similar to Alternative 1. Indirect and cumulative impacts to socioeconomics and land use would be similar to those occurring under LPV 109 Levee Section proposed action.

3.5. HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

CEMVN is obligated under ER 1165-2-132 to assume responsibility for reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within the vicinity of the proposed action. ER 1165-2-132 identifies CEMVN's HTRW policy to avoid use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (*e.g.*, Resource Conservation and Recovery Act 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.

ASTM E 1527-05 Phase I Environmental Site Assessments (ESA) were completed for the project area. A copy of the Phase I ESAs will be maintained on file at CEMVN. The Phase I ESAs documented the Recognized Environmental Conditions (REC) for the project area. If a REC cannot be avoided due to the necessity of construction requirements, CEMVN may further investigate the REC to confirm presence or absence of contaminants, actions to avoid possible contaminants, and determine if local, state or Federal coordination is required. Because CEMVN plans to avoid RECs, the probability of impacting HTRW in the project area is low. A site reconnaissance, conducted 6 April 2009, revealed no new additional HTRW concerns.

LPV 109

There were no REC's identified within the levee footprint or within 1,000 feet of the levee. However, there were suspected RECs identified near the project area. Four underground storage tanks at Schaffer's Grocery were documented as being "Active" as of 23 March 2001 (Earth Tec, Inc. 2007a). The potential exists that a release occurred from one or more of them or that a release occurred when the area was flooded. The two abandoned portable toilets, previously identified in reach LPV 108 near South Point, may contain human waste. Further, abandoned boats and an abandoned house within 1,000 feet of the LPV 109 levee may contain fuels and lubricants, and may also contain hazardous substances. The potential exists for a release from one or more of these boats. Suspected RECs within the LPV 109 footprint would be handled according to Phase I ESA documentation. Clean-up of leaks or hazardous waste spills would occur if required due to potentially hazardous conditions. If evidence of contamination is observed once ground disturbance occurs within the project corridor, removal and clean-up of hazardous materials would be required.

LPV 110

No RECs were recorded within 1,000 feet of the LPV 110 proposed action alignment (EarthTech, Inc. 2007b).

LPV 111

Three suspected RECs were recorded within 1,000 feet of the LPV 111 proposed action alignment (EarthTech, Inc. 2007c):

- The former BOC Gases facility (metals, petroleum products and potentially solvents);
- The Canal Pump House No. 1 (known throughout this document as Pump Station No. 15) located approximately midway along the northeast-trending stretch of the levee (petroleum products and potentially solvents); and
- One abandoned portable toilet (human wastes).

Suspected RECs within the LPV 111 footprint would be handled according to Phase I ESA documentation. Clean-up of leaks or hazardous waste spills would occur if required due to potentially hazardous conditions. If evidence of contamination is observed once ground disturbance occurs within the project corridor, removal and clean-up of hazardous materials would be required.

4. CUMULATIVE IMPACTS

NEPA requires a Federal agency to consider not only direct and indirect impacts of a proposed action, but also cumulative impacts of the action. Cumulative impacts are defined as the "the impact to the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The HSDRRS is divided into three USACE authorized projects: 1) LPV; 2) WBV; and 3) New Orleans to Venice. WBV and New Orleans to Venice projects are not discussed further because their alignments are not located within the project region. The LPV project was authorized by Section 204 of the Flood Control Act of 1965 (P.L. 89-298 as amended), and currently provides for enlargement of hurricane risk reduction levees along Lake Pontchartrain in Orleans, Jefferson, and St. Charles Parishes and in portions of Orleans and St. Bernard Parishes between the Mississippi River and MRGO. Impacts of Hurricane Betsy on New Orleans in September 1965 (81 deaths and billions of dollars in property damage) prompted Congress to authorize the LPV project to protect areas in the vicinity of Lake Pontchartrain and surrounding parishes from storm surges. Various projects that make up the LPV have resulted in construction of 125 miles of levees, concrete floodwalls and other structures. The LPV project has provided increasing levels of storm surge risk reduction for the New Orleans area as funding for various component projects has been approved during the past 40 years.

Following Hurricane Katrina, it was recognized that portions of the levees and floodwalls that comprise the LPV project were never constructed to authorized elevations, had not been maintained to keep previously constructed structures at the authorized elevation, and had specific design vulnerabilities. Therefore, CEMVN is in the process of implementing construction projects to raise the hurricane and storm damage risk reduction levees and floodwalls associated with the LPV project to authorized elevations and new design criteria.

In addition to ongoing construction in association with raising levee and floodwall elevations to authorized levels within various reaches of the LPV project, CEMVN is planning to raise levees, floodwalls, and floodgates, and construct new structures within all reaches of the LPV to provide 100-year level of risk reduction. This includes modifications in St. Charles Basin, Jefferson East Bank Basin, Orleans East Bank Basin, remaining portions of New Orleans East Basin not covered by this IER, and Chalmette Loop Basin. Levee improvements throughout the LPV project would require substantial amounts of borrow material, and borrow sites have been identified to provide adequate material in proximity to proposed risk reduction projects. In addition to modifying and raising existing structures, three new outfall canal closure structures are proposed at 17th Street, Orleans Avenue, and London Avenue canals in Orleans East Bank Basin, and new gated surge barriers are proposed at Seabrook and in the GIWW, MRGO and Bayou Bienvenue. All of these HSDRRS projects are currently in design and construction stages, and impacts from these component projects will be addressed in separate IERs and in the CED.

Replacement of the lock structure at the IHNC and integration of the new lock structure into the risk reduction system is also in planning stages. This involves construction of a new lock within the IHNC north of Claiborne Avenue, raising the North Claiborne Avenue Bridge, replacing the St. Claude Avenue Bridge, demolishing the existing lock, and disposal of over 2 million cubic yards of dredged material.

CEMVN is also involved in other regional risk reduction and coastal restoration planning efforts. Louisiana Coastal Protection and Restoration (LACPR) efforts involve comprehensive planning

for protection and restoration for all of coastal Louisiana. LACPR is working to finalize the technical report. CEMVN is closing the MRGO at the Bayou LaLoutre ridge, which will stop all maritime access (deep-draft and shallow-draft) in the MRGO to the Gulf of Mexico from the IHNC. The closure structure is being constructed of riprap and built to an elevation of +7 feet NAVD 88, connecting the historic Bayou LaLoutre ridgeline. Once completed, there would be no further access for maritime traffic between the Mississippi River, Breton Sound and Gulf of Mexico to the eastern leg of the GIWW besides the IHNC lock. As part of this closure, CEMVN is implementing an MRGO Ecosystem Restoration Study that would lead to the restoration of all areas affected by the MRGO navigation channel. CEMVN, as well as other Federal agencies, participate in coastal restoration projects through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). These are specific prioritized restoration projects implemented coast-wide by Louisiana Department of Natural Resources (LDNR), Coastal Restoration Division in cooperation with Federal agencies. Within Lake Pontchartrain Basin there are 14 projects proposed or constructed under CWPPRA designed to restore, enhance or build marsh habitat and prevent erosion of marsh habitat. Projects involve numerous protection and restoration methods, including rock armored shoreline protection breakwaters, dredged material marsh construction, marsh terracing and planting, fresh water and sediment diversion projects, and modification or management of existing structures.

Rebuilding efforts are taking place throughout southeast Louisiana and along the Mississippi and Alabama Gulf Coast. The Insurance Information Institute (2007a) has estimated that total insured losses from Hurricane Katrina were $40.6 billion in six states; and in Louisiana, insured losses are estimated at nearly $26 billion (Insurance Information Institute 2007b); much of those insured losses will be a component of regional rebuilding efforts. Although it is unknown how many structures will be rebuilt in Orleans Parish and throughout the Gulf Coast over the next 5 to 10 years, a large-scale rebuilding effort is underway. FEMA is providing funding to the various public agencies in the City of New Orleans and St. Bernard Parish for rebuilding efforts. This includes funding for street repairs, including 6,000 city blocks in Orleans Parish, sidewalk repairs, repairs to damaged sewer and potable water infrastructure, and repairs or replacement of public buildings.

To assist in guiding rebuilding efforts by planning district, a District Plan for New Orleans East was prepared as part of the Unified New Orleans Plan, which is a comprehensive post-Katrina planning effort required by the New Orleans City Charter and the Louisiana Recovery Authority. The planning effort was developed through an interdisciplinary team led by the New Orleans Community Support Foundation and Community Support Organization. Funding for the planning was provided by the Greater New Orleans Foundation, Rockefeller Foundation, Bush-Clinton Katrina Fund and DaimlerChrysler. Each District Plan recommends specific prioritized projects for future implementation. The District Plan for New Orleans East primarily focuses on housing recovery, redevelopment of neighborhood parks and schools, a regional library, utility and transportation upgrades, Lakefront Airport relocation and redevelopment, and redevelopment of retail shopping complexes.

Several transportation projects in the area are proposed, including the replacement of the Almonaster Bridge over the IHNC. The replacement of the Almonaster Bridge with a four-lane bridge would make Almonaster Boulevard a continuous four-lane roadway from Franklin Avenue to Interstate 510 and Old Gentilly Road in Eastern New Orleans. Further, the existing bridge, which is now nearly 90 years old, suffers from chronic maintenance problems, and has been closed to vehicular traffic since Hurricane Katrina. The Almonaster Bridge also serves as the crossing for the CSX Railroad between their intermodal yard just east of the IHNC and the New Orleans Public Belt system that serves the extensive port facilities and other Class I railroads in the region, and a new bridge would make this crossing more reliable.

The widening of the I-10 high-rise bridge at the IHNC (north of the IHNC lock) to an eight-lane highway, with breakdown lanes, between the Almonaster exit of I-10 and Crowder Boulevard in eastern New Orleans is also proposed. The replacement of the I-10 Twin Span Bridge across Lake Pontchartrain from New Orleans East to Slidell is under construction. This project was initiated following Hurricane Katrina and will replace the existing bridge crossing. Once completed, portions of the existing bridge may be left for recreational purposes (*i.e.*, fishing).

Construction of T-walls and floodgates would have a short-term adverse cumulative impact to noise and transportation. As a part of rebuilding efforts associated with Hurricane Katrina and other HSDRRS projects, such as the proposed Seabrook floodgate at the IHNC and levee improvements along LPV 106 west of the project corridor, ongoing construction projects in New Orleans East would contribute to road closures and increased construction traffic, as well as increased noise levels in the region. It is anticipated that 140 million cubic yards of material would be needed to raise levee elevations regionally to meet the 100-year level of risk reduction. Additionally, thousands of H-piles and sheetpiles would be delivered to project construction sites. The total number of truck trips required, or haul routes, for the movement of this quantity of material is unknown, but cumulative short-term impacts to transportation would occur. Numerous sensitive receptors regionally would be exposed to DNL exceeding 65 dBA during nearby construction activities. However, because most of the proposed construction occurs within existing risk reduction corridors, no adverse cumulative impacts are anticipated for any other resource as a result of construction of T-walls and floodgates.

Dredging of channels in Lake Pontchartrain to complete foreshore protection in reaches LPV 106 and LPV 108, construction of the I-10 Twin Span Bridge, and construction of the Seabrook floodgate at the IHNC would have cumulative adverse impacts to water quality, fisheries, EFH, and Gulf sturgeon critical habitat through increased turbidity, suspension of contaminated sediments, increased sediment oxygen demand, and damage to SAV. Construction of HSDRRS projects would have significant cumulative impacts to wetlands, primarily through increased footprints of risk reduction structures.

The proposed action would have cumulative beneficial impacts to socioeconomics. The LPV project would be improved to provide additional hurricane, storm, and risk reduction, reducing the threat of inundation of infrastructure due to severe tropical storm events. Improved hurricane, storm, and risk reduction benefits all residents, regardless of income or race, increases confidence, reduces insurance rates, and allows for development and redevelopment of existing urban areas. Providing 100-year level of risk reduction would aid in the recovery and creation of businesses and industries, employment and income in the New Orleans area.

As indicated previously, in addition to this IER, the CEMVN is preparing a draft CED that will describe the work completed and the work remaining to be constructed. The purpose of the draft CED will be to document the work completed by the CEMVN on a system-wide scale. The draft CED will describe the integration of individual IERs into a systematic planning effort. Additionally, the draft CED will contain updated information for any IER that had incomplete or unavailable data at the time it was posted for public review. Overall cumulative impacts and future operations and maintenance requirements will also be included. Table 15 describes an overview of other HSDRRS projects that may contribute to the cumulative impacts previously discussed.

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Table 15. HSDRRS Impacts and Compensatory Mitigation to be Completed

IER	Parish		Non-wet fBLHBLH *acres*	Non-wet BLHBLH *AAHUs*	BLH (acres) *acres*	BLH AAHUs *AAHUs*	Swamp (Acres) *acres*	Swamp AAHUs *AAHUs*	Marsh (Acres) *acres*	Marsh AAHUs *AAHUs*	EFH (Acres) *acres*
1 LPV, La Branch Wetlands Levee	St. Charles	Protected Side	-	-	-	-	137.05	73.99	-	-	-
		Flood Side	-	-	11.33	8.09	143.57	110.97	-	-	-
2 LPV, West Return Floodwall	St. Charles, Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	33.40	9.00	-	-	-
3 LPV, Jefferson Lakefront Levee	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	26.00
4 LPV, Orleans Lakefront Levee	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
5 LPV, Outfall Canals	Jefferson	Protected Side	-	-	-	-	-	-	-	-	3.20
		Flood Side	-	-	-	-	-	-	-	-	
6 LPV, NOE Citrus Lakefront	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
10 LPV, Chalmette Loop Levee	St. Bernard	Protected Side	-	-	38.32	16.44	-	-	106.55	57.31	-
		Flood Side	-	-	35.31	14.22	-	-	323.04	209.94	-
11 Tier 2 Borgne IHNC Protection	Orleans, St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	15.00	2.59	-	-	186.00	24.33	-
12 GIWW, Harvey, Algiers	Jefferson, Orleans, Plaquemines	Protected Side	-	-	251.70	177.3	-	-	-	-	-
		Flood Side	-	-	2.30	1.90	74.90	38.50	-	-	-
13 WBV, Belle Chasse Basin	Plaquemines	Protected Side	-	-	40.00	24.01	1.00	0.66	-	-	-
		Flood Side	-	-	4.00	2.23	-	-	20.00	-	-
14 WBV, Westwego to Harvey Levee	Jefferson	Protected Side	-	-	45.00	30.00	-	-	-	-	-
		Flood Side	-	-	45.50	18.58	29.75	17.02	-	-	-
15 WBV, Lake Cataouatche Levee	Jefferson	Protected Side	-	-	23.50	6.13	-	-	-	-	-
		Flood Side	-	-	3.60	1.35	-	-	-	-	-
16 WBV, Lake Cataouatche Basin	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	24.10	11.30	-	-	62.00	29.85	-

Table 15, continued

IER	Parish		Non-wet fBLHBLH *acres*	Non-wet BLHBLH *AAHUs*	BLH (acres) *acres*	BLH AAHUs *AAHUs*	Swamp (Acres) *acres*	Swamp AAHUs *AAHUs*	Marsh (Acres) *acres*	Marsh AAHUs *AAHUs*	EFH (Acres) *acres*
17 Company Canal Floodwall	Jefferson	Protected Side	-	-	5.50	2.69	-	-	-	-	-
		Flood Side	-	-	-	-	19.00	17.09	-	-	-
18 GFBM	Jefferson, Plaquemines, St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
18 GFBM	Orleans	Protected Side	226.00	68.79	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
18 GFBM	St. Bernard	Protected Side	74.30	43.59	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
19 CFBM	Hancock County, MS; Iberville, Orleans, Plaquemines, St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
19 CFBM	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
22 GFBM	Jefferson	Protected Side	157.76	89.64	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
22 GFBM	Plaquemines	Protected Side	86.93	28.90	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
23 CFBM	Hancock County, MS; Plaquemines, St. Bernard, St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
25 GFBM	Jefferson	Protected Side	78.30	40.90	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
25 GFBM	Orleans	Protected Side	873.00	231.00	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
25 GFBM	Plaquemines	Protected Side	17.70	12.10	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
26 CFBM	Jefferson, Plaquemines, St. John the Baptist; Hancock County, MS	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
		Protected Side									

Table 15, continued

IER	Parish		Non-wet fBLHBLH *acres*	Non-wet BLHBLH *AAHUs*	BLH (acres) *acres*	BLH AAHUs *AAHUs*	Swamp (Acres) *acres*	Swamp AAHUs *AAHUs*	Marsh (Acres) *acres*	Marsh AAHUs *AAHUs*	EFH (Acres) *acres*
		Flood Side									
Totals		Protected Side	1473.09	514.92	404.02	256.57	138.05	74.65	106.55	57.31	3.20
		Flood Side	-	-	141.14	60.26	300.62	192.58	591.04	264.12	26.00
		Both	1473.09	514.92	545.16	316.83	438.67	267.23	697.59	321.43	29.20

Not applicable to the IER or number impacted is 0
GFBM: Government Furnished Borrow Material // CFBM: Contractor Furnished Borrow Material

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5. SELECTION RATIONALE

Based on the analysis of the potential environmental impacts to the human and natural environment described in this IER and the evaluation of the engineering effectiveness, risk and reliability, social acceptability and economic value, the proposed action alternatives for LPV 109 Levee Section, LPV 109 I-10 Crossing, LPV 109 US 90 and US 11 Crossings, LPV 110 and LPV 111 are the preferred alternatives. The selection of the proposed action alternatives is based on the best combination of cost effectiveness, schedule, environmental impacts and risk and reliability.

No realignment is proposed for LPV 109, 110 or 111. All three reaches would raise the existing levees and floodwalls to the 100-year level of risk reduction and replace existing floodgates with new floodgates at the higher elevation. The increased levee heights with levee slopes and stability berms that meet design criteria would substantially increase the structure's footprints, especially for the LPV 109 and LPV 111 levees. Although the LPV 109 Levee Section proposed action has the most impacts to wetlands, these impacts would be fully mitigated and described in a future mitigation IER.

Risk and reliability are critical measures used in selecting alternatives for HSDRRS implementation. The length of time necessary to complete the construction of risk reduction structures was considered in the selection of the proposed action alternatives. The goal of CEMVN is to provide the 100-year level of risk reduction by June 2011, and construction completion dates beyond June 2011 increase the temporal risk to metropolitan New Orleans. It was determined that all the LPV 109 and LPV 111 alternatives would require more time to construct, and engineering analyses have determined that LPV 109 Levee Sections Alternatives 2 and 3, LPV 109 I-10 Crossing Alternative 1, LPV 109 US 90 and US 11 Crossings Alternatives 1 and 2 and LPV 111 Alternatives 1 and 3 would likely not be completed by June 2011, due to complexity of design and availability of equipment and materials.

LPV 109 I-10 Crossing Alternative 1 would have unacceptable long-term impacts to I-10 due to grade changes that would reduce the speeds of large trucks and potentially lead to a reduced LOS on I-10. LPV 109 US 90 and US 11 Crossings Alternative 1 would have short-term closures of both US 90 and US 11 during embankment construction which would severely limit access to temporary residences (camps) and businesses located east of LPV 109, and limit commuter access to Slidell and the Gulf Coast.

The ability to construct an alternative to meet factors of safety and design criteria is also a concern for several of the alternatives and is considered in the selection of the proposed action alternatives. The underlying soils providing a foundation for risk reduction structures are very weak and the placement of additional material necessary to raise the elevation of structures requires substantial ground improvements. The proposed action alternatives for LPV 109, 110 and 111 provide the simplest and most reasonable measures for providing foundational soil stabilization. The alternatives evaluated for LPV 109 and LPV 111 that use lightweight fill to raise the levee elevation (LPV 109 Levee Section Alternative 4 and LPV 111 Alternative 2) would greatly reduce the requirements for soil improvements; however, there are greater risk concerns with using lightweight materials for levee construction. These materials are more susceptible to erosion during overtopping, and require additional levee slope protection measures to increase erosion protection. The complexity of using lightweight materials and additional levee slope protection measures in levee construction increases the difficulties in constructability for these alternatives. Retrofitting of existing floodgates (LPV 109 US 90 and US 11 Crossings Alternative 3 and LPV 110 Alternative 1) also increases the complexity of construction because of the large offset from the new levee centerlines imposed by these alternatives. Sharper angles in risk reduction structures would be necessary to match the alignment of the retrofitted

floodgates to the new centerline of the adjacent levees, increasing the risk and difficulty of constructability for the structures.

Cost of structures is also a consideration in making an alternative selection. Although CEMVN does not choose the least expensive alternative, the choice is made based upon overall value of the alternative. Many of the alternatives were substantially more costly to build than the proposed action for all three reaches. This was especially true for the construction of ramps or bridges at the US 90 and US 11 crossings of LPV 109 (LPV 109 US 90 and US 11 Crossings Alternatives 1 and 2) a bridge over a levee at the LPV 109 I-10 Crossing (Alternative 1), and the construction of a T-wall cap at LPV 111 (LPV 111 Alternative 3).

Other considerations such as long-term operations and maintenance, and real estate requirements were also considered in the selection of the proposed action alternatives. However, it was determined that for these concerns, there was little difference between the alternatives evaluated.

Taking no action would avoid direct temporary and long-term impacts from construction activities, including the permanent loss of 353.6 acres of wetlands and potentially significant short-term impacts to transportation. However, the no action alternative does not meet the project's purpose and need, and would have indirect impacts to local residences and businesses from damage due to a greater risk of flooding associated with large storm events and the costs of clean-up and debris removal following the storm event.

6. COORDINATION AND CONSULTATION

6.1. PUBLIC INVOLVEMENT

Extensive public involvement has been sought in preparation of this IER. The project analyzed in this IER was publicly disclosed and described in the *Federal Register* on 13 March 2007 and on the website www.nolaenvironmental.gov. Scoping for this project was initiated on 12 March 2007 through placement of advertisements/public notices in the *New Orleans Times-Picayune* and *USA Today*. After the scoping meetings, a 30 day public comment period was open for comment submission. CEMVN hosted public meetings on 24 July 2007; 25 October 2007; 10 March 2008; 29 April 2008; and 29 August 2008. The public was able to provide verbal comments during meetings and written comments after each meeting. Meetings were advertised in the *New Orleans Times-Picayune* 1 week prior to each meeting. Comments and concerns at these public meetings focused on the time frame for implementing the HSDRRS projects; how the NSRR impacts the levee; the height of the 100-year storm surge; the heights of the risk reduction measures; pump sizes and capacity; redevelopment of New Orleans East; air emissions concerns; and MRGO closure.

This draft IER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action will be held if requested by a stakeholder during the review period. Any comments received during this public meeting will be considered part of official record. After the 30-day comment period, and public meeting if requested, the CEMVN District Commander will review all comments received during the review period and make a determination if they rise to the level of being substantive in nature. If comments are not considered to be substantive, the District Commander will make a decision on the proposed action. This decision will be documented in an IER Decision Record. If a comment(s) is determined to be substantive in nature, an Addendum to the IER will be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period the District Commander will make a decision on the proposed action. The decision will be documented in an IER Decision Record.

6.2. AGENCY COORDINATION

Preparation of this IER has been coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in project planning and alternative analysis phases of the project (members of this team are listed in Appendix C). This interagency team was integrated with the CEMVN PDT to assist in planning of this project and to complete a mitigation determination of potential direct and indirect impacts. Monthly meetings with resource agencies were also held concerning this and other IER projects. The following agencies, as well as other interested parties, are receiving copies of this draft IER:

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, NOAA National Marine Fisheries Service
U.S. Natural Resources Conservation Service
Governor's Executive Assistant for Coastal Activities
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer

The CEMVN received a draft programmatic Coordination Act Report from the USFWS on 26 November 2007 (Appendix D). The USFWS' programmatic recommendations applicable to this project would be incorporated into project design studies to the extent practicable, consistent with engineering and public safety requirements. The USFWS' programmatic recommendations, and the CEMVN's response to them, are listed below:

Recommendation 1: To the greatest extent possible, situate flood protection so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized.

CEMVN Response 1: The proposed alignments for LPV 109, 110 and 111 avoid impacts to wetlands and non-wet bottomland hardwoods to the greatest extent possible. However, the increased levee heights and changes to levee slopes to meet design criteria require an increase in the levee footprints, which permanently impact 353.6 acres of marsh and forested wetlands in Bayou Sauvage NWR.

Recommendation 2: 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.

CEMVN Response 2: No wetlands would be enclosed by new levee alignments.

Recommendation 3: Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design project features and timing of construction.

CEMVN Response 3: No bald eagle nesting or wading bird colonies would be adversely impacted because none exist within the project area.

Recommendation 4: Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

CEMVN Response 4: The removal of trees in forested wetlands would be conducted in the fall or winter, if possible, to minimize impacts to nesting migratory birds. Alternatively, if trees would be removed during bird nesting season, preconstruction surveys for nesting birds would be conducted and all eggs and nestlings within the project area would be relocated before the start of construction.

Recommendation 5: The project's first Project Cooperation Agreement (or similar document) should include language that includes the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation features.

CEMVN Response 5: USACE Project Partnering Agreements do not mandate that funds be available for specific project features, but require the non-Federal sponsor to provide certification of sufficient funding for the entire project. Any mitigation components are considered a feature of the entire project. The non-Federal sponsor is responsible for all Operational, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features, as required by the USACE OMRR&R manual provided to the non-Federal sponsor upon completion of a project.

Recommendation 6: Further detailed planning of project features (*e.g.*, Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the USFWS, NOAA Fisheries, LDWF, USEPA, and LDNR. The USFWS shall be provided an opportunity to review and submit recommendations on all the work addressed in those reports.

CEMVN Response 6: Concur.

Recommendation 7: The CEMVN should avoid impacts to public lands, if feasible. If not feasible, the CEMVN should establish and continue coordination with agencies managing public lands that may be impacted by a project feature until construction of that feature is complete and prior to any subsequent maintenance. Points of contacts for the agencies overseeing public lands potentially impacted by project features are: Kenneth Litzenberger, Project Leader for the USFWS' Southeast National Wildlife Refuges, and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR, Office of State Parks contact Mr. John Lavin at 1-888-677-1400, National Park Service (NPS) contact Superintendent David Luchsinger, (504) 589-3882, extension 137 (david_luchsinger@nps.gov), or Chief of Resource Management David Muth (504) 589-3882, extension 128 (david_muth@nps.gov) and for the 404(c) area contact the previously mentioned NPS personnel and Ms. Barbara Keeler (214) 665-6698 with the USEPA.

CEMVN Response 7: Most of the permanent impacts from levee and floodwall construction would occur on public lands, and additional right-of-way would be required. CEMVN will coordinate with the Project Leader for the USFWS' Southeast National Wildlife Refuges concerning proposed construction activities.

Recommendation 8: If applicable, a General Plan should be developed by the CEMVN, the USFWS, and the managing natural resource agency in accordance with Section 3(b) of the Fish and Coordination Act for mitigation lands.

CEMVN Response 8: Concur.

Recommendation 9: If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements; a summary of some of those requirements is provided in Appendix A (to the draft Fish and Wildlife Coordination Act Report). Other land-managing natural resource agencies may have similar requirements that must be met prior to accepting mitigation lands; therefore, if they are proposed as a manager of a mitigation site, they should be contacted early in the planning phase regarding such requirements.

CEMVN Response 9: Concur.

Recommendation 10: If a proposed project feature is changed significantly or is not implemented within one year of the date of the Endangered Species Act consultation letter, the USFWS recommended that USACE reinitiate coordination to ensure that the proposed project would not adversely affect any federally-listed threatened or endangered species or their habitat.

CEMVN Response 10: Concur.

Recommendation 11: In general, larger and more numerous openings in a protection levee better maintain estuarine-dependent fishery migration. Therefore, as many openings as practicable, in number, size, and diversity of locations should be incorporated into project levees.

CEMVN Response 11: Concur; however, the proposed action would not affect fish passage.

Recommendation 12: Flood protection water control structures in any watercourse should maintain pre-project cross-sections in width and depth to the maximum extent practicable, especially structures located in tidal passes.

CEMVN Response 12: Water control structures that provide hydrologic management of portions of Bayou Sauvage NWR would be reconstructed under the proposed action.

Recommendation 13: Flood protection water control structures should remain completely open except during storm events. Management of those structures should be developed in coordination with the USFWS, NOAA Fisheries, LDWF, and LDNR.

CEMVN Response 13: See CEMVN Response 12.

Recommendation 14: Any flood protection water control structure sited in canals, bayous, or a navigation channel which does not maintain the pre-project cross-section should be designed and operated with multiple openings within the structure. This should include openings near both sides of the channel as well as an opening in the center of the channel that extends to the bottom.

CEMVN Response 14: See CEMVN Response 12.

Recommendation 15: The number and siting of openings in flood protection levees should be optimized to minimize the migratory distance from the opening to enclosed wetland habitats.

CEMVN Response 15: See CEMVN Response 11.

Recommendation 16: Flood protection structures within a waterway should include shoreline baffles and/or ramps (*e.g.*, rock rubble, articulated concrete mat) that slope up to the structure invert to enhance organism passage. Various ramp designs should be considered.

CEMVN Response 16: No flood protection structures would be located within a waterway under the proposed action.

Recommendation 17: To the maximum extent practicable, structures should be designed and/or selected and installed such that average flow velocities during peak flood or ebb tides do not exceed 2.6 feet per second. However, this may not necessarily be applicable to tidal passes or other similar major exchange points.

CEMVN Response 17: See CEMVN Response 16.

Recommendation 18: To the maximum extent practicable, culverts (round or box) should be designed, selected, and installed such that the invert elevation is equal to the existing water depth. The size of the culverts selected should maintain sufficient flow to prevent siltation.

CEMVN Response 18: See CEMVN Response 16.

Recommendation 19: Culverts should be installed in construction access roads unless otherwise recommended by the natural resource agencies. At a minimum, there should be one 24-inch culvert placed every 500 feet and one at natural stream crossings. If the depth of water crossings allow, larger-sized culverts should be used. Culvert spacing should be optimized on a case-by-case basis. A culvert may be necessary if the road is less than 500 feet long and an area would hydrologically be isolated without that culvert.

CEMVN Response 19: No new construction access roads would be needed under the proposed action

Recommendation 20: Water control structures should be designed to allow rapid opening in the absence of an offsite power source after a storm passes and water levels return to normal.

CEMVN Response 20: See CEMVN Response 16.

Recommendation 21: Levee alignments and water control structure alternatives should be selected to avoid the need for fishery organisms to pass through multiple structures (*i.e.*, structures behind structures) to access an area.

CEMVN Response 21: See CEMVN Response 16.

Recommendation 22: Operational plans for water control structures should be developed to maximize the cross-sectional area open for as long as possible. Operations to maximize freshwater retention or redirect freshwater flows could be considered if hydraulic modeling demonstrates that is possible and such actions are recommended by the natural resource agencies.

CEMVN Response 22: See CEMVN Response 16.

Recommendation 23: CEMVN shall fully compensate for any unavoidable losses of wetland habitat or non-wet bottomland hardwoods caused by project features.

CEMVN Response 23: CEMVN will fully compensate for unavoidable losses of wetlands impacted by the proposed action.

Recommendation 24: 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 CEMVN shall provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

CEMVN Response 24: See CEMVN Response 5.

Recommendation 25: Any proposed change in mitigation features or plans should be coordinated in advance with the USFWS, NOAA Fisheries, LDWF, USEPA, and LDNR.

CEMVN Response 25: Concur.

Recommendation 26: A report documenting the status of mitigation implementation and maintenance should be prepared every three years by the managing agency and provided to the CEMVN, USFWS, NOAA Fisheries, USEPA, LDNR, and LDWF. That report should also describe future management activities, and identify any proposed changes to the existing management plan.

CEMVN Response 26: Concur.

The USFWS reviewed the proposed action to see if it would affect any threatened and endangered species under its jurisdiction, or their critical habitat. The USFWS concurred with the CEMVN in a letter dated 2 February 2009 that the proposed action would not have adverse effects to threatened and endangered species under its jurisdiction (Appendix D). No project-specific recommendations were made by the USFWS.

The USFWS' project-specific recommendations in the draft Coordination Act Report provided on 8 April 2009 (Appendix D), and CEMVN's responses to the recommendations, are listed below.

Recommendation 1: The USFWS, LDWF, NOAA Fisheries, and other agencies shall be provided an opportunity to review and submit recommendations on the draft plans and specifications for all levee work addressed in this report.

CEMVN Response 1: CEMVN will provide all resource agencies with a copy of the draft plans and specifications for review and comment.

Recommendation 2: Access channels should be refilled up to the prior lakebed elevation after project construction, especially the channel sections in water depths of 3 feet or less. Post-construction surveys (*e.g.*, centerline surveys) should be taken to ensure access channels have been adequately backfilled.

That information should be provided to the natural resource agencies for review. In areas shallower than 3 feet, where pre-existing elevations have not been successfully restored, the USACE should ensure those elevations are restored by additional measures.

CEMVN Response 2: CEMVN will make all efforts to restore lake bottom elevations to their original grade. Post-construction lake bottom elevation surveys will be conducted, and survey results will be provided to the natural resource agencies.

Recommendation 3: USACE should avoid impacts to Bayou Sauvage NWR when feasible. USACE should continue to coordinate with refuge personnel during planning and compatibility determination processes. A Special-Use Permit should be obtained prior to any entrance onto the refuge. Coordination should continue until construction is complete and prior to any subsequent maintenance. Points of contacts for that refuge are Kenneth Litzenberger, Project Leader for the Service's Southeast National Wilflife Refuges and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR. The USACE should not sign the Decision Record until a Compatibility Determination is complete.

CEMVN Response 3: CEMVN will coordinate with refuge personnel during all phases of the project that may affect refuge lands, obtain a Special-Use Permit before entrance onto the refuge, and work with refuge personnel on the completion of a Compatibility Determination.

Recommendation 4: Mitigation for impacts to the Bayou Sauvage NWR should occur on Bayou Sauvage NWR property. Mitigation planning should include refuge staff. USACE and local sponsor shall obtain 175 AAHUs to compensate for the unavoidable, project-related loss of forested and emergent wetlands.

CEMVN Response 4: CEMVN will coordinate with refuge personnel during all phases of the project and work with refuge personnel to provide the compensatory mitigation for any loss of forested or emergent wetlands on Bayou Sauvage NWR property.

Recommendation 5: USFWS, LDWF, NOAA Fisheries and other natural resource agencies should be consulted regarding the adequacy of any proposed mitigation.

CEMVN Response 5: CEMVN will consult and coordinate with natural resource agencies through the Interagency Environmental Team during all phases of the project to provide adequate mitigation for any loss of forested or emergent wetlands on Bayou Sauvage NWR property.

Recommendation 6: Flood protection and ancillary features such as staging areas and access roads should be designed and positioned so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized to the greatest extent possible.

CEMVN Response 6: CEMVN will avoid all wetlands and non-wet bottomlands to the greatest extent possible. CEMVN will work with the Interagency Environmental Team to avoid or minimize environmental impacts to the greatest extent possible.

Recommendation 7: Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting birds when practical.

CEMVN Response 7: The removal of trees in forested wetlands would be conducted in the fall or winter, if possible, to minimize impacts to nesting migratory birds. Alternatively, if trees would be removed during bird nesting season, preconstruction surveys for nesting birds would be conducted, and all eggs and nestlings within the project area would be relocated before the start of construction.

Recommendation 8: If a proposed project feature is changed significantly or is implemented within one year of the date of our Endangered Species Act consultation letter, we recommend that USACE reinitiate coordination with this office to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their habitat.

CEMVN Response 8: CEMVN concurs.

Recommendation 9: USACE should monitor the recovery of the SAV beds in the shallower portions (*i.e.*, less than 3 feet depth) of Lake Pontchartrain from the western end of IER 6 to 6,000 feet east of Paris Road. If SAV has not re-colonized to pre-project conditions within one year following backfilling, USACE should plant appropriate species of SAV in the project area. Coordination with USFWS, NOAA Fisheries and other interested natural resource agencies should be conducted to determine the adequacy of recovery and planting specification, if needed.

CEMVN Response 9: A pre-construction and post-construction bathymetric survey and SAV population survey would be conducted to document percent occurrences of aquatic plants in or near the construction area. If post-construction surveys do not indicate natural SAV re-colonization, SAV plantings would occur in order to return the site to pre-construction conditions to the greatest extent practicable. CEMVN will work with the Interagency Environmental Team and local Lake Pontchartrain interest organizations to restore lake bottom habitat.

Recommendation 10: Areas on the Bayou Sauvage NWR where soils borings have been taken should be assessed to ensure accuracy of the anticipated impact area (0.18 acres) and determine recovery impacts.

CEMVN Response 10: CEMVN will monitor the soils boring areas to determine recovery.

NOAA Fisheries reviewed the proposed action to see if it would affect any threatened and endangered species under its jurisdiction, or their critical habitat. Section 7 consultation with NOAA Fisheries was initiated by letter on 7 September 2008, and CEMVN has made the determination that the proposed action would not have adverse impacts to threatened and endangered species under its jurisdiction. NOAA Fisheries concurred with CEMVN's determination on 13 March 2009 (Appendix D).

LDNR reviewed the proposed action for consistency with the Louisiana Coastal Resource Program (LCRP). CEMVN determined that the project is consistent with the LCRP, and submitted the coastal consistency determination to LDNR for review. The LDNR determined that the project is consistent with the LCRP on 11 March 2009 (Appendix D).

CEMVN submitted the Water Quality Certification and Air Quality Certification to LDEQ for the proposed action. LDEQ issued the Water Quality Certification for the project on 6 April 2009 (Appendix D).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the Louisiana SHPO and Native American tribes. The SHPO reviewed the proposed action and determined that it would not adversely affect any cultural resources (Appendix D). Eleven Federally recognized tribes that have an interest in the region were given the opportunity to review the proposed action. Four tribes responded, concurring with the SHPO (Appendix D).

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7. MITIGATION

Mitigation for unavoidable impacts to the human and natural environment described in this and other IERs will be addressed in separate mitigation IERs. CEMVN 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. As with the planning process of all other IERs, the public will have the opportunity to give input about the proposed work. These mitigation IERs will, as described in Section 1 of this IER, be available for a 30-day public review and comment period.

Quantitative analysis utilizing existing methodologies for water resources planning has identified acreages by habitat type for direct or indirect impacts of implementing the proposed action. The increase levee and floodwall footprints for LPV 109, LPV 110 and LPV 111 would impact 353.6 acres of wetlands, which includes brackish and intermediate marsh and forested wetland habitats. A complementary comprehensive mitigation IER will be prepared documenting and compiling unavoidable impacts for each IER. This mitigation IER will implement compensatory mitigation as early as possible. All mitigation activities will be consistent with standards and policies established in the CWA Section 404 and appropriate CEMVN policies and regulations governing this activity. Mitigation for unavoidable impacts would be completed in areas close to where impacts occurred, as is CEMVN policy.

Impacts to wetlands from construction of the LPV 109 and LPV 111 levees were analyzed using 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 CWPPRA; however, the methodology is widely used to evaluate the impacts of coastal projects on wetland values. The results of the WVA, measured in AAHUs, provide an estimate of the positive or negative environmental effects of a potential project. Typically, for a CEMVN 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, and community models have been developed for fresh marsh, intermediate marsh, brackish marsh, salt 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 graph is a graphical representation of how fish and wildlife habitat quality or "suitability" of a given habitat type is predicted to change as values of the given variable change, and allows the model user to numerically describe, through the SI, the habitat quality of a wetland area 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).

The final step in model development (Environmental Working Group 2006) is to construct a mathematical formula that combines all SIs into a single HSI value. Because the SIs range from 0.1 to 1.0, the HSI also ranges from 0.1 to 1.0, and is a numerical representation of the overall or "composite" habitat quality of the particular wetland area being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each wetland 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 and future with-project. Specifically, predictions are made as to how the model variables would change through time under the scenarios. Through that process, HSIs are established for baseline (pre-project) conditions and for future without-project and future with-project scenarios for selected target years (TY) throughout the expected life of the project. Those 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 future without-project and future with-project scenarios are annualized averaged over the project life, to determine AAHUs. The impact of a project can be quantified by comparing AAHUs between the future without-project and future with-project 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.

The USFWS performed a WVA for the proposed action. Their assessment determined that bottomland hardwood, fresh/intermediate marsh and brackish marsh would be impacted by expansion of the levee footprint in the LPV 109 and LPV 111 reaches. Construction of the flood protection levee would result in the loss of bottomland hardwood wetlands, fresh/intermediate marsh, and brackish marsh. The USFWS' analyses indicated that the project implementation would result in the direct loss of 101 AAHUs of bottomland hardwood forested wetlands, 37 AAHUs of fresh/intermediate marsh, and 37 AAHUs of brackish marsh.

In an effort to avoid direct impacts to Gulf sturgeon that may possibly be using the project area during the winter months to forage, the CEMVN would adhere to a construction window for the temporary flood protection at Pump Station No.15, allowing construction in the project area to occur during the months of May through September.

Manatee protective measures should be included in all CEMVN construction and dredging contracts. These measures were discussed in Section 3.2.7.

8. COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Construction of the proposed actions will not commence until the proposed actions achieves environmental compliance with all applicable laws and regulations, as described below. Environmental compliance for the proposed actions would be achieved upon: coordination of this IER with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NOAA Fisheries confirmation that the proposed action would not be likely to adversely affect any endangered or threatened species or completion of Endangered Species Act Section 7 consultation (received 2 February 2009); LDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LCRP receipt of a Water Quality Certificate from the State of Louisiana; public review of the Section 404(b)(1) Public Notice; signature of the Section 404(b)(1) Evaluation; USEPA concurrence with ocean disposal of dredged material in accordance with Section 103 of the Marine Protection, Research, and Sanctuaries Act; coordination with the SHPO; receipt and acceptance or resolution of all USFWS Fish and Coordination Act recommendations; receipt and acceptance or resolution of all LDEQ comments on the air quality impact analysis documented in the IER; and receipt and acceptance or resolution of all NOAA Fisheries' EFH recommendations.

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9. CONCLUSION

9.1. INTERIM DECISION

The proposed action would require the construction of structures necessary to provide the 100-year level of risk reduction for New Orleans East. The following structures would be improved under the proposed action.

- The elevation of the existing levee within the LPV 109 project area would be increased, stability berms constructed and three highway crossings modified. The existing I-10 elevated earthen ramp would be raised to cross LPV 109. New floodgates would be constructed at the US 90 and US 11 crossings.

- The CSX Railroad floodgate and supporting T-walls would be reconstructed to provide the 100-year level of risk reduction at LPV 110.

- The levee in LPV 111 would be raised by using foundational support, the levee slopes covered in concrete and the T-wall at Pump Station No. 15 reconstructed. Dewatering of the discharge basin at Pump Station No. 15 would be required for access to the T-wall demolition and construction.

CEMVN has assessed the environmental impacts and has determined that the proposed action would permanently impact 353.6 acres of forested wetlands and intermediate and brackish marsh from an expanded levee footprint; adversely modify Gulf sturgeon critical habitat; temporarily impact vehicular transportation during ramp construction on I-10 and floodgate construction at US 90 and US 11; require additional right-of-way acquisition; and have temporary noise impacts exceeding a DNL of 65 dBA within 1,000 feet of the project corridor. However, many of the structural components would be constructed on previously disturbed areas, and would primarily permanently impact maintained turf grasses. The proposed action would provide substantial cumulative beneficial long-term economic impacts by generating community and regional growth and recovery, and maintain community cohesion.

9.2. PREPARED BY

The point of contact for this IER is Mr. Gib Owen, CEMVN. Table 16 lists the preparers of relevant sections of this report. The address of the preparers is: U.S. Army Corps of Engineers, New Orleans District; Planning, Programs, and Project Management Division, CEMVN-PM; P.O. Box 60267; New Orleans, Louisiana 70160-0267.

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APPENDIX A

LIST OF ABBREVIATIONS AND ACRONYMS

AAHUs – Average Annual Habitat Units
BEA – Bureau of Economic Analysis
bgs – below ground surface
BMP – best management practice
CB – cement-bentonite
CED – Comprehensive Environmental Document
CEMVN – New Orleans District
CEQ – Council on Environmental Quality
CFBM – Contractor Furnished Borrow Material
CFR – Code of Federal Regulations
CO – carbon monoxide
CWA – Clean Water Act
CWPPRA – Coastal Wetlands Planning, Protection, and Restoration Act
dB – decibel
dBA – A-weighted decibel
DNL – day-night average sound level
DO – dissolved oxygen
DOTD – Louisiana Department of Transportation and Development
DSM – deep soil mixing
E – endangered
EA – Environmental Assessment
E.O. – Executive Order
EFH – Essential Fish Habitat
EIS – Environmental Impact Statement
ER – Engineering Regulation
ESA – Environmental Site Assessment
FEMA – Federal Emergency Management Agency
FHWA – Federal Highway Administration
FONSI – Finding of No Significant Impact
GFBM – Government Furnished Borrow Material
GIWW – Gulf Intracoastal Waterway
GMFMC – Gulf of Mexico Fisheries Management Council
HSDRRS – Greater New Orleans Hurricane and Storm Damage Risk Reduction System
HSI – Habitat Suitability Index
HTRW – hazardous, toxic and radioactive waste
HUs – Habitat Units
I-10 – Interstate 10
IER – Individual Environmental Report
IHNC – Inner Harbor Navigation Canal
JPM-OS – Joint Probability Method with Optimal Sampling
LA 47 – Louisiana Highway 47
LACPR – Louisiana Coastal Protection and Restoration
LCRP – Louisiana Coastal Resources Program
LDEQ – Louisiana Department of Environmental Quality
LDNR – Louisiana Department of Natural Resources
LDWF – Louisiana Department of Wildlife and Fisheries
LOS – level of service
LPV – Lake Pontchartrain and Vicinity Project
LRA – Louisiana Recovery Authority
MRGO - Mississippi River Gulf Outlet

MSA – Metropolitan Statistical Area
NAAQS – National Ambient Air Quality Standards
NAICS – North American Industry Classification System
NASA – National Aeronautics and Space Administration
NAVD 88 – North American Vertical Datum 88
NEPA – National Environmental Policy Act
NO_2 – nitrogen dioxide
NOAA – National Oceanographic and Atmospheric Administration
NOAA Fisheries – National Marine Fisheries Service
NPS – National Park Service
NRHP – National Register of Historic Places
NSRR – Norfolk Southern Railroad
NWR – National Wildlife Refuge
O_3 – ozone
OMRR&R – Operational, Maintenance, Repair, Replacement and Rehabilitation
PA – Programmatic Aggreement
PDT – project delivery team
P.L. – Public Law
PM 2.5 – particulate matter less than 2.5 microns in size
PM 10 – particulate matter less than 10 microns in size
ppt – parts per thousand
PV – prefabricated vertical
REC – Recognized Environmental Condition
ROD – Record of Decision
SAV - submerged aquatic vegetation
SHPO –State Historic Preservation Officer
SI – Suitability Index
SIR – Supplemental Information Report
SO_2 – sulfur oxide
SOD – sediment oxygen demand
SWPPP – Stormwater Pollution Prevention Plan
SPCCP – Spill Prevention Control and Countermeasures Plan
T – threatened
TMDL – total maximum daily load
TY – target year
US 11 – U.S. Highway 11
US 90 – U.S. Highway 90
USACE – U.S. Army Corps of Engineers
USEPA – U.S. Environmental Protection Agency
USFWS – U.S. Fish and Wildlife Service
USGS – U.S. Geological Survey
VOC – volatile organic compounds
WBV – West Bank and Vicinity
WRDA – Water Resources Development Act
WVA – Wetland Value Assessment

APPENDIX B

PUBLIC COMMENT AND RESPONSE SUMMARY

All comments received during the public review of the Draft IER #7 will be included in Appendix B

APPENDIX C

MEMBERS OF INTERAGENCY ENVIRONMENTAL TEAM

Kyle Balkum	Louisiana Dept. of Wildlife and Fisheries
Brian Marks	Louisiana Department of Natural Resources
Catherine Breaux	U.S. Fish and Wildlife Service
David Castellanos	U.S. Fish and Wildlife Service
James Harris	U.S. Fish and Wildlife Service
Ken Litzenberger	U.S. Fish and Wildlife Service
Jack Bohanan	U.S. Fish and Wildlife Service
Frank Cole	Louisiana Department of Natural Resources
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Jeffrey Harris	Louisiana Department of Natural Resources
Richard Hartman	NOAA National Marine Fisheries Service
Christina Hunnicutt	U.S. Geologic Survey
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Ismail Merhi	Coastal Protection and Restoration Authority
Angela Trahan	U.S. Fish and Wildlife Service
David Walther	U.S. Fish and Wildlife Service
Patrick Williams	NOAA National Marine Fisheries Service

APPENDIX D

AGENCY COORDINATION

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
646 CAJUNDOME BLVD.
SUITE 400
LAFAYETTE, LA 70506

FAXFORM
FAX (337) 291-3139
COMM (337) 291-3100

DATE: 12-6-07

TO: Ms. Laura Lee Wilkinson 504-862-1557 CEMVN

FROM: David Castellano

SUBJECT: T+E Concurrence IERs 5-11

NUMBER OF PAGES TO FOLLOW: 5

REMARKS:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
December 6, 2007

Colonel Jeffery Bedey
Hurricane Protection Office (HPO)
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Bedey,

Please reference the November 7, 2007, letter, and November 11, 2007, electronic mail from Laura Lee Wilkinson requesting our review of the U.S. Army Corps of Engineers' (Corps) proposed 100 Year Hurricane Protection Projects for Individual Environmental Reports (IER) 5-11 in Orleans, Jefferson, and St. Bernard Parishes and concurrence with determinations on effects to Federally Listed Species. That project would involve improvements to levees, floodwalls, floodgates, and construction of new barriers, closure structures, navigable gates and/or permanent pump stations in the New Orleans East Bank, New Orleans East and Chalmette Loop sub basins. These improvements are necessary to provide 100-year level flood protection for the New Orleans Metropolitan area. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), 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.).

The projects included in IERs 5-11 span a large geographic area and have unique components, but the number of potentially impacted threatened or endangered species is small; therefore, the IERs will be grouped according to potentially affected species.

Federally listed as an endangered species, West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

Some or all of the proposed project features, including alternatives, of IERs 5, 6, 7, 8, and 11 (especially the dredging of access channels for IERs 6 and 7), could potentially impact the manatee. The Corps has incorporated the following protective measures into its construction

contracts; therefore, the Service concurs with your determination that construction of the proposed project features is not likely to adversely affect the manatee.

All contract personnel associated with the project should be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the Service's Lafayette, Louisiana Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

The Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation. The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components.

In that critical habitat designation, responsibility for consultation with specific Federal agencies was also identified for the Service and for the NMFS. For estuarine and marine waters in Louisiana, the NMFS is responsible for consultations regarding impacts to the sturgeon and its

critical habitat with all Federal agencies, except the Department of Transportation, the Environmental Protection Agency, the U.S. Coast Guard, and the Federal Emergency Management Agency, which consult with the Service. Therefore, please contact Dr. Stephania Bolden (727/824-5312) in St. Petersburg, Florida, for information concerning that species and its critical habitat. Should the proposed project directly or indirectly affect the Gulf sturgeon or its critical habitat in Louisiana, further consultation with that office will be necessary.

The pallid sturgeon (*Scaphirhynchus albus*) is an endangered fish found in both the Mississippi and Atchafalaya Rivers (with known concentrations in the vicinity of the Old River Control Structure Complex). The pallid sturgeon is adapted to large, free-flowing, turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Habitat loss through river channelization and dams has adversely affected this species throughout its range. According to the information provided, the construction of the proposed project features, including alternatives, of IERs 5-11 would not impact the Mississippi River, therefore we concur that they are not likely to adversely affect the pallid sturgeon.

The project-area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which has officially been removed from the List of Endangered and Threatened Species as of August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern Parishes. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how 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. A copy of the NBEM Guidelines is available at: http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf. The construction of the proposed project features, including alternatives, of IERs 7, and 10 may potentially impact the bald eagle. If the Corps determines that construction activities will be located at or closer than 660 feet from a nest tree, the Service recommends that the Corps contact this office to aid in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of the nest to cause the least impact.

Federally listed as an endangered species, brown pelicans (*Pelecanus occidentalis*) are not currently known to nest in the project vicinity. Brown pelicans feed along the Louisiana coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance. The Service concurs that construction of the proposed project features is not likely to adversely affect the brown pelican.

Federally listed as a threatened species, the piping plover (*Charadrius melodus*), as well as its designated critical habitat, occur along the Louisiana coast. Piping plovers winter in Louisiana, and may be present for 8 to 10 months annually. They arrive from the breeding grounds as early

as late July and remain until late March or April. Piping plovers feed extensively on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation; they also require unvegetated or sparsely vegetated areas for roosting. Plovers move among sites as environmental conditions change, and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation. The Service concurs that construction of the proposed project features is not likely to adversely impact the piping plover or its critical habitat because they are not known to occur in the project area.

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

Several portions of the project area are located within or will require access through the Service's Bayou Sauvage National Wildlife Refuge. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

Federal agencies proposing a project that includes features on a national wildlife refuge are encouraged to contact the Refuge Manager early in the planning process. The Refuge Manager will work with the project proponent to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If the proposed project requires a compatibility determination, a concise description of the project (refuge use) including who, what, where, when, how and why will be needed to prepare the compatibility determination. In order to determine the anticipated impacts of use, the project proponent may be required to provide sufficient data and information sources to document any short-term, long-term, direct, indirect or cumulative impacts on refuge resources. Compatibility determinations will include a public review and comment before issuing a final determination.

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge

Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage National Wildlife Refuge for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

Based on our review, the Service concurs with your determinations that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the pallid sturgeon, brown pelican, bald eagle, and piping plover. Because of manatee protective measures included in the Corps' construction contracts, the Service also concurs that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the manatee. The Service recommends that the Corps contact NMFS regarding impacts to the Gulf sturgeon and its critical habitat and implement the above mentioned survey and protection measure to protect colonial nesting birds.

We appreciate the opportunity to review the Proposed 100 Year Hurricane Protection Projects for IERs 5-11. If you need further assistance or have questions regarding this letter, please contact David Castellanos (337/291-3112) of this office.

Sincerely,

James F. Boggs
Acting Field Supervisor
Louisiana Field Office

cc: NOAA, St. Petersburg, FL
Laura Lee Wilkinson, CEMVN, New Orleans, LA
LDWF, Natural Heritage, Baton Rouge, LA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
April 8, 2009

Colonel Alvin B. Lee
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee

Please reference the Individual Environmental Report 7 New Orleans East Levee, Maxent Canal to Michoud Slip, Orleans Parish, Louisiana (IER 7). That study was conducted in response to 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 of Engineers (Corps) to upgrade some existing hurricane protection projects to provide protection against a 100-year hurricane event. This report contains an analysis of the impacts on fish and wildlife resources that would result from the implementation of 100-year hurricane protection for that area, and provides recommendations to minimize project impacts on those resources.

The proposed project was authorized by Supplemental 4 which instructed the Corps to proceed with engineering, design, and modification (and construction where necessary) of the Lake Pontchartrain and Vicinity (LPV) and the West Bank and Vicinity (WBV) Hurricane Protection Projects so those projects would provide 100-year hurricane protection. Procedurally, project construction has been authorized in the absence of the report of the Secretary of the Interior that is required by Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). In this case, the authorization process has prevented our agencies from following the normal procedures for fully complying with the FWCA. The FWCA requires that our Section 2(b) report be made an integral part of any report supporting further project authorization or administrative approval. Therefore, to fulfill the coordination and reporting requirements of the FWCA, the United States Fish and Wildlife Service (Service) will be providing a 2(b) report for each IER.

This draft report incorporates and supplements our FWCA Reports that addressed impacts and mitigation features for the LPV Hurricane (dated July 25, 1984, and January 17, 1992) Protection projects, and a November 26, 2007, draft programmatic FWCA report that addressed the overall 100 year hurricane protection project.

This draft report does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. This report has been provided to the Louisiana Department of

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Wildlife and Fisheries and the National Marine Fisheries Service; their comments will be incorporated into our final report.

DESCRIPTION OF THE STUDY AREA

The work proposed in IER 7 is located entirely within Orleans Parish and involves the construction of floodwalls and upgrading approximately 20 miles of existing levees near and around the Bayou Sauvage National Wildlife Refuge (NWR). The study area is roughly bounded by Paris Road (Interstate-510) to the west, Lake Pontchartrain to the north and east, Chef Menteur Pass to the southeast, and the Gulf Intracoastal Waterway (GIWW) to the south (Figure 1).

Although some construction is occurring in developed areas and on existing levees, project implementation will also directly impact marshes, bottomland hardwoods, and shrub-scrub areas that provide medium to high habitat values for diverse fish and wildlife resources. Project impacts would result primarily from levee rights-of-way (ROW) expansion and construction of levees.

FISH AND WILDLIFE RESOURCES

Description of Habitats

Habitat types in the study area include forested wetlands (i.e., bottomland hardwoods and/or swamps), marsh, wetland scrub-shrub, open water, and developed areas. Factors that will strongly influence future fish and wildlife resource conditions in the area include freshwater input and erosional loss of estuarine marshes outside of the hurricane protection levee. The wetlands within the hurricane protection levee are currently experiencing higher loss rates than the wetlands outside of the levee directly connected to natural hydrologic processes.

Forested wetlands in the study area are predominantly bottomland hardwoods (BLH) and some swamp. Where the duration of flooding and/or saturation is sufficient, BLH habitats are defined as intermittently flooded palustrine forested wetlands (Cowardin et al. 1979). BLH habitat in the study area is predominantly vegetated by sugarberry, black willow, Chinese tallow, live oak, waxmyrtle, elderberry, and groundsel bush.

Fresh and intermediate marshes occur on the protected side of levees of the study area. Vegetation common in fresh marshes includes giant cutgrass, cattail, pennywort, maidencane, wax myrtle, alligatorweed, flatsedges, and spikerushes. Plant species commonly found in intermediate marshes include sawgrass, bulltongue, California bulrush, deer pea, and saltmeadow cordgrass.

Open water in the study area consists of marsh ponds on the protected side of the levee and Lake Pontchartrain on the flood side. These ponds support submerged and floating aquatic vegetation such as coontail, fanwort, pondweeds, water primrose, duckweed, and water hyacinth. Outside

Figure 1: Project Area for LPV 108, 109, 110, and 111;
New Orleans East Lakefront to Michoud Canal (IER #7)

Figure 1. IER 7 project area, New Orleans, Louisiana.

of the levee, the more brackish tolerant submerged aquatic vegetation (SAV) widgeon grass is found in shallow waters (typically less than 3 feet in depth) of Lake Pontchartrain.

Developed habitats in the study area include commercial areas, as well as roads and existing levees. Those habitats do not support significant wildlife use.

Fishery/Aquatic Resources

Freshwater sport fishes present in the marshes and open water include largemouth bass and smaller sunfishes; other fishes likely to occur are bullhead catfishes, bowfin, and gars. Estuarine-dependent fishes and shellfishes such as Atlantic croaker, red drum, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, brown shrimp, white shrimp, and blue crab occur in the marshes outside of the protection levee.

Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297) set forth a new mandate for NOAA's National Marine Fisheries Service (NMFS), regional fishery management councils (FMC), and other federal agencies to identify and protect important marine and anadromous fish habitat. The Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Act support one of the nation's overall marine resource management goals- maintaining sustainable fisheries. Essential to achieving this goal is the maintenance of suitable marine fishery habitat quality and quantity. Detailed information on federally managed fisheries and their EFH is provided in the 1999 generic amendment of the Fishery Management Plans (FMP) for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council (GMFMC). The generic FMP subsequently was updated and revised in 2005 and became effective in January 2006 (70 FR 76216). NMFS administers EFH regulations.

EFH includes all waters and substrates within estuarine boundaries, outside of the hurricane protection levee, including the subtidal vegetation (SAVs, seagrasses and algae) and adjacent tidal vegetation (marshes). The forested wetland areas and supra-tidal wetlands (i.e., those located on levee berms) within the project ROW are not likely to be suitable habitat for any of the managed species (e.g., shrimp, red drum).

Wildlife Resources

Mammals known to occur in the project-area wetlands include mink, raccoon, swamp rabbit, nutria, river otter, and muskrat. Those wetlands also support a variety of birds including herons, egrets, ibises, least bittern, rails, gallinules, olivaceous cormorant, white pelican, 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. Wading bird rookeries are known to exist in the southern

part of the study area near the LPV 111 reach.

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, 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, northern harrier, 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 intermediate marshes of the project area. Reptiles such as the American alligator, snapping turtle, softshell turtle, red-eared turtle, and diamond backed terrapin are also expected to occur in the study area wetlands.

Endangered and Threatened Species

In letters dated December 6, 2007, and on January 30, 2009, the Service concurred with the Corps' determination that the construction of the proposed project features in IER 7 is not likely to adversely affect the pallid sturgeon, brown pelican, bald eagle, and piping plover. Because of manatee protective measures included in the Corps' construction contracts, the Service also concurs that the construction of the proposed project features in IER 7 is not likely to adversely affect the manatee. The Service recommends that the Corps contact NMFS regarding impacts to the Gulf sturgeon and its critical habitat and implement the above mentioned survey and protection measure to protect colonial nesting birds.

Refuge Land

Several portions of the project area are located within or will require access through the Service's Bayou Sauvage NWR. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

Federal agencies proposing a project that includes features on a national wildlife refuge are encouraged to contact the Refuge Manager early in the planning process. The Refuge Manager will work with the project proponent to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If the proposed project requires a compatibility determination, a concise description of the project (refuge use) including who, what, where, when, how and why will be needed to prepare the compatibility determination. In order to determine the anticipated impacts of use, the project proponent may be required to provide sufficient data and information sources to document any short-term, long-term, direct, indirect or cumulative impacts on refuge resources. Compatibility determinations will include a public review and comment before issuing a final determination.

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

DESCRIPTION OF SELECTED PLAN

The purpose of the proposed action is to provide the 100-year level of protection for the Greater New Orleans Hurricane and Storm Damage Reduction System (HSDRRS) for New Orleans East. The term "100-year level of protection", refers to a level of protection which reduces the risk of hurricane surge and wave driven flooding that the New Orleans Metropolitan area has a 1 percent chance of experiencing each year. Elevations of the existing floodwalls and levees within four reaches of the LPV project (reaches 108, 109, 110 and 111 that comprise the Lakefront to Michoud Canal project), a component of the HSDRRS, are below 100-year design elevations and do not meet Corps design criteria. Combined, these reaches complete the Lakefront to Michoud Canal project and are located between the Citrus Lakefront Levee project (described in Citrus Lakefront Levee IER #6) and Michoud Canal floodwall (LPV 112).

Various alternative alignments and structures (*i.e.*, floodwalls and levees) were evaluated for each reach of the Lakefront to Michoud Canal project. Based upon a detailed analysis that included evaluating risk and reliability, construction schedule, cost, ROW requirements, environmental impacts, and operations and maintenance needs, the following alignments and structures were chosen as the proposed actions for LPV 108, 109, 110 and 111.

Earthen levees in southern Louisiana settle over time due to the type of soils and geology present

in the area. Because of this settlement, levees are maintained over the project life (50 years) by a process of multiple lifts. The Corps has determined that a base elevation for the levees will allow the levee to be certified into the National Flood Insurance Program (NFIP). This base elevation plus some overbuild is what the Corps is proposing to construct as discussed below for each reach. As stated, because settlement is an issue in this location, the Corps proposed plan includes initially overbuilding the levees to an elevation that has been determined to allow the levee to settle for ten years, but still be above the height required to be eligible for certification into the NFIP. After ten years, an additional lift would be required to maintain the levee above the required NFIP elevation.

The LPV 108 reach is approximately 6.3 miles long (Figure 1). The authorized level of flood protection ranges from +17.5 feet North American Vertical Datum 1988 (NAVD 88) in the western portion of LPV 108 to +18.5 feet NAVD 88 in the eastern portion. This height provides the 100-year level of flood protection; therefore no further levee work is required to achieve NFIP certification for this reach.

Riprap foreshore protection along Lake Pontchartrain would be raised to reduce erosion and wave impact on the LPV 108 levee. Approximately 121,000 cubic yards of riprap would be required to raise levee foreshore protection to an elevation that would not settle below a net grade of approximately +14 feet NAVD 88 in 10 years. It is anticipated that riprap would be transported to the Lake Pontchartrain shoreline by barge and placed from equipment stationed on barges in the lake and from trucks and equipment accessing the foreshore protection from the shoreline. The placement of foreshore protection would permanently fill approximately 8.0 acres of Lake Pontchartrain. While included as part of project this work is actually maintenance of the previously constructed erosion protection. To provide barge access, channels would be dredged in Lake Pontchartrain perpendicular and parallel to the shoreline. It is proposed that five offshore to inshore access channels perpendicular to the Lake Pontchartrain shoreline and four lateral channels parallel to the shoreline would be constructed to allow the tug boat and barge to approach the construction area (Figure 2). Perpendicular and parallel channel dimensions would be approximately 10 feet deep, 100 feet wide at the channel bottom with a 2:1 slope on both sides of the channel. Perpendicular channels would range from 764 to 1,126 feet long and parallel channels would be 2,000 feet long. The dredging operation would excavate approximately 482,594 cubic yards of material. Dredged material (tailings) would be placed within a 178-foot wide area located on one side of and parallel to the dredged channel. The width of the channel and dredged material placement area would create a 400-foot wide footprint, which includes the 140-foot wide channel (top width; 100-foot wide bottom width), the 178-foot wide dredged material stock pile, and the space between the stock pile and channel. Assuming these dimensions, the channel and excavated sediments are expected to directly impact approximately 118.1 acres of lake bed. After construction dredged material for the access channels would be used to backfill the dredged channels.

The LPV 109 reach includes the use of stability berms, high strength geotextile and prefabricated vertical (PV) drains (*i.e.*, wick drains) for levee construction. A stability berm with a width of 120 feet would be constructed on the protected side from South Point to US Highway 90 (US

90), and a stability berm with a width of 175 feet on the protected side would be constructed from US 90 to LPV 110. Two to three layers of high strength geotextile would be used, and the levee fill placed in five lifts between South Point and US 90 and in six lifts between US 90 and LPV 110. PV drains would be used to promote horizontal drainage in subsurface clay soils. Additionally, seepage analysis would be performed during levee design, and if additional seepage control measures are warranted, a cement-bentonite (CB) slurry wall would be constructed beneath the levee. The levee would be raised to an elevation that would vary with distance from Lake Pontchartrain and would not settle below a net grade of between +17.0 feet NAVD 88 (from South Point to US 90) and +22.0 feet NAVD 88 (from US 90 to CSX Railroad) in 10 years. Flood side levee slopes would be 1:4 (vertical:horizontal) from South Point to US 90 and 1:5 (vertical:horizontal) from US 90 to LPV 110. Protected side levee slopes would be 1:4 (vertical:horizontal). The levee would be vegetated along both slopes along its entire length following construction. Levee reconstruction would impact two pump stations and four drainage control structures that provide water level management for Bayou Sauvage NWR. These structures would be redesigned and constructed to accommodate the new levee heights and footprints.

The expanded levee and stability berm footprint would require the acquisition of ROW. The majority of the additional ROW needed for construction is located in Bayou Sauvage NWR. Additionally, a haul route for construction equipment access would be improved along an existing Service-owned road between the LPV 109 levee and US 90.

Flood protection for three highway crossings (Interstate 10 [I-10], US 90 and U.S. Highway 11[US 11]), and the CSX railroad crossing is incorporated into the proposed design for LPV 109.

For the I-10 crossing, a T-wall transitioning into the adjacent levee would be constructed at the crossing at an elevation of +19.0 feet NAVD 88. I-10, which is a six-lane divided highway, would be raised using a bridge crossing over the T-wall. The bridge would extend approximately 900 feet on each side (1,800 feet total) of the T-wall. Bridge construction would be sequenced in order to maintain three lanes of traffic in both directions at all times, but would require the construction of a temporary three-lane bridge structure between the existing I-10 bridges. The construction of a bridge would occur within existing Louisiana Department of Transportation and Development (DOTD) ROW.

Risk reduction for the US 90 and US 11 crossings are incorporated into the proposed design for LPV 109. The US 90 (a four-lane undivided highway), and US 11 (a two-lane highway) crossings would each incorporate the construction of a new floodgate supported on both sides by a T-wall that transitions into the LPV 109 levee. The height of the US 11 floodgate and T-wall would be +18.5 feet NAVD 88 and the height of the US 90 floodgate and T-wall would be +22.0 feet NAVD 88.

The existing CSX Railroad floodgate and associated T-wall at LPV 110 would be raised to an elevation that would not settle below a net grade of approximately +30 feet NAVD 88 in 10 years. The proposed work would include the replacement of the gate monolith and adjacent T-

walls and I-walls with T-wall type floodwalls. Because the LPV 110 floodwall would be slightly offset from the centerline of the adjacent levees, the new T-walls would be constructed to tie into the LPV 109 and LPV 111 levees. The CSX Railroad would remain in service during the floodgate and floodwall construction and no additional ROW would be required.

The LPV 111 levee would be raised to an elevation that would not settle below a net grade ranging from +25.0 feet NAVD 88 (closest to the CSX Railroad crossing) to +29.0 feet NAVD 88 (closest to the Michoud Canal floodwall) in 10 years. Ground improvement techniques to strengthen the foundation soils would be needed to raise the 5.3 miles of levee to the design elevation by June 2011. Deep soil mixing, which is a process that modifies the physical and chemical characteristics of the soil without excavating, would be required for the entire length of the levee to improve the foundation soil strength. Deep soil mixing does not require degrading of the levee surface for installation. Shifting of the center of the levee to the protected side as much as 61 feet would be required to allow the wave berm slope to roughly match the flood side slope of the existing levee, thereby reducing the amount of fill added to the flood side slope. After raising the LPV 111 levee to the 100-year elevation, concrete slope protection would be placed from toe-to-toe on both sides of the levee to prevent scouring. Cement for deep soil mixing and slope protection would be delivered to the project area by barge from the GIWW. It is anticipated that the cement would be pumped from barges in the GIWW over the wetlands located at the toe of the LPV 111 levee to the LPV 111 levee construction site. Additional ROW would be required for the expanded LPV 111 levee, and most of that ROW occurs in Bayou Sauvage NWR.

A new reinforced concrete T-wall would be constructed to replace the existing T-wall at Pump Station No. 15. The T-wall contains three 72-inch pipes that discharge into a basin on the flood side of the T-wall. The top of the T-wall fronting Pump Station No. 15 would be +34.0 feet NAVD 88 with the adjacent levee tie-in section raised to +32 feet NAVD 88. The new T-wall would transition into levee on both sides. During T-wall demolition, temporary flood protection would be constructed in the discharge basin adjacent to the GIWW. The three 72-inch pipes would be extended through the temporary flood protection to discharge into the GIWW. The temporary flood protection in the discharge basin would also be used as a cofferdam to dewater the discharge basin during T-wall construction. A temporary bridge for access during levee and T-wall construction would be placed across Maxent Canal just north of Pump Station No. 15.

As part of construction, numerous utilities, including electrical services, gas lines, telephone poles and lines, storm drainpipes, and water control structures and pump stations for Bayou Sauvage National NWR, would be avoided or relocated. All staging and laydown areas would be located either within the project construction corridor, or within previously developed areas immediately adjacent to the project corridor (*e.g.*, adjacent to highway rights-of-way). Construction of all three reaches is anticipated to require approximately 2 years.

All T-walls would be approximately 2-feet wide supported by an approximately 12- to 17-foot wide and 3-foot high concrete slab connected to H-piles (driven to a depth of approximately 85 feet below the ground surface) and a continuous sheet pile cutoff wall (constructed to depths

ranging from 50 to 60 feet below the ground surface) for further stabilization and seepage protection. It is anticipated that T-walls would be cast-in-place; however, consideration would be given to using precast concrete for T-wall foundations and wall stems.

Materials (*e.g.*, sheetpile, H-pile, concrete, soil) for the construction of T-walls and earthen levees would be transported from staging areas located adjacent to the project corridor, from borrow pits, and from contractors in the region to the active construction areas. Trucks delivering materials would travel along I-10, US 11, US 90, Intracoastal Drive, Industrial Parkway and the Maxent Canal access road and offload at specific points where construction is occurring. Existing access roads from US 11 to LPV 109 would be used as haul routes. Heavy equipment that would likely be used during demolition and construction activities includes haulers, excavators, pile drivers (vibratory and hammer), dozers, graders, cranes, backhoes, and water trucks. Construction activities could occur 24 hours daily and 7 days a week during the construction period.

ALTERNATIVES UNDER CONSIDERATION

Including the no action alternative, four alternatives were considered in detail for the LPV 109 Levee Section, three alternatives were considered in detail for the LPV 109 I-10 Crossing, and four alternatives were considered in detail for the LPV 109 US 90 and US 11 Crossings. Two alternatives were considered in detail for LPV 110 and four alternatives were considered in detail for LPV 111, including a no action alternative for each reach.

LPV 109 Levee Section

No Action. Under the no action alternative, floodwalls would be replaced and levee heights increased to meet previously authorized elevations. Levee and floodwall improvements would occur within the existing ROW. Maintenance of levees and floodwalls would continue.

Alternative 1: Raise Levee by Placing Stability Berms on Both Sides and Using Pre-fabricated Vertical Drains. Design elevations would be reached by placing levee fill in five stages from South Point to US 90 and in six stages along US 90 to LPV 110. It is anticipated that levee construction would need to be conducted in stages to prevent bearing capacity failure. It is estimated that each stage would need approximately 4 months to substantially complete primary consolidation and associated strength gain in the clay soils. Stability berms would be added to meet slope stability factors of safety requirements. Levee side slopes would be the same as LPV 109 proposed action. PV drains would be utilized in levee construction to achieve strength gain in the underlying soft clay stratum. A stability berm width would be approximately 160 feet on the protected side between South Point and US 90, and a stability berm width of approximately 225 feet on the protected side and 90 feet on the flood side would be required between US 90 and LPV 110. A seepage analysis would be performed during the design phase, and if additional seepage control measures are recommended, a CB slurry wall underneath the levee would be constructed.

Alternative 2: Raise Levee by Using Geotextile and Prefabricated Vertical Drains. Levee

construction with two types of ground improvements, high strength geotextile and the incorporation of PV drains to increase the rate of consolidation, would be used to reach the design elevations by June 2011. Three to four layers of high strength geotextile would be used, with the levee fill being placed in five stages from South Point to US 90 and in six stages from US 90 to LPV 110. It is estimated that each stage would need approximately 4 months to substantially complete primary consolidation and achieve adequate strength gain in clay soils. Flood side levee slopes would be the same as LPV 109 proposed action; however, protected side levee slopes would be 1:3 (vertical:horizontal). A seepage analysis would be performed during the design phase and if additional seepage control measures are recommended, a CB slurry wall underneath the levee would be constructed.

Alternative 3: Raise Levee Using Deep Soil Mixing. Deep-soil mixing (DSM) would be used to provide foundational support for raising the levee to the 100-year level of risk reduction elevation. DSM introduces engineered grout or reagent into the underlying soils to modify their physical and chemical characteristics without excavation. DSM provides soil stabilization and minimizes levee width, and allows for levees to be constructed in fewer lifts (*i.e.*, shorter period of time).

Alternative 4: Raise Levee Using Lightweight Fill. The use of lightweight fill materials such as geofoam, expanded clay and Elastizell to raise the LPV 109 levee to the 100-year level of risk reduction elevation were evaluated. These materials result in small loads being imposed on the levee. The existing levee surface would be partially degraded to create a working platform. Lightweight materials would then be used to raise the levee elevation. Because of the risk of breaches in the levee dislodging lightweight materials, erosion protection would be placed along the slopes of the levee.

LPV 109 I-10 Crossing

No Action. Under the no action alternative, the I-10 crossing of LPV 109 would be replaced to meet previously authorized elevations. Improvements would occur within the existing ROW. I-10 would be raised using an abutment or bridge to allow for a higher elevation T-wall or levee to be constructed at the I-10 crossing to meet the previously authorized elevation. Maintenance of structures would continue. No further action would occur.

Alternative 1. Construct Levee and Raise I-10 with a Ramp. A levee would be constructed using one of the alternatives previously described, and I-10 would be raised over the levee with a ramp. Because the I-10 bridges are located approximately 1,300 feet east of the LPV 109 crossing, the ramp profile was developed to meet Department of Transportation and Development (DOTD) criteria without impacting these bridges. The abutment for the ramp would be contained entirely within the existing DOTD ROW; however since settlement of I-10 is not allowed the subsurface soils under the ramp would be improved using DSM.

Alternative 2. Construct Levee and Raise I-10 with a Bridge. A 3,095-foot long, 40-foot high bridge would be constructed over the LPV 109 levee and would meet DOTD's design criteria. Because of the length of this bridge, the existing I-10 bridges located 1,300 feet east of the LPV

109 crossing would also be reconstructed. The bridge would meet Corps design criteria by providing 15 feet of vertical clearance over the proposed LPV 109 levee. The maximum allowable grade of 3 percent would used to minimize the length of the bridges and the amount of reconstruction of the existing bridges.

LPV 109 US 90 and US 11 Crossings

No Action. Under the no action alternative, floodgates and floodwalls would be replaced to meet previously authorized elevations. Floodgate improvements would occur within the existing ROW. Maintenance of structures would continue. No further action would occur.

Alternative 1. Raise Highways Using a Ramp. A ramp over the LPV 109 levee would be constructed for the two crossings similar to the method described for I-10. Because of ROW limitations that do not allow for adequate side slopes, retaining walls would be used on both sides of the US 90 and US 11 ramps. Also, ROW limitations would likely require complete closure of these two highways for a period of time during construction.

Alternative 2. Raise Highways Using a Bridge. A bridge over the LPV 109 levee would be constructed for the two highway crossings similar to the method described for I-10. The bridges would be approximately 3,095-feet long and 40 feet high, providing 15 feet of vertical clearance over the LPV 109 levee. ROW limitations would likely require complete closure of these two highways for a portion of the construction period.

Alternative 3. Retrofit Existing Floodgate. The existing floodgate structures would be raised to the design elevation and adjacent I-walls and levee structures raised in elevation, retrofitted to meet design criteria and sloped to meet the flood protection in the adjacent levee section. Additionally, because the centerline of the LPV 109 levee would shift 73 feet to the west, the existing floodgate would be offset and new T-walls would be constructed at angles to connect the existing floodgate to LPV 109 levee reaches.

LPV 110

No Action. Under the no action alternative, the 60 feet of I-wall type floodwall would be improved or replaced to meet previously authorized elevations. Maintenance of T-walls and the floodgates that are currently at the previously authorized elevation would continue. No further construction would occur.

Alternative 1. Retrofit Existing Floodgate. The existing LPV 110 floodgate and floodwalls would be raised 10 feet to meet design elevation. Adjacent I-walls and levees would be raised and retrofitted to meet current design standards. All floodwalls and levee structures would be sloped to meet the flood protection in adjacent reaches.

LPV 111

No Action. Under the no action alternative, levees along the GIWW and the floodwall at Pump Station No. 15 would be maintained at previously authorized elevations. Some additional seepage protection may be required to meet design criteria. No further action would occur.

Alternative 1. Raise Levee with Prefabricated Vertical Drains and Geotextile. Levees would be constructed utilizing two types of ground improvements, high strength geotextile and the incorporation of PV drains to increase the rate of consolidation. Three to four layers of high strength geotextile would be used, with the levee fill being placed in five to seven stages to allow for sufficient consolidation of material. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action.

Alternative 2. Raise Levee with Lightweight Fill. Using lightweight fill materials such as geofoam, shredded and baled tires, expanded clay and Elastizell were evaluated. These materials result in small loads being imposed on the levee to raise the elevation to the 100-year risk reduction elevation. The existing levee surface would be partially degraded to create a working platform. Lightweight materials would then be used to raise the levee elevation. Because of the risk of breaches in the levee dislodging lightweight materials, erosion protection would be placed along the slopes of the levee. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action.

Alternative 3. T-wall Cap. The existing levee would be degraded to create a working platform and a T-wall would be constructed on top of the existing levee to an elevation of +31.0 feet NAVD 88. The T-wall would be approximately 27,330 feet long and would require construction precautions to meet vessel loading design criteria, since the LPV 111 T-wall cap would be adjacent to a navigable waterway. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action.

EVALUATION METHODS FOR SELECTED PLAN AND ALTERNATIVES

The Service used the Habitat Assessment Methodology (HAM) to quantify the impacts to forested habitats. The Fresh-Intermediate, and Brackish Coastal Marsh Models of the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) Wetland Value Assessment (WVA) Methodology was used to quantify the impacts to the marsh habitat. Those habitat assessment models utilized in this evaluation are 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 (Louisiana Department of Natural Resources 1994; U.S. Fish and Wildlife Service 1980). However, both models are community-level evaluations instead of the species-based approach used with HEP. Further explanation of how impacts/benefits are assessed and an explanation of the assumptions affecting habitat suitability (i.e., quality) index (HIS) values for each target year are available for review at Service's Lafayette, Louisiana, field office.

IMPACTS OF SELECTED PLAN AND ALTERNATIVES

The no action alternative was not selected because it would not allow completion of 100 year flood protection; the purpose of the Supplemental 4 authorization. Fish and wildlife resources would not be significantly impacted by selection of the no action alternative for reaches 109-111. However,

with the no action alternative, maintenance of rock foreshore protection along LPV 108 would still be conducted. Impacts to SAVs resulting from maintenance of the riprap erosion protection (dredging of access channels, stockpiling of dredged material and riprap in Lake Pontchartrain) for LPV 108 has not be quantified, but surveys prior to and post construction will be undertaken to determine the need for restoration activities.

Prior to levee rebuilding, soil borings will be taken along the LPV 109 reach on the protected and flood sides of the levee. Most of the work will be within the Bayou Sauvage NWR. The purpose of the borings is to characterize the subsurface soils which will underlie part the new levee and berm. The 43 boring sites will experience temporary impacts due to compaction from marsh buggy tracks, discharge of soil during the boring process and removal of dirt from the bore hole. Because most borings will be taken near the existing ROW and efforts have been undertaken to minimize the footprint of this activity, it is estimated by the Corps that only 0.18 acres would be impacted. Post boring surveys of the boring sites should be conducted to ensure the accuracy of impact areas and assess any recovery from impacts. The temporal analysis of the boring impacts would extend from when the borings occur till the time of levee construction which is estimated to be approximately 1 year. Borings are anticipated to result in the loss of 0.05 AAHUS of bottomland hardwood forest and 0.05 AAHUS of marsh.

The LPV 109 and LPV 111 levee reaches will be impacted by the expansion of the levee base onto the surrounding marsh and BLH, eliminating linear strips of these habitats. Approximately 206 acres of moderate-quality bottomland hardwood forested wetlands and 74 acres of emergent marsh would be directly impacted by levee construction and upgrading. Our analyses indicate that project implementation would result in the direct loss of 101 AAHUs in bottomland hardwood forested wetlands, and 37 AAHUs each of fresh/intermediate and brackish marsh.

The selected plan for LPV 111 is a deep soil mixing process which minimizes the levee base width necessary for upgrade to 100 year protection level. Impact acreage of the selected plan for this levee reach is significantly less than for the selected plan for LPV 109. The deep soil mixing alternative was not selected as the proposed plan for LPV 109 resulting in a much larger levee footprint and subsequent greater impacts to habitat. The Service recommends that the IER should contain at least a summary of the plan selection process and the justifications for elimination of alternatives from consideration.

FISH AND WILDLIFE CONSERVATION MEASURES

Clearing and grubbing should be limited to only what is necessary at the time of construction. If bald eagle nesting locations and wading bird colonies are found in the project area before or during construction, adverse impacts may be avoided by timing of construction and further consultation with the Service. SAVs may be directly impacted by dredging of access channels and indirectly by turdidity increases resulting for erosion of disposed access channel material stockpiled in Lake Pontchartrain. Prior to construction and following backfilling of the access channels the Corp should survey for SAVs in Lake Pontchartrain from the western end of IER 6 eastward to 6,000 feet west of Paris Road. Surveys should be taken at 1,000 feet intervals along

the shoreline out to the 3 foot depth contour with samples taken every 20 feet. SAV should be replanted, if needed, to minimize project impacts. The need to replant would be determined in coordination with the Service, NMFS, and other interested natural resource agencies.

COMPENSATORY MITIGATION MEASURES

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 supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process.

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 wetlands for fish and wildlife and the relative scarcity of that habitat type, those wetlands are usually designated as Resource Category 2 habitats, the mitigation goal for which is no net loss of in-kind habitat value. The degraded bottomland hardwood forest and wetland scrub-shrub that would be impacted is placed in Resource Category 3 due to its reduced value to wildlife. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value. Project impacts will be minimized to some extent by hauling in material for the levee. Because the "no action" alternative was not selected, avoiding the project impacts altogether is not feasible. Therefore, remaining project impacts should be mitigated via compensatory replacement of the habitat values lost.

To replace the project-related loss of moderate-quality forested wetland habitat, fresh/intermediate marsh, and brackish marsh, the Corps and the local sponsor should develop and fund mitigation actions that would produce the equivalent of 101, 37, and 37 AAHUs, respectively, within the Bayou Sauvage NWR. The Service would be involved in evaluating the adequacy of mitigation at any site.

SERVICE POSITION AND RECOMMENDATIONS

Construction of the flood protection levee would result in the loss of 206 acres of bottomland hardwood wetlands, 100 acres of fresh/intermediate marsh, and 70 acres of brackish marsh for a loss of 101, 37, and 37 AAHUs respectively. The Service does not object to providing improved hurricane protection to the greater New Orleans area provided the following fish and wildlife

conservation recommendations are implemented concurrently with project implementation:

1. The Service, LDWF, NMFS, and other resource agencies shall be provided an opportunity to review and submit recommendations on the draft plans and specifications for all levee work addressed in this report.

2. Access channels should be refilled up to the prior lakebed elevation after project construction, especially the channel sections in water depths of 3 feet or less. Post-construction surveys (e.g., centerline surveys) should be taken to ensure access channels have been adequately backfilled. That information should be provided to the natural resource agencies for review. In areas shallower than 3 feet, where pre-existing elevations have not been successfully restored, the Corps should ensure those elevations are restored by additional measures

3. The Corps should avoid impacts to Bayou Sauvage NWR, when feasible. The Corps should continue to coordination with Refuge personnel during planning and compatibility determination processes. A Special-Use Permit should be obtained prior to any entrance onto the refuge. Coordination should continue until construction is complete and prior to any subsequent maintenance. Points of contacts for that refuge are Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR. The Corps should not sign the Decision Record until a Compatibility Determination is complete.

4. Mitigation for impacts to the Bayou Sauvage NWR should occur on Bayou Sauvage NWR property. Mitigation planning should include refuge staff. The Corps and local sponsor shall obtain 175 AAHUs to compensate for the unavoidable, project-related loss of forested and emergent wetlands.

5. The Service, LDWF, NMFS and other natural resource agencies should be consulted regarding the adequacy of any proposed mitigation.

6. Flood protection and ancillary features such as staging areas and access roads should be designed and positioned so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized to the greatest extent possible.

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

8. If a proposed project feature is changed significantly or is not implemented within one year of the date of our Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with this office to ensure that the proposed project would not adversely affect any federally listed threatened or

endangered species or their habitat.

9. The Corps should monitor the recovery of the SAV beds in the shallower portions (i.e., less than 3 feet in depth) of Lake Pontchartrain from the western end of IER 6 to 6,000 feet east of Paris Road. If SAV has not re-colonized to pre-project conditions within one year following backfilling, the Corps should plant appropriate species of SAV in the project area. Coordination with the Service, NMFS and other interested natural resource agencies should be conducted to determine the adequacy of recovery and planting specification, if needed.

10. Areas on the Bayou Suavage NWR where soil borings have been taken should be assessed to ensure the accuracy of the anticipated impact area (0.18 acres) and determine recovery from impacts.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD/CRD), Baton Rouge, LA

LITERATURE CITED

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-79/31. 108 pp.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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January 30, 2007

Colonel Michael McCormick
Hurricane Protection Office (HPO)
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel McCormick:

Please reference the December 31, 2008, letter from Mr. Gib Owen, Acting Chief of the Environmental Planning and Compliance Branch, requesting our concurrence with determinations regarding impacts to threatened or endangered species and their critical habitat made by U.S. Army Corps of Engineers' (Corps) for work proposed in Individual Environmental Reports (IER) 5-11 in Orleans, Jefferson, and St. Bernard Parishes. Those projects would involve improvements to levees, floodwalls, floodgates, and construction of new barriers, closure structures, navigable gates and/or permanent pump stations in the New Orleans East Bank, New Orleans East and Chalmette Loop sub basins. These improvements are necessary to provide 100-year level flood protection for the New Orleans Metropolitan area. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), 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.).

The projects included in IERs 5-11 span a large geographic area and have unique components, but the number of potentially impacted threatened or endangered species is small; therefore, the IERs will be grouped according to potentially affected species.

Federally listed as an endangered species, West Indian manatees (*Trichechus manatus*) occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

Some or all of the proposed project features, including alternatives, of IERs 5, 6, 7, 8, and 11 (especially the dredging of access channels for IERs 6 and 7), could potentially impact the

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manatee. The Corps has incorporated the following protective measures into its construction contracts; therefore, the Service concurs with your determination that construction of the proposed project features is not likely to adversely affect the manatee.

All contract personnel associated with the project should be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the Service's Lafayette, Louisiana Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

The Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (i.e., March to May). Adults and sub-adults may be found in those rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Sturgeon less than two years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species.

On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation. The primary constituent elements essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components.

In that critical habitat designation, responsibility for consultation with specific Federal agencies was also identified for the Service and for the NMFS. For estuarine and marine waters in

Louisiana, the NMFS is responsible for consultations regarding impacts to the sturgeon and its critical habitat with all Federal agencies, except the Department of Transportation, the Environmental Protection Agency, the U.S. Coast Guard, and the Federal Emergency Management Agency, which consult with the Service. Therefore, please contact Dr. Stephania Bolden (727/824-5312) in St. Petersburg, Florida, for information concerning that species and its critical habitat. Should the proposed project directly or indirectly affect the Gulf sturgeon or its critical habitat in Louisiana, further consultation with that office will be necessary.

The project-area forested wetlands may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which has officially been removed from the List of Endangered and Threatened Species as of August 8, 2007, however the bald eagle continues to be protected under the MBTA and the BGEPA. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern parishes. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants.

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how 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/migratorybirds/issues/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. The construction of the proposed project features for IER 10, Reach LPV 148, may potentially impact the bald eagle. If the Corps determines that construction activities will be located at or closer than 660 feet from a nest tree, the Service recommends that the Corps conduct an on-line evaluation 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 our office.

Federally listed as an endangered species, brown pelicans (*Pelecanus occidentalis*) are not currently known to nest in the project vicinity. Brown pelicans feed along the Louisiana coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance. The Service concurs that construction of the proposed project features is not likely to adversely affect the brown pelican.

IERs 6, 7, 8, 9, and 10 are 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

Portions of IER 6 and 7 are located within or may require access through the Service's Bayou Sauvage National Wildlife Refuge. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

Federal agencies proposing a project that includes features on a national wildlife refuge are encouraged to contact the Refuge Manager early in the planning process. The Refuge Manager will work with the project proponent to determine if the proposed project constitutes a "refuge use" subject to a compatibility determination. If the proposed project requires a compatibility determination, a concise description of the project (refuge use) including who, what, where, when, how, and why will be needed to prepare the compatibility determination. In order to determine the anticipated impacts of use, the project proponent may be required to provide sufficient data and information sources to document any short-term, long-term, direct, indirect or cumulative impacts on refuge resources. Compatibility determinations will include a public review and comment before issuing a final determination.

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan Refuge Manager for the Bayou Sauvage National Wildlife Refuge at (985) 822-2000, for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

Based on our review, the Service concurs with your determinations that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the brown pelican, and because of manatee protective measures included in the Corps' construction contracts, the Service also concurs that the construction of the proposed project features in IERs 5-11 is not likely to adversely affect the manatee. The Service recommends that the Corps contact NMFS regarding impacts to the Gulf sturgeon and its critical habitat and implement the above mentioned survey and protection measure to protect colonial nesting birds. The Service is also willing to assist the Corps evaluate the potential impacts to the bald eagle under the NBEM Guidelines.

We appreciate the opportunity to review the proposed 100 Year Hurricane Protection Projects for IERs 5-11. If you need further assistance or have questions regarding this letter, please contact David Walther (337/291-3122) of this office.

Sincerely,

for James F. Boggs
Field Supervisor
Louisiana Field Office

cc: NOAA, St. Petersburg, FL
Laura Lee Wilkinson, CEMVN, New Orleans, LA
LDWF, Natural Heritage, Baton Rouge, LA

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
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LAFAYETTE, LOUISIANA 70506

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NEW ORLEANS, LA 70160

70160$0267 B001

September 17, 2008

Planning, Programs, and
Project Management Division
Environmental Planning and
Compliance Branch

Subject: Informal Endangered Species Act Section 7 Consultation for **IER 6**: Lake Pontchartrain and Vicinity, New Orleans East, New Orleans Lakefront Levee to Citrus Lakefront Levee, New Orleans Airport Floodwall to Paris Road, Orleans Parish, Louisiana Project and **IER 7**: Lake Pontchartrain and Vicinity, New Orleans East, New Orleans East Lakefront Levee to New Orleans East Back Levee, Paris Road to Eastbank of Michoud Canal, Orleans Parish, Louisiana Project.

Mr. David Bernhart
U.S. National Marine Fisheries
Southeastern Regional Office
Protected Resources Division
263 13th Ave. South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN), is preparing two Individual Environmental Reports (IERs) on improvements to the New Orleans (N.O.) Lakefront Levee to the Citrus Lakefront Levee; N.O. Airport Floodwall to Paris Road; N.O. East Lakefront Levee to N.O. East Back Levee, and Paris Road to Eastbank of Michoud Canal, in Orleans Parish, Louisiana (figure 1). The purpose of the proposed action is to upgrade the Lake Pontchartrain and Vicinity (LPV) levees in Orleans Parish to the 100 year level of protection and to provide shoreline protection along Lake Pontchartrain to protect these levees.

The proposed action would provide shoreline protection in the form of foreshore rock placed along the Lake Pontchartrain shoreline and involve construction access dredging of 9 channels (see enclosed drawings). Using the digitized 2004 Lake Pontchartrain shoreline, the foreshore rock would extend into the water and cover approximately 14 acres of Gulf sturgeon critical habitat. Approximately 44 acres of Lake Pontchartrain water bottom would be dredged via bucket dredge as access channels for construction. Material dredged from the access channels would be temporarily stockpiled adjacent to the channels on approximately 134 acres of Lake Pontchartrain water bottom, but would be returned to the channels following completion of construction.

The threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is known to occur in Lake Pontchartrain through the sampling efforts of Louisiana Department of Wildlife and Fisheries Inland Fisheries Division. On March 19, 2003, the United States Fish and Wildlife Service (USFWS) and the National Oceanographic and Atmospheric Administration (NOAA) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for Gulf sturgeon in Louisiana. This designation included portions of the Pearl and BogueChitto Rivers; Lake Pontchartrain east of the Lake Pontchartrain Causeway; and all of Little Lake, the Rigolets, Lake St. Catherine, and Lake Borgne. Although the proposed project would involve activities in the critical habitat of a Federally listed species, the CEMVN believes that the scope of the activities constitute a Not Likely to Adversely Affect (NLAA) determination for the species and its habitat under Section 7 of the Endangered Species Act (ESA). As a result, the CEMVN requests concurrence from NOAA in a finding of NLAA for the Federally listed Gulf sturgeon and its critical habitat through informal consultation. Details on the parts of the project in Gulf sturgeon critical habitat and a narrative describing our conclusions in this regard are provided below.

Rock would be placed upon approximately 11 miles of existing foreshore protection that was initially installed in 1985, raising it to elevation 14 feet (ft) NAVD88. Using the digitized 2004 Lake Pontchartrain shoreline, this added rock would extend into the water and permanently cover approximately 14 acres of Gulf sturgeon critical habitat (see enclosed drawings).

Placement of the rock foreshore protection would be via access channels perpendicular and parallel to the protection alignment. These access channels would be dredged to a depth of -10 ft NAVD 88 via bucket dredge, be no wider than 100 ft bottom width, and disturb approximately 44 acres of water bottom (figure 2). Material from the access/floatation channels would be stockpiled linearly, adjacent to and on one side of the channels in an area equaling approximately 134 acres (including the 14 - 40 ft buffer between the access/floatation channels and stockpile sites) and be returned to the floatation channel at the end of construction. A silt curtain would be deployed on all sides of the stockpile sites except the side(s) adjacent to the access channel or directly on land in an effort to contain the stockpiled material to the maximum extent possible for backfilling.

The potential physical impacts to species of concern are related to direct physical impacts and habitat alteration due to activities conducted in the water and are summarized as follows:

The construction of the shoreline protection would result in the permanent loss of water bottom habitat in these areas. The footprint of the shoreline protection would cover 14 acres of Lake Pontchartrain water bottom and impact the benthic habitat in waters less than 1 meter deep.

A temporary loss of benthic invertebrates would occur with the dredging of the access channels and the stockpiling of the access channel material. The stockpiled access material would be returned to its original location upon project completion. Benthic habitat disturbed during the project for the access channels is approximately 44 acres. Access channel material stockpiled adjacent to the channel would disturb approximately 134 acres of benthic habitat. Total temporary impact to Gulf sturgeon critical habitat would be approximately 178 acres.

Turbidity in the project area would temporarily increase during project construction but would return to normal after construction is completed.

Gulf sturgeon: The USFWS and NOAA utilized primary constituent elements essential for the conservation of the Gulf sturgeon in order to designate critical habitat for the species in the March 19, 2003 Federal Register. These primary constituent elements are those habitat components that support feeding, resting, sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support those habitat components. The following are the primary constituent elements for Gulf sturgeon critical habitat and CEMVN's responses on how the MRGO, Louisiana, and Lake Pontchartrain Wetland Creation and Shoreline Protection project would affect these elements. CEMVN has determined that the proposed action is Not Likely To Adversely Affect Gulf sturgeon critical habitat based on these responses.

1) Abundant prey items within riverine habitats for larval and juvenile life stages, and within estuarine and marine habitats for juvenile, sub-adult, and adult life stages.

The proposed action would not affect any riverine habitats.

The proposed action would temporarily decrease the amount of Gulf sturgeon prey species available in the estuarine areas that are being dredged for the project's access channels as well as those areas acting as temporary disposal sites for access channel material. These areas would, however, quickly re-colonize with the benthic species important to the diet of the various stages of Gulf sturgeon using the area upon project completion.

The proposed action would permanently decrease the amount of Gulf sturgeon prey species available in the estuarine areas in the proposed location of the foreshore rick dikes. Fox et al., (AFS Symposium 28:111-126, 2002) found in their investigations of the estuarine and nearshore marine habitats used by Gulf sturgeon in the Choctawhatchee Bay and nearshore Gulf of Mexico that Gulf sturgeon were typically found in water depths of 2-4 meters. The depths along the foreshore protection alignment in Lake Pontchartrain are shallower than 1 meter in depth. As such, the CEMVN believes these areas are rarely, if ever used by Gulf sturgeon foraging for prey species.

2) Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay.

The proposed action will not occur within a riverine system or spawning area.

3) Riverine aggregation areas, also referred to as resting, holding and staging areas, used by adult, sub-adult, and/or juveniles, generally, but not always, located in holes below normal riverbend depths, believed necessary for minimizing energy expenditures during freshwater residency and possibly for osmoregulatory functions.

The proposed action will not occur within a riverine system or near any potential resting, holding, or staging areas.

4) A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of freshwater discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging; and necessary for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larvae staging.

The proposed action will not occur within a riverine system. Additionally, the proposed action will not impact the flow or flushing of water through a riverine system.

5) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.

The proposed action would result in a localized increase in turbidity at the project area from actions associated with the dredging of the access channels, placement of the stockpiled material and placement of the foreshore protection. However, the rise in turbidity would be temporary and would be reduced with the movement of the tides. As such, there would be no significant change in the temperature, salinity, pH, hardness, turbidity, oxygen content, or other chemical characteristics of the water in Lake Pontchartrain as a result of the proposed action that would affect the normal behavior, growth, and viability of all Gulf sturgeon life stages. In addition, if Gulf sturgeon were in the area during construction, they would be free to relocate in the vicinity of the proposed project since the project area encompasses only a small section of a 403,200 acre estuarine/brackish lake of which approximately ½ is designated critical habitat.

6) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.

The proposed action would result in localized sediment disturbance at the project area from actions associated with the dredging of the access channels, placement of the stockpiled material and placement of the foreshore protection. However, the sediments disturbed from the dredging of the access channels would be returned to their original location upon project completion. The removal of sediments from the access channel would not impact the texture and other chemical characteristics necessary for the normal behavior, growth, and viability of Gulf sturgeon life stages because either these disturbances will occur in waters depths that Gulf sturgeon do not normally utilize or the type of sediment presently occurring in the project area would be restored at the end of construction.

7) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by a permanent structure, or a dammed river that still allows for passage).

The proposed action is for shoreline protection adjacent to an estuarine/brackish lake and does not block nor hinder the migratory movements of Gulf sturgeon between their riverine, estuarine and marine habitats.

In an effort to avoid direct impacts to Gulf sturgeon that may possibly be using the project area during the winter months to forage, the CEMVN would adhere to a dredging window for the project, allowing construction in the project area to occur during the months of May through September. The bucket drop procedure developed by USFWS would also be employed to encourage any Gulf sturgeon in the vicinity to leave the project area. Due to the water depths along the Lake Pontchartrain shoreline where the foreshore protection will be placed, the size of the estuarine/brackish lake this work is to occur in, and the ability of benthic organisms to rapidly re-colonize disturbed areas, the CEMVN believes that the proposed action is not likely to adversely affect Gulf sturgeon or their critical habitat.

Based on the information provided in this correspondence, CEMVN requests concurrence of a NLAA determination for Gulf sturgeon and their associated critical habitat for IERs 6 and 7. The NOAA will be notified immediately if any of the actions considered in this document are modified, requiring further consultation. If impacts to Gulf sturgeon and their critical habitat occur beyond what has been already considered, all operations will cease and NOAA will be notified. Any modifications or conditions to the proposed action as a result of this concurrence will be implemented prior to commencement of activities. CEMVN believes this fulfills all requirements of the Endangered Species Act and no further action is necessary. Questions or comments on this issue should be addressed to Mrs. Elizabeth Behrens who may be reached via telephone at (504) 862-2025, by email at elizabeth.h.behrens@usace.army.mil or by mail at U.S. Army Corps of Engineers; CEMVN-PM-RS; P.O. Box 60267; New Orleans, Louisiana, 70160-0267.

Sincerely,

For Elizabeth Wiggins
Chief, Environmental Planning
and Compliance Branch

Enclosures

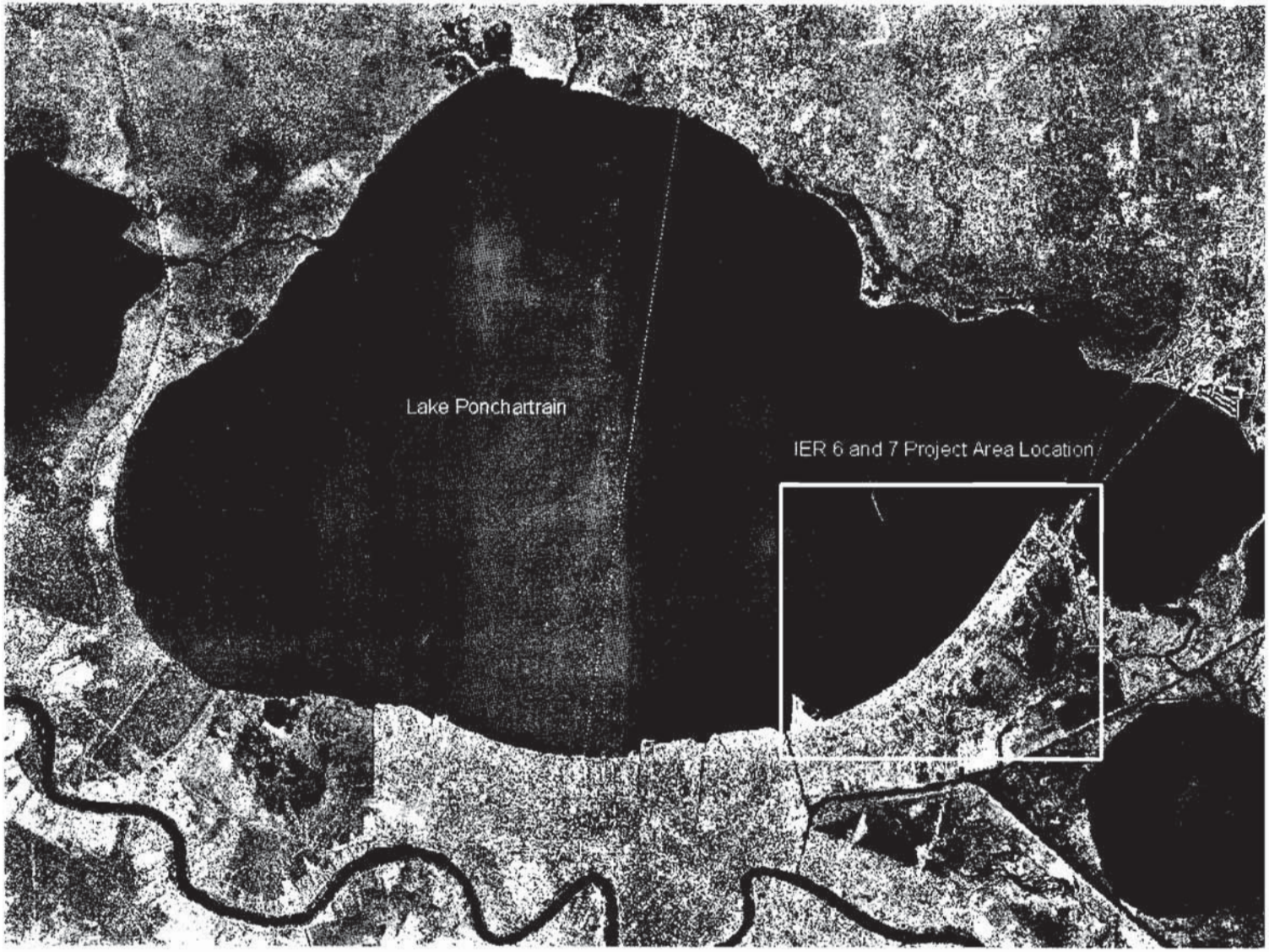

Figure 1. IER 6 & 7 Project Area

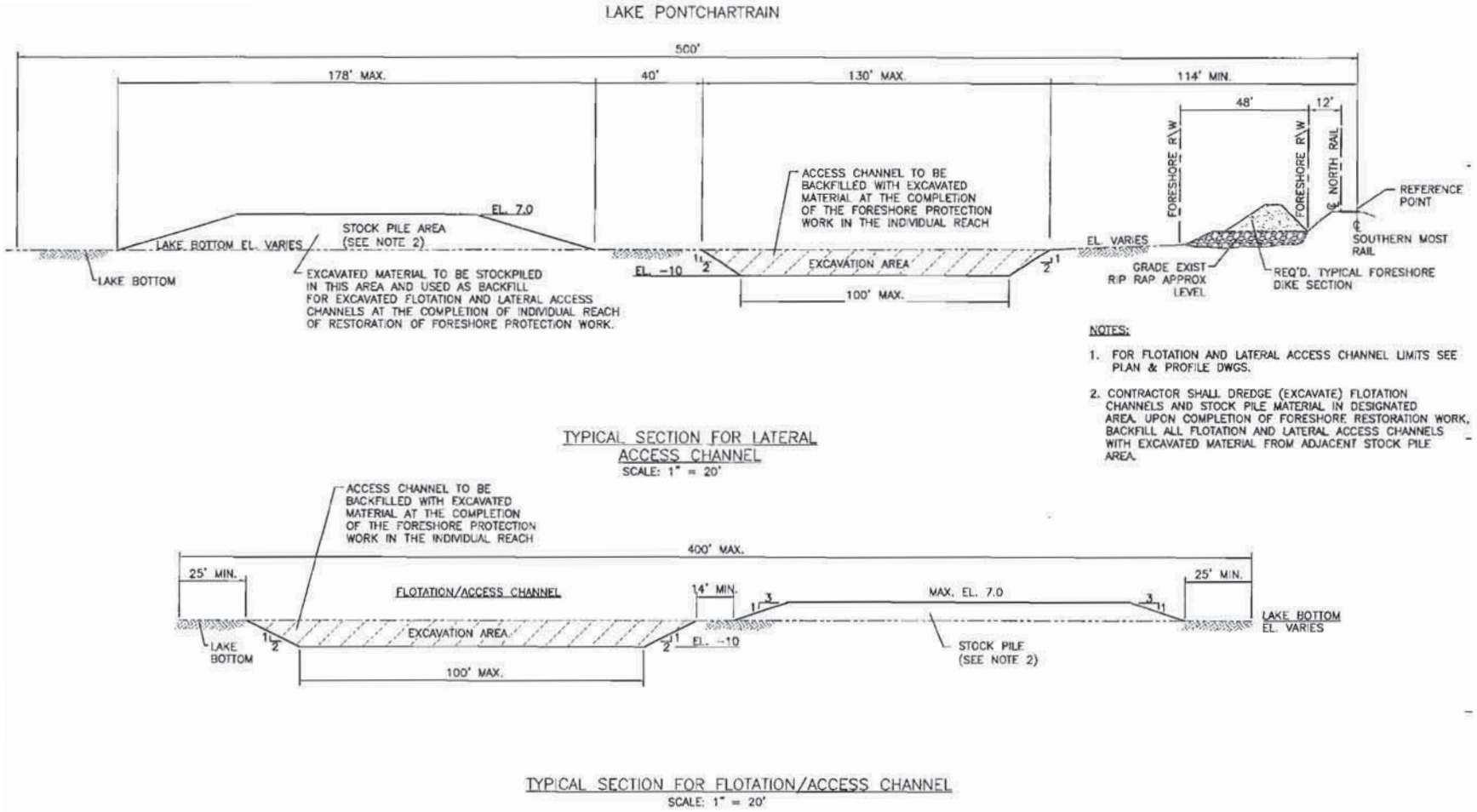

Figure 2. Access/Floatation Channel Cross Sections

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5312, FAX 824-5309
http://sero.nmfs.noaa.gov

MAR 13 2009 F/SER31:KS

Ms. Elizabeth Wiggins
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Re: IER 6 and 7

Dear Ms. Wiggins:

This responds to your letter dated September 17, 2008, requesting section 7 consultation pursuant to the Endangered Species Act (ESA) for the Army Corps of Engineers' (COE) Individual Environmental Reports (IER) 6 and 7. The reports evaluate the COE's proposal to upgrade the existing hurricane protection system to protect communities and infrastructure in Orleans Parish, Louisiana, from 100-year level storms. The proposed projects include the placement of rock on the existing foreshore protection to raise its elevation on several sections of the levee system on Lake Pontchartrain near New Orleans, Louisiana. You requested concurrence from the National Marine Fisheries Service (NMFS) with your determination the projects are not likely to adversely affect the threatened Gulf sturgeon and its designated critical habitat. NMFS' determinations regarding the effects of the proposed action are based on the description of the action in this and any related consultation documents. You are reminded that any changes to the proposed action may negate the findings of the present and completed consultations and may require reinitiation of consultation with NMFS.

Alternative Arrangements for NEPA and Incremental ESA Analysis

Though NMFS has previously completed consultation on three COE-proposed hurricane protection projects, we have only recently recognized that those projects as well as the projects evaluated in IERs 6 and 7 are components of the COE's comprehensive plan to upgrade existing structures in the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, which was authorized and funded under Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery (2006). The 17 projects included in the proposed comprehensive plan will upgrade the existing hurricane protection system, damaged and weakened by Hurricanes Katrina and Rita in 2005, to reduce the threats to communities and infrastructure from 100-year level storms. On March 13, 2007, the COE implemented Alternative Arrangements under the provisions of the Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (NEPA; 40 CFR 1506.11) to expedite complete environmental analysis for the proposed comprehensive plan. The Alternative Arrangements allow decisions on individual components

of the overall proposed action so that the process can be completed more quickly than under the traditional NEPA process. The COE deemed the Alternative Arrangements necessary to reduce the risk of flooding and to restore public confidence in the hurricane protection system so that economic recovery of the area could proceed. When sufficient information is available from each of the IERs analyzing the proposed individual projects making up the comprehensive plan, the COE will produce a draft Comprehensive Environmental Document (CED). The CED will incorporate the IERs by reference and address the work completed, as well as the remaining work to be completed, on a system-wide scale and include a final mitigation plan. The COE has committed to NMFS that if individual and/or cumulative effects to listed species or designated critical habitat not previously addressed in IERs that have undergone consultation are subsequently identified in the CED, the COE will reinitiate consultation with NMFS.

The Endangered Species Act has been interpreted by courts, including the Supreme Court of the United States, as requiring comprehensive consultation on the entire scope of a proposed project or plan. Incremental consultation on separate stages or phases of a project is allowable only where the project is implemented under statutes that authorize staged decision-making, including staged environmental reviews and the potential for modification or cancellation of subsequent stages.

The regulations implementing the ESA include provisions at 50 CFR 402.14(k) for consulting on projects in incremental steps that are based on the caselaw discussed above. Section 402.14(k) provides that:

> Incremental steps. When the action is authorized by a statute that allows the agency to take incremental steps toward the completion of the action, the Service shall, if requested by the Federal agency, issue a biological opinion on the incremental step being considered, including its views on the entire action. Upon the issuance of such a biological opinion, the Federal agency may proceed with or authorize the incremental steps of the action if:
> (1) The biological opinion does not conclude that the incremental step would violate section 7(a)(2);
> (2) The Federal agency continues consultation with respect to the entire action and obtains biological opinions, as required, for each incremental step;
> (3) The Federal agency fulfills its continuing obligation to obtain sufficient data upon which to base the final biological opinion on the entire action;
> (4) The incremental step does not violate section 7(d) of the Act concerning irreversible or irretrievable commitment of resources; and
> (5) There is a reasonable likelihood that the entire action will not violate section 7(a)(2) of the Act.

In accordance with these provisions, the consultation on each incremental step must be in the context of the entire action (i.e., the effects of all previous steps should be considered in the evaluation of the effects of the current step). NMFS has previously completed consultations on IERs 2, 3, and 11. Therefore, this consultation will consider the effects of those projects in the evaluation of the effects of the currently proposed actions, IERs 6 and 7, on listed species and critical habitat under NMFS purview.

Previously Authorized IER Projects

Section 7 consultation was completed on IER 2 on June 6, 2008. The project consists of replacing existing floodwalls with new T-walls, constructing a breakwater, and dredging a channel for equipment access in the western portion of Lake Pontchartrain in Jefferson and St. Charles Parishes, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. The project is not located in designated Gulf sturgeon critical habitat and has not yet been constructed.

Consultation for IER 3 was completed on May 28, 2008; consultation on modifications to the project was completed on November 6, 2008. The project, as modified, consists of the construction of a cement breakwater, the addition of rock riprap to existing foreshore protection along the shoreline, and dredging for equipment access in Lake Pontchartrain in Jefferson Parish, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. In addition, NMFS determined that IER 3 was not likely to adversely affect designated Gulf sturgeon critical habitat in Unit 8. Water quality impacts related to dredging and stockpiling of dredged material are expected to be insignificant because they will be temporary and minimized by the use of silt curtains. Potential effects to sediment quality resulting from dredging and stockpiling of dredged material will also be insignificant. While dredging may temporarily uncover a layer of finer-grained sediment, the original material will be placed back in the channel and sediment quality will be returned to pre-project conditions. Prey abundance will be temporarily affected by the dredging of 9 acres of waterbottom and the placement of dredged material on 20 acres of waterbottom. However, the project area encompasses only a small portion of the 403,200 acres of available habitat in Lake Pontchartrain supporting Gulf sturgeon prey items. Stockpiled material will be placed back into the dredged channels upon project completion and returned to pre-project contours. Benthic invertebrates utilized by Gulf sturgeon are expected to recolonize the dredged area rapidly, as they have been found to recolonize within one year when sediment composition and depth remain consistent. The permanent loss of 9 acres of habitat (due to the construction of the breakwater, riprap, and foreshore protection) on prey abundance is also expected to be insignificant. Gulf sturgeon prey are expected to be found in sandy substrate, while the substrate found at the site of the breakwater is mainly hard bottom. Further, Gulf sturgeon are expected to be found in deeper waters (2 to 4 meters) than those at the site of the proposed foreshore protection (less than 1 meter). The project has not yet been constructed.

Consultation on IER 11 was completed on August 12, 2008. The project consists of construction of storm surge protection structures (flood control gates and concrete floodwalls) and dredging for equipment access between the Inner Harbor Navigation Canal and Lake Borgne in Orleans and St. Bernard Parishes, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. Although not located in designated Gulf sturgeon critical habitat, the project is hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect hydroperiod, salinity, ability for benthic communities to be established and maintained, water

velocity, dissolved oxygen, siltation, or accessibility; therefore, NMFS determined the project was not likely to adversely affect designated Gulf sturgeon critical habitat. This project is currently under construction.

Currently Proposed Projects

The proposed projects, IERs 6 and 7, are located between 30.0381°N, 90.0126°W (WGS84) and 30.1488°N, 89.8800°W (WGS84) in Orleans Parish, Louisiana, and includes improvements to structures from the New Orleans Lakefront Levee to the Citrus Lakefront Levee, the New Orleans Airport Floodwall to Paris Road, New Orleans East Lakefront Levee to New Orleans East Back Levee, and Paris Road to Eastbank of Michoud Canal. The elevation of 11 miles of existing foreshore protection will be raised to 14 feet NAVD88 by placing additional rock on the structure. To access the foreshore protection for rock placement, a bucket dredge will be used to excavate nine 10-foot-deep channels perpendicular to the shoreline of Lake Pontchartrain, ranging from 750- to 1,600-feet long and up to 400 feet wide. Four 2,000- by 500-foot-wide lateral access channels parallel to the shoreline will also be dredged. Dredging will only occur May through September in order to avoid impacts to Gulf sturgeon that may use Lake Pontchartrain as winter foraging habitat. Dredged material will be stockpiled adjacent to the channels (with a 14- to 40-foot buffer in between) and surrounded with a siltation curtain to keep it in place. All dredged material will be returned to the access channels once the project is completed. Approximately 44 acres of waterbottom will be dredged and 134 acres of waterbottom will be temporarily covered by the stockpiled dredged material, resulting in temporary impacts to 178 acres of benthic habitat through burying and physical disruption of potential prey. Permanent impacts will result from the placement of rock on the existing foreshore protection, which will extend into the water and permanently cover an additional 14 acres of waterbottom. Water depths in the area where the rock will be placed are less than 1 meter deep.

Effects to Species and Designated Critical Habitat from Previous and Currently Proposed IER Projects

As discussed in a previous section of the document, in accordance with the provisions of the ESA at 50 CFR 402.14(k), section 7 consultation on each incremental step of a phased/staged action must be in the context of the entire action (i.e., the effects of all previous steps should be considered in the evaluation of the effects of the current step). NMFS has previously completed consultations on IERs 2, 3, and 11. Therefore, this consultation will consider the effects of those projects in the evaluation of the effects of the currently proposed actions, IERs 6 and 7, on listed species and critical habitat under NMFS purview.

In addition to Gulf sturgeon, three listed species of sea turtles may occur at the project sites: the endangered Kemp's ridley, the threatened/endangered[1] green, and the threatened loggerhead. The currently proposed projects, IERs 6 and 7, as well as IER 3 are located within designated Gulf sturgeon critical habitat Unit 8. Although not located in critical habitat, IER 11 is

[1]Green turtles are listed as threatened, except for breeding populations in Florida and the Pacific Coast of Mexico, which are listed as endangered.

hydrologically connected to Unit 8. The primary constituent elements (PCEs) essential for the conservation of Gulf sturgeon present in Unit 8 include: abundant prey items; water quality and sediment quality necessary for normal behavior, growth, and viability of all life stages; and, safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats. Of these PCEs, NMFS believes water quality, sediment quality, and prey abundance may be affected.

NMFS has analyzed the routes of potential effects from the proposed projects in IERs 2, 3, 6, 7, and 11 and concluded that listed sea turtles and Gulf sturgeon are not likely to be adversely affected from the suite of activities proposed. The risk of injury to listed species from dredging activities associated with IERs 6 and 7 will be discountable based on the type of dredge being used and the adherence to the May-September dredging window. Gulf sturgeon are not likely to be present during dredging activities because they primarily utilize Lake Pontchartrain for winter foraging and dredging will only occur in the summer. There are no reported takes of sea turtles or Gulf sturgeon by a bucket dredge. Further, the likelihood of sea turtles and Gulf sturgeon being struck by the transit and anchoring of equipment and vessels at the project site is discountable due to these species' mobility. The likelihood of effects to Gulf sturgeon and sea turtles from dredging and the transit and anchoring of equipment and vessels were also determined to be discountable in the consultations on IERs 2, 3, and 11 due to these species' mobility, the type of dredges being used, and/or the lack of species' presence in dredging sites located in marsh or in heavily controlled artificial waterways of low habitat value.

NMFS considers the temporary loss of 178 acres of benthic habitat due to dredging and stockpiling of dredged material, and the permanent loss of 14 acres of habitat due to placement of rock on the existing foreshore protection, proposed in IERs 6 and 7 as having insignificant effects on sea turtles and Gulf sturgeon. The project area encompasses only a small portion of the 403,200-acre lake and there is similar habitat in the vicinity such that impacts to foraging success, reproduction, resting, or other activities that might occur in the area are expected to be minor and insignificant. Further, the bottom substrate does not support submerged aquatic vegetation and is likely a poor source of other forage resources for sea turtle species. Due to the shallow water depth and high-energy wave environment where the rock will be placed, the project area provides poor foraging habitat for Gulf sturgeon, as well. Water depths in the 14-acre rock placement site are less than 1 meter. Gulf sturgeon are usually found at deeper depths (2 to 4 meters), where lower wave energy at the substrate, compared to the shallower swash zone, interferes less with feeding.

We evaluated the potential impacts on listed species from the additive loss of a total of 322 acres of habitat (266 temporarily, 56 permanently) from implementing IERs 2, 3, 6, 7 and 11. If all impacts occurred in areas utilized by species under NMFS' purview, then only 0.08 percent of the available habitat in Lake Pontchartrain would be temporarily or permanently lost as foraging habitat. There is sufficient available habitat in the vicinity such that impacts to foraging success, reproduction, resting, or other behaviors are expected to be minor and insignificant. However, all of the permanent impacts and a portion of the temporary impacts will occur in areas that are not utilized by listed species under NMFS' purview because: (1) they consist of marsh, peat substrate, or hardbottom that do not support prey species or other foraging resources for sturgeon

and sea turtles; (2) the sites have high wave energy that interferes with feeding; and, (3) they are much shallower (less than 1 meter) than depths preferred by sturgeon and sea turtles. Project activities in IER 11 will not impact habitat in Lake Pontchartrain, but may cause sea turtles and Gulf sturgeon to temporarily avoid the project site due to construction noise. Also, the operation of flood control structures could potentially hinder access by sea turtles and sturgeon to Lake Pontchartrain, but the structures will remain open at all times with the exception of major storms or hurricanes and many other access points to the lake will remain available to these species.

NMFS and the United States Fish and Wildlife Service jointly designated Gulf sturgeon critical habitat on April 18, 2003 (50 CFR 226.214). NMFS believes the suite of project activities in IERs 3, 6, 7, and 11[2] may affect but are not likely to adversely affect Gulf sturgeon critical habitat in Unit 8. Water quality PCE impacts related to dredging and stockpiling of dredged material in IERs 3, 6, and 7 are expected to be insignificant because they will be temporary and minimized by the use of silt curtains. Potential effects to the sediment quality PCE resulting from dredging and stockpiling of dredged material will also be insignificant. While dredging in IERs 3, 6, and 7 may temporarily uncover a layer of finer-grained sediment, the original material will be placed back in the channel and sediment quality will be returned to pre-project conditions. Further, the placement of inert, non-toxic rock in these projects will not affect water quality or sediment quality. Prey abundance will be temporarily affected by the currently proposed projects (IERs 6 and 7) from the dredging of 44 acres of waterbottom and the placement of dredged material on 134 acres of waterbottom. The total temporary loss of Gulf sturgeon critical habitat from activities in IERs 3, 6, and 7 of 207 acres will be insignificant. This represents only a small portion (0.05 percent) of the available habitat in Lake Pontchartrain supporting Gulf sturgeon prey items. Further, stockpiled material will be placed back into the dredged channels upon project completion and returned to pre-project contours. Benthic invertebrates utilized by Gulf sturgeon are expected to recolonize the dredged area rapidly, as they have been found to recolonize within one year when sediment composition and depth remain consistent. The permanent loss of 14 acres of habitat will result from the placement of rock on the existing foreshore protection associated with IERs 6 and 7. The total permanent loss of prey associated with habitat that will be impacted by IERs 3, 6, and 7 of 23 acres will also be insignificant. Water depths at the project sites are less than 1 meter and these areas experience high wave energy. Gulf sturgeon are suction feeders; due to their feeding morphology, they are usually found at deeper depths (2 to 4 meters), where lower wave energy at the substrate, compared to the shallower swash zone, interferes less with feeding. Although not located in designated Gulf sturgeon critical habitat, project activities in IER 11 are hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect hydroperiod, salinity, the ability for benthic communities to be established and maintained, water velocity, dissolved oxygen, siltation, or accessibility; therefore, NMFS determined the project was not likely to adversely affect designated Gulf sturgeon critical habitat.

Future IER Projects

Based on information provided by the COE, two consultations on three remaining IERs must be completed with NMFS. Varying levels of information are available regarding the remaining IER

[2]Project activities in IER 2 are not located in designated critical habitat.

projects. A brief summary of each remaining IER, with the key available details, are presented here in order to make a determination that the continued incremental consultation on each IER complies with 50 CFR 402.14(k).

IER 5 consists of the construction of two breakwaters to protect two pump stations in Orleans and Jefferson Parishes, Louisiana; consultation on this IER has been initiated. The project is located in Gulf sturgeon critical habitat Unit 8. Substrate at the project site is 50 percent sand and water depths at the breakwater locations are between 8 and 11 feet of water. Because the project is located in designated Gulf sturgeon critical habitat, and the substrate and water depth characteristics at the sites suggest they support Gulf sturgeon foraging activities, this project may adversely affect designated Gulf sturgeon critical habitat, and formal consultation is required. However, based on the small size of the area affected by the breakwaters (3.3 acres), we believe it would not be reasonably expected that this project would result in the destruction or adverse modification of designated critical habitat. Adverse effects to listed sea turtles from IER 5 are not expected. These conclusions, however, must be evaluated through completing the formal consultation on IER 5.

The COE will submit a single request for consultation on a supplement to IER 3 and IER 11 Tier 2. The IER 3 supplemental activities include the construction of bypass/detour lanes coming off the Lake Pontchartrain Causeway into New Orleans to reroute traffic around the other constructed components of IER 3. The project will occur in Gulf sturgeon critical habitat Unit 8. Temporary impacts from dredging for equipment access and the stockpiling of dredged material are expected to be similar to, or less than, the temporary impacts to 29 acres of habitat currently proposed in IER 3. Permanent impacts will result from the driving of piles into waterbottoms for the detour lanes. It is unknown how much designated critical habitat will be affected by these activities; however, other similar projects in Gulf sturgeon critical habitat have been found to affect a relatively small footprint and sturgeon can continue to forage underneath the pile-supported structure once construction is completed. IER 11 Tier 2 is not located in Gulf sturgeon critical habitat. However, components of the project involve placing flood control structures and shallowing waterbottoms with fill material in areas traversed by sturgeon and sea turtles. The COE will place coffer dams around the area during the majority of the construction period to exclude listed species from the site and to prevent sediments and other materials from flowing into Lake Pontchartrain. Further, the majority of construction will occur between May and September when Gulf sturgeon are not expected to be in the area. However, some components of the project may occur when the coffer dams are not in place and outside the May to September timeframe. Therefore, NMFS will have to evaluate expected impacts from IER 11 Tier 2 to listed species when all the necessary information becomes available. However, based on the short duration of the construction impacts, the low likelihood of interactions between construction activities and listed species, and the lack of operational impacts to listed species, any impacts associated with the project would not reasonably be expected to result in jeopardy. This conclusion must be verified through the completion of consultation on the project.

Analysis of Compliance with 50 CFR 402.14(k)

As discussed above, NMFS has determined that the incremental step of implementing IERs 6 and

7 will not violate section 7(a)(2) of the ESA, as required in 50 CFR 402.12(k)(1). As required by 50 CFR 402.14(k) paragraphs (2) and (3), the COE will consult with NMFS on all future IERs that may affect species or critical habitat under NMFS' purview, and through ongoing information collection, will reinitiate consultation if new or unanticipated effects of previous action become apparent. Further, COE will complete a comprehensive environmental review of the effects of the entire hurricane protection plan as soon as sufficient information is available about each of the IERs.

Though specific project details for the remaining IERs are still in development, based on information currently available analyzed above, there is a reasonable likelihood that the COE's comprehensive plan to upgrade the Greater New Orleans Hurricane and Storm Damage Risk Reduction System will not violate section 7(a)(2) of the ESA by jeopardizing the continued existence of a listed species or destroying or adversely modifying designated critical habitat. Paragraph (4) of 50 CFR 402.14(k) requires that each incremental step of a comprehensive action does not violate section 7(d) of the ESA concerning irreversible or irretrievable commitment of resources. Therefore, the actions consulted on and authorized in IERs 2, 3, 6, 7, and 11 cannot foreclose the implementation of reasonable and prudent alternatives (RPAs), that may be necessary to address effects from the remaining consultations on IERs 3 supplemental, 5, and 11 Tier 2, or the additive effects of successively implemented projects. None of the impacts from the IERs, either individually or comprehensively, are expected to rise to the level of jeopardy to a listed species or destruction or adverse modification of designated critical. However, if information provided by the COE in the future suggests that jeopardy or adverse modification are likely, then potential RPAs (e.g., fully adhering to dredging/construction windows, modifications to structure design and placement) are still available to the action agency. Therefore, based on available information to date, we conclude that consultations on the IER projects under the Alternative Arrangements comply with all the provisions contained in 50 CFR 402.14(k) for consultations on incremental actions.

This concludes your consultation responsibilities under the ESA for species under NMFS' purview until such time as additional information on IER projects under the comprehensive plan to upgrade the Greater New Orleans Hurricane and Storm Damage Risk Reduction System becomes available. Consultation must also be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. We have enclosed additional information on other statutory requirements that may apply to this action, and on NMFS' Public Consultation Tracking System (PCTS) to allow you to track the status of ESA consultations.

Thank you for your continued cooperation in the conservation of threatened and endangered species under NMFS' purview. If you have any questions on this consultation or PCTS, please contact Kelly Shotts at (727) 824-5312, or by e-mail at kelly.shotts@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

cc: F/SER43, Hartman/Williams

File: 1514-22 F.1. LA
Ref: I/SER/2008/06354

O:\SECTION7\INFORMAL\Defense\Army\COE\COE-NO\2009\06354 IER 6&7 GC.doc

PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 5-13-2008)

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

BOBBY JINDAL
GOVERNOR

SCOTT A. ANGELLE
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL RESTORATION AND MANAGEMENT

March 11, 2009

Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
U.S. Army Corps of Engineers, New Orleans District
PO Box 60267
New Orleans, Louisiana 70160-0267

RE: **C20090033,** Coastal Zone Consistency
U.S. Army Corps of Engineers, New Orleans District
Direct Federal Action
IER 7 – New Orleans East Lakefront to Michoud Canal Hurricane Protection Levee
Orleans Parish, Louisiana

Dear Ms. Wiggins:

The above referenced project has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The project, as proposed in the application, is consistent with the LCRP. If you have any questions concerning this determination please contact Jeff Harris of the Consistency Section at (225) 342-7949.

Sincerely,

Karl L Morg for

Jim Rives,
Administrator

JR/jdh

cc: Laura Lee Wilkinson, COE-NOD
David Butler, LDWF
Wynetca Fisher, Orleans Parish
Tim Killeen, CMD FI

BOBBY JINDAL
GOVERNOR

HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

APR 06 2009

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

Attention: Laura Lee Wilkinson

RE: Water Quality Certification (WQC 090306-01/AI 163529/CER 20090001)
Individual Environmental Report (IER) #6
Individual Environmental Report (IER) #7
Orleans Parish

Dear Ms. Wilkinson:

The Department has reviewed your application for the construction of the Citrus Lakefront (IER #6) and Lakefront to Michoud Canal (IER #7) hurricane protection levees, in the vicinity of New Orleans East.

The requirements for Water Quality Certification have been met in accordance with LAC 33:IX.1507.A-E. Based on the information provided in your application, we have determined that the placement of the fill material will not violate the water quality standards of Louisiana provided for under LAC 33:IX.Chapter 11. Therefore, the Department has issued a Water Quality Certification.

Sincerely,

Thomas F. Harris
Administrator
Waste Permits Division

TFH/jjp

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

REPLY TO
ATTENTION OF

April 9, 2007

Pam Breaux
State Historic Preservation Officer
Dept. of Culture, Recreation & Tourism
Division of Historic Preservation
1051 N. Third Street
Baton Rouge, LA 70804

Re: Request to Initiate Consultation Under Section 106 of the National Historic Preservation Act for the Lake Ponchartrain and Vicinity (LPV), and the West Bank and Vicinity (WBV) Hurricane Protection Projects, St. Charles, Jefferson, Orleans, Plaquemines, and St. Bernard Parishes, Louisiana.

Dear Ms. Breaux:

The U.S. Army Corps of Engineers, New Orleans District (USACE), is proposing to construct improvements along the existing Lake Ponchartrain and Vicinity (LPV) and the West Bank and Vicinity Hurricane Protection Projects located in St. Charles, Jefferson, Orleans, Plaquemines, and St. Bernard Parishes, Louisiana. This proposed activity has the potential to cause effects on historic properties.

In response to the need for accelerated schedules, emergency alternative arrangements have been approved in order to expedite project review under the National Environmental Policy Act (NEPA). Under these alternative arrangements, twenty-one sub-projects have been initially identified within the LPV and WBV project areas. Each sub-project will be studied and reviewed separately as an Interim Environmental Report (IER). Additional information on the Emergency Alternative Arrangements and individual IER's can be found on the District's web page (HTTP://www.MVN.USACE.Army.Mil) under the Hurricane Recovery Links section, Environmental Processes & NEPA Compliance. Project fact sheets and a map showing IER locations are attached herein.

The Advisory Council on Historic Preservation (ACHP) has requested the New Orleans District to execute a programmatic agreement that will establish Section 106 procedures under the alternative arrangements for the LPV and WBV projects. USACE staff recently held meetings with Duke Rivet, Louisiana State Historic Preservation Office; Kimberly Walden, Chitimacha Tribe of Louisiana; and Kenneth Carleton, Mississippi Band of the Choctaw at their prospective offices and briefed them on project plans, NEPA alternative arrangements, the programmatic agreement, and proposed cultural resources investigations. It was agreed that management summaries prepared in accordance with SHPO standards would be acceptable for

the initial review of cultural resources investigations and for providing comments on USACE determination of effects on historic properties. Draft and final reports incorporating all associated IER cultural resources investigations will be prepared after the IER investigations are complete.

During development of the programmatic agreement and until the programmatic agreement is executed, USACE is initiating standard Section 106 consultation procedures for the LPV and WBV projects. In order to determine if the area of potential effects (APE) established for this federal undertaking contains historic properties, USACE has prepared three draft scopes of work to conduct initial cultural resources investigations in seventeen IER's. These scopes of work are enclosed for your review and comment. Historic structure surveys and assessments will be conducted under separate scopes of work.

Thank you very much for your consideration in this matter. Please contact Mr. Michael Swanda at (504) 862-2036 if you have any questions or require further information.

Sincerely,

for Elizabeth Wiggins
Chief, Environmental Planning
And Compliance Branch

Enclosures

CF: Mississippi Band of the Choctaw, Carleton
Chitimacha Tribe of Louisiana, Walden
SHPO, Rivet
ACHP, Dwin-Vaughn
ACHP, Eddins
ACHP, Klima

TRIBAL HISTORIC
PRESERVATION OFFICE
SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
HC-61, BOX 21A
CLEWISTON, FL 33440
(863) 983-6549

TRIBAL OFFICERS:
MITCHELL CYPRESS
CHAIRMAN
MOSES OSCEOLA
VICE CHAIRMAN
PRISCILLA D. SAYEN
SECRETARY
MICHAEL D. TIGER
TREASURER

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

Monday, January 26, 2009

Subject: IER #7

Dear Mr. Swanda,

The Tribal Historic Preservation Office of the Seminole Tribe of Florida (STOF-THPO) has received your email correspondence concerning the aforementioned project. The STOF-THPO concurs with the findings of "no adverse effect." However, the STOF-THPO would like to be informed should any archaeological and/or historic resources be inadvertently discovered during the construction process. We thank you for the opportunity to review the information that has been sent to date regarding this project. For any future correspondence regarding this project, please reference THPO-002975.

We look forward to working with you in the future.

Sincerely,

FOR

Willard Steele,
Tribal Historic Preservation Officer

Direct routine inquiries to:

Dawn Hutchins,
Compliance Review Supervisor

HPO

Jena Band of Choctaw Indians

P. O. Box 14 • Jena, Louisiana 71342-0014 • Phone: 318-992-2717 • Fax: 318-992-8244

January 27, 2009

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

RE: REQUEST TO CONTINUE CONSULTATION UNDER SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE LAKE PONTCHARTRAIN AND VICINITY HURRICANE PROTECTION PROJECT, NEW ORLEANS EAST LAKEFORNT TO MICHOUD CANAL, INDIVIDUAL ENVIRONMENTAL REPORT #7, ORLEANS PARISH, LOUISIANA.

To Whom It May Concern:

Reference is made to your letter, dated January 19, 2009, concerning the above-proposed project.

After thorough review of the documents submitted, it has been determined that there will be no significant impact in regards to the Jena Band of Choctaw Indians.

Should you have any questions, please feel free to call me.

Sincerely,

Lillie McCormick

Lillie McCormick
Environmental Director
Jena Band of Choctaw Indians
Ph: 318-992-8258
Fax: 318-992-8244
lmccormickjbc@centurytel.net

Choctaw Nation of Oklahoma

P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Gary Batton
Assistant Chief

February 5, 2009

Elizabeth Wiggins
Dept. of the Army
New Orleans Dist. Corp of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Elizabeth Wiggins:

We have reviewed the following proposed project (s) as to its effect regarding religious and/or cultural significance to historic properties that may be affected by an undertaking of the projects area of potential effect.

Project Description: Report #7 New Orleans East Lakefront to Michoud Canal

Comments: After further review of the above-mentioned project (s), to the best of our knowledge, it will have no adverse effect on any historic properties in the project's area of potential effect. However, should construction expose buried archaeological or building materials such as chipped stone, tools, pottery, bone, historic crockery, glass or metal items, or should it uncover evidence of buried historic building materials such as rock foundations, brick, or hand-poured concrete, this office should be contacted immediately @ 1-800-522-6170 ext. 2137.

Sincerely,

Terry D. Cole
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma

By: Caren A. Johnson
Caren A. Johnson
Administrative Assistant

CAJ: vr

ALABAMA-COUSHATTA TRIBE OF TEXAS
571 State Park Rd 56 • Livingston, Texas 77351 • (936) 563-1100

February 12, 2009

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

Dear Mr. Swanda:

On behalf of Chief Oscola Clayton Sylestine and the Alabama-Coushatta Tribe, our appreciation is expressed on your agency's efforts to consult us concerning Individual Environmental Report #7, "Lake Pontchartrain and Vicinity Hurricane Protection Project, New Orleans to Michoud Canal" for Orleans Parish.

Our Tribe maintains ancestral associations within the state of Louisiana despite the absence of written records to completely identify Tribal activities, villages, trails, or grave sites. It is our objective to ensure any significances of Native American ancestry including the Alabama-Coushatta Tribe are administered with the utmost attention.

Upon review of your January 19, 2009 documents submitted to our Tribe, no impact to religious, cultural, or historical assets of the Alabama-Coushatta Tribe of Texas should occur based upon the absence of corroborating evidence from recent cultural resource investigations. Therefore, we concur with the "no adverse effect" recommendation

In the event of inadvertent discovery of human remains and/or archaeological artifacts, we would appreciate compliance with your statement of "work will be halted and your office will be contacted for further consultation." 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 CULTURAL DEVELOPMENT
DIVISION OF ARCHAEOLOGY

PAM BREAUX
SECRETARY

SCOTT HUTCHESON
ASSISTANT SECRETARY

February 17, 2009

Ms. Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0276

Re: Management Summary
LA Division of Archaeology Report No. 22-3216
Management Summary: Phase I Cultural Resources Survey and Archaeological Inventory, Nautical Remote Sensing Survey, and Phase II National Register Testing and Evaluation of Locus 07-02-E-011, Target 36_2 and Site 16OR453, Performed for Lake Pontchartrain and Vicinity Project, Individual Environmental Report Area 7 (IER#7), Orleans Parish
R. Christopher Goodwin, & Associates, Inc.

Dear Ms. Wiggins:

We acknowledge the receipt of your letter dated January 19, 2009, and two copies of the above- referenced draft report. We have completed our review and offer the following comments on the preferred alignment for IER#7.

Based in the report findings, we concur that archaeological sites 16OR28 and 16OR447, located within the Area of Potential Effects (APE), are not eligible for inclusion on the National Register of Historic Places (NRHP). Locus 07-02-E-01, originally thought to be the remnants of archaeological site 16OR12, does not warrant further consideration. In regards to site 16OR12, testing confirmed that there was no indication of this archaeological site in the recorded location and that the site has probably been destroyed as previously reported. The recorded presence of burials at this site raises concern, and although testing indicated that the site was probably destroyed, there is still a possibility of remnants of the site present. We therefore recommend that this area be monitored during ground disturbing activity.

Staging area SA07-1, located in the near vicinity of 16OR70, was not subject to subsurface testing because of the presence of a gravel surface. It is unclear if this area will be subject to ground disturbing activity. If so, we highly recommend that the area be monitored at that time. Staging area SA07-2 was similarly graveled and considered in a high probability area. We would also recommend monitoring of this high probability area if ground-disturbing activity is planned.

Archaeological sites 16OR37 and 16OR38 were previously determined to be ineligible for the NRHP. According to the current APE, these locations will be on the periphery and will not be affected by the proposed project; therefore, no further consideration is necessary.

In regard to the nautical survey of this IER, we concur that shipwreck 16OR453 does not possess the qualities of significance for eligibility on the NRHP. We also concur that Target 36_2 does not warrant site status. Target 37_1 identified-, as a potentially significant submerged cultural resource, should be avoided by a buffer zone. If avoidance is not feasible, then further testing of this anomaly will be required.

The remains of the Pointe Aux Herbes Lighthouse (16OR226) will need to be assessed. It is unclear, based on the report, as to whether or not this resource is within or adjacent to the APE. In either case, this potentially historic property should be addressed in the document. The remains of the destroyed fishing camps along Lake Pontchartrain should also be recorded as an archaeological site and assessed under the NRHP criteria.

Please review the enclosed technical comments and photocopied pages with comments/corrections noted. We look forward to receiving two copies of the draft report with comments addressed, as appropriate. All site and site update forms will need to be finalized prior to the acceptance of the final report. If you should have any questions, please contact Stacie Palmer in the Division of Archaeology by email at spalmer@crt.state.la.us or by phone at (225) 342-5737 or if you should have questions in regards to site form submittal, please contact either Cheraki Williams or Jill Andrew at (225) 342-8170.

Sincerely,

Scott Hutcheson
State Historic Preservation Officer

SH:SP:s

Enclosure: as stated

Cc: Mr. William P. Athens
R. Christopher Goodwin & Associates, Inc.
309 Jefferson Highway, Suite A
New Orleans, LA 70121

Technical Comments:

1. Suggestion – Phase II testing implies that there is a known archaeological site. We suggest that you use the term additional phase I testing for site identification.

2. Survey Method – Our standards require that high probability areas be surveyed at 30m intervals. Please justify shovel testing at 50m intervals in high probability areas.

3. Survey Method – Why was the area of the previously recorded site 16OR12 tested at 30m intervals instead of the standard 10m intervals?

MITCHELL J. LANDRIEU
LIEUTENANT GOVERNOR

State of Louisiana

OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT
DIVISION OF ARCHAEOLOGY

PAM BREAUX
SECRETARY

SCOTT HUTCHESON
ASSISTANT SECRETARY

February 25, 2009

Ms. Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0276

Re: Management Summary
LA Division of Archaeology Report No. 22-3216
Management Summary: Phase I Cultural Resources Survey and Archaeological Inventory, Nautical Remote Sensing Survey, and Phase II National Register Testing and Evaluation of Locus 07-02-E-011, Target 36_2 and Site 16OR453, Performed for Lake Pontchartrain and Vicinity Project, Individual Environmental Report Area 7 (IER#7), Orleans Parish
R. Christopher Goodwin, & Associates, Inc.

Dear Ms. Wiggins:

In response to you letter dated January 19th we offer the following comments. We believe, based on the information provided, that the proposed undertakings for IER#7 (preferred alignment) should have no affect on historic properties.

After a discussion with Cheraki Williams it was agreed that the remains of the destroyed fishing camps along Lake Pontchartrain would not need to be recorded as an archaeological site. The associated standing structure forms for these fish camps, however, will need to reviewed and updated for the final report. If you should have any questions, please contact either Stacie Palmer or Cheraki Williams in the Division of Archaeology by phone at (225) 342-8170.

Sincerely,

Scott Hutcheson
State Historic Preservation Officer

SH:SP:s

cc: Mr. William P. Athens
R. Christopher Goodwin & Associates, Inc.
309 Jefferson Highway, Suite A
New Orleans, LA 70121

The draft programmatic fish coordination act report dated 26 November 2007 can be viewed on www.nolaenvironmental.gov at the following link:

http://www.nolaenvironmental.gov/nola_public_data/projects/usace_levee/docs/original/FWCADraftReportProgramtic.pdf

APPENDIX E

AIR QUALITY ANALYSIS

CALCULATION SHEET-COMBUSTIBLE EMISSIONS-NEW ORLEANS LAKEFRONT TO MICHOUD CANAL LEVEE

Assumptions for Cumbustable Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	2	300	12	240	1728000
Tug Boat	1	1200	12	240	3456000
Diesel Dump Truck	6	300	12	240	5184000
Clam Shell Dredge	1	300	12	240	864000
Diesel Trenchers	2	175	12	240	1008000
Diesel Pile Driver	2	300	12	240	1728000
Diesel Cement & Mortar Mixers	5	300	12	240	4320000
Diesel Cranes	2	175	12	240	1008000
Diesel Graders	0	300	12	240	0
Diesel Tractors/Loaders/Backhoes	2	100	12	240	576000
Diesel Bull Dozers	3	300	12	240	2592000
Diesel Front End Loaders	2	300	12	240	1728000
Diesel Fork Lifts	3	100	12	240	864000
Diesel Generator Set	2	40	12	240	230400

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Tug Boat (1200 hp Stern Drive)	0.242	1.040	6.757	0.180	0.174	0.842	530.801
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Clam Shell Dredge	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bull Dozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the age population of equipment in U.S. for the 2006 calendar year.

CALCULATION SHEET-COMBUSTIBLE EMISSIONS-NEW ORLEANS LAKEFRONT TO MICHOUD CANAL LEVEE

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.838	3.942	10.454	0.781	0.762	1.409	1020.681
Tug Boat (1200 hp Stern Drive)	1.409	5.637	18.662	1.295	1.257	2.818	2042.124
Diesel Dump Truck	2.514	11.825	31.363	2.342	2.285	4.227	3062.044
Clam Shell Dredge	0.324	1.238	4.380	0.305	0.295	0.705	510.626
Diesel Hole Cleaners\Trenchers	0.567	2.710	6.454	0.511	0.489	0.822	595.175
Diesel Bore/Drill Rigs	1.143	4.361	13.615	0.952	0.933	1.390	1008.684
Diesel Cement & Mortar Mixers	2.904	11.045	34.657	2.285	2.238	3.475	2521.711
Diesel Cranes	0.489	1.444	6.354	0.378	0.367	0.811	588.955
Diesel Graders	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Diesel Tractors/Loaders/Backhoes	1.174	5.211	4.583	0.870	0.844	0.603	438.677
Diesel Bull Dozers	1.028	3.942	13.596	0.943	0.914	2.114	1531.879
Diesel Front End Loaders	0.724	2.952	9.521	0.666	0.647	1.409	1021.062
Diesel Aerial Lifts	1.885	7.389	8.150	1.323	1.285	0.905	657.730
Diesel Generator Set	0.307	0.955	1.516	0.185	0.180	0.206	149.116
Total Emissions	**14.981**	**61.412**	**158.926**	**12.531**	**12.201**	**20.189**	**14637.838**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-COMBUSTIBLE EMISSIONS-NEW ORLEANS LAKEFRONT TO MICHOUD CANAL LEVEE

Construction Worker Personal Vehicle Commuting to Construction Sight-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	120	240	15	15	0.65	0.77	1.41
CO	12.4	15.7	120	240	15	15	5.90	7.47	13.38
NOx	0.95	1.22	120	240	15	15	0.45	0.58	1.03
PM-10	0.0052	0.0065	120	240	15	15	0.00	0.00	0.01
PM 2.5	0.0049	0.006	120	240	15	15	0.00	0.00	0.01

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Heavy Duty Trucks Delivery Supply Trucks to Construction Sight									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	240	2	2	0.01	0.02	0.03
CO	1.32	3.21	60	240	2	2	0.04	0.10	0.14
NOx	4.97	12.6	60	240	2	2	0.16	0.40	0.56
PM-10	0.12	0.33	60	240	2	2	0.00	0.01	0.01
PM 2.5	0.13	0.36	60	240	2	2	0.00	0.01	0.02

Commute to New Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emisssions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	0	0	0	-	0.00	-
CO	12.4	15.7	60	0	0	0	-	0.00	-
NOx	0.95	1.22	60	0	0	0	-	0.00	-
PM-10	0.0052	0.0065	60	0	0	0	-	0.00	-
PM 2.5	0.0049	0.006	60	0	0	0	-	0.00	-

POV Source: USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway vehicle emission factor model.
Fleet Charactorization: 20 POVs commuting to work were 50% are pick up trucks and 50% passenger cars

Conversion factor:	gms to tons
	0.000001102

CALCULATION SHEET-COMBUSTIBLE EMISSIONS-NEW ORLEANS LAKEFRONT TO MICHOUD CANAL LEVEE

Fugitive Dust Emissions at New Construction Site.					
Construction Site	**Emission Factor tons/acre/month (1)**	**Total Area-Construction Site/month**	**Months/yr**	**Total PM-10 Emissions tns/yr**	**Total PM-2.5 (2)**
Fugitive Dust Emissions	0.11	51.76	12	68.32	13.66

1. Midwest Research Institute, (MRI). 1996. Improvement of Specific Emission Factors (BACM Project No. 1) Prepared for South Coast Air Quality Management District. SCAQMD Contract 95040, Diamond Bar, CA. March 1996. Mid-Atlantic Regional Air Management Association (MARAMA). Fugitive Dust-Construction Calculation Sheet can be found online at: http://www.marama.org/visibility/Calculation_Sheets/. MRI= Midwest Research Institute, Inventory of Agricultural Tiling, Unpaved Roads, Airstrips and construction Sites., prepared for the U.S. EPA, PB 238-929, Contract 68-02-1437 (November 1977)

2. 20% of the total PM-10 emissions are PM-2.5 (EPA 2006).

Coastruction Site Area	**Demension (ft)**			
Proposed Prioject	**Length**	**Width**	**Units**	**Total Acres**
New Construction Area	32,208	70	1	51.76
New Construction Area	20	20	0	0.00
Total				**51.76**

Conversion Factors	**Miles to feet**	**Acres to sq ft**	**Sq ft to acres**	**Sq ft in 0.5 acres**
	5280	0.000022957	43560	21780

Assumptions	**Sections/day**	**Length of Section (ft)**	**Length/day (ft)**	**Days/yr**	**Length/yr (ft)**	**Miles/yr**
Floodwall installed per day (ft)	22	10	220	290	63800	12.08

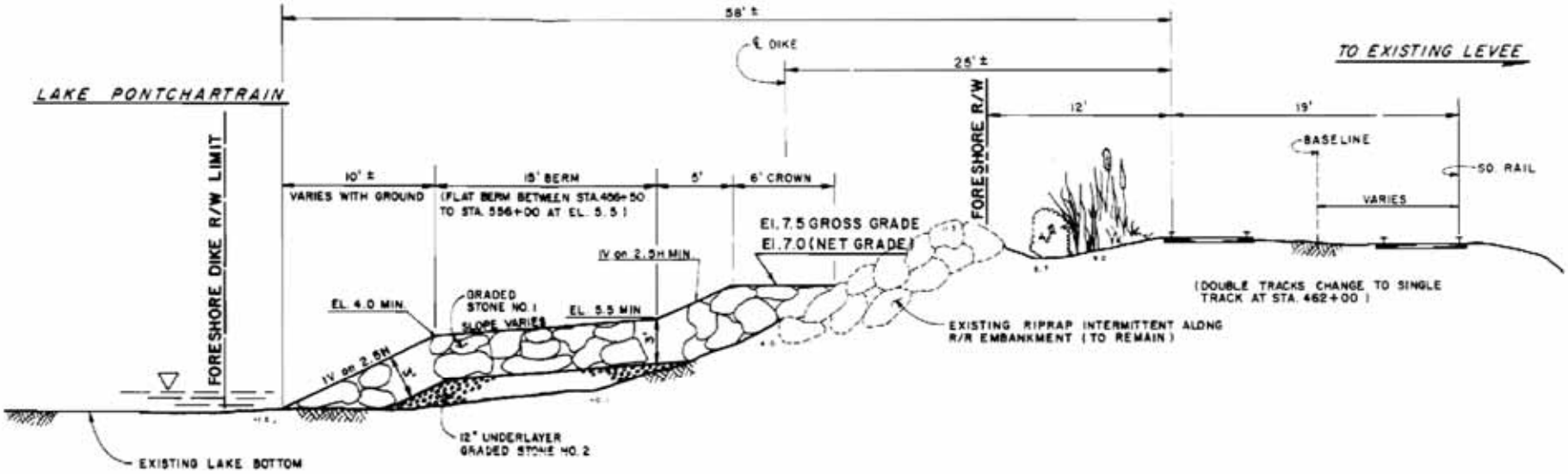
Assumptions	**Sections/day**	**Length of Section (ft)**	**Length/day (ft)**	**Days/Month**	**Length/Month (ft)**	**Miles/Month**
Floodwall installed per day (ft)	22	10	220	24	5280	1.00
Length of floodwall/yr (miles)	6.10					

CALCULATION SHEET-COMBUSTIBLE EMISSIONS-NEW ORLEANS LAKEFRONT TO MICHOUD CANAL LEVEE

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)						
Emission source	VOC	CO	NOx	PM-10	PM-2.5	SO_2
Combustable Emissions	14.98	61.41	158.93	12.53	12.20	20.19
Construction Site-fugitive PM-10	NA	NA	NA	68.32	13.66	NA
Construction Workers Commuter & Trucking	1.44	13.52	1.59	0.02	0.02	NA
Total emissions	16.42	74.93	160.52	80.87	25.89	20.19
De minimis threshold	NA	NA	NA	NA	NA	NA

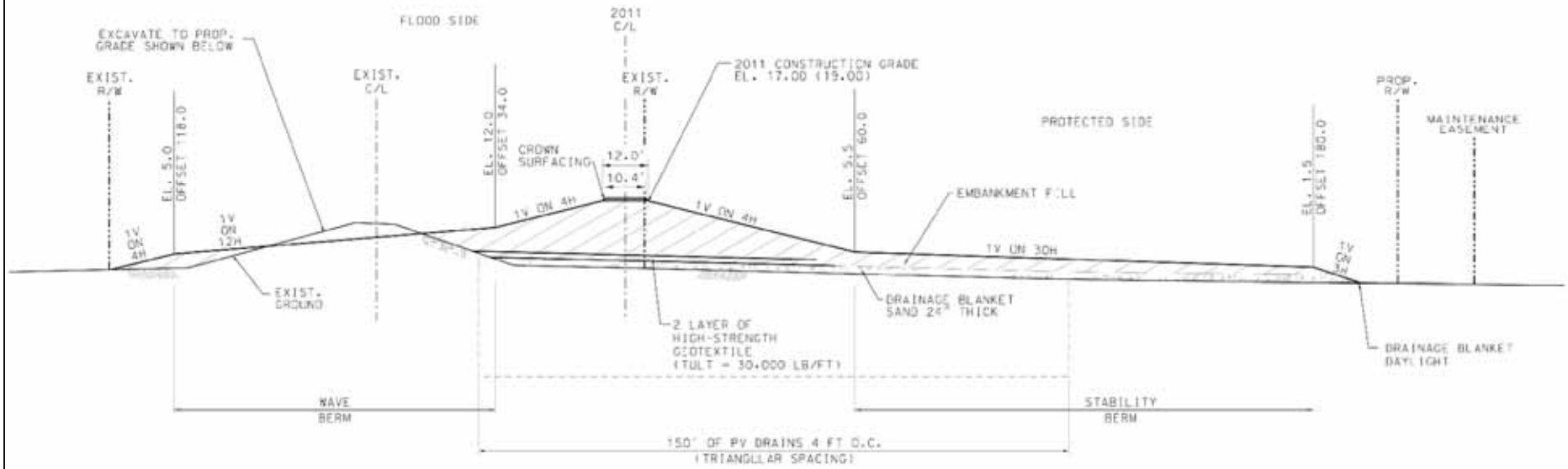
APPENDIX F

TYPICAL CROSS-SECTIONS



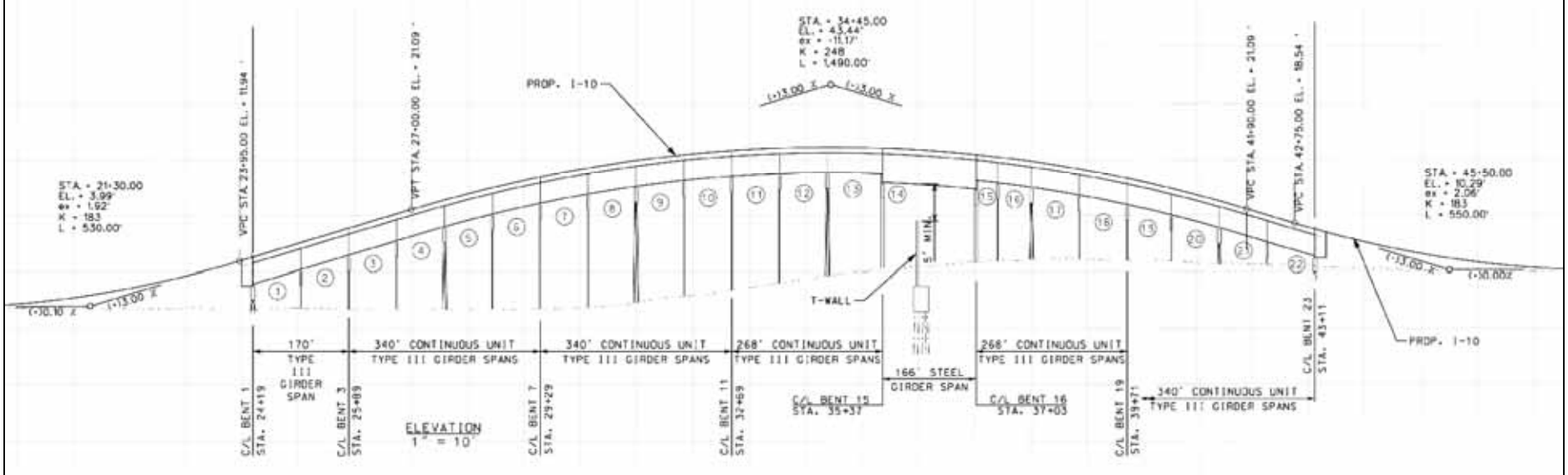
Source: URS

Figure F1: Typical Foreshore Protection Cross-Section for LPV108



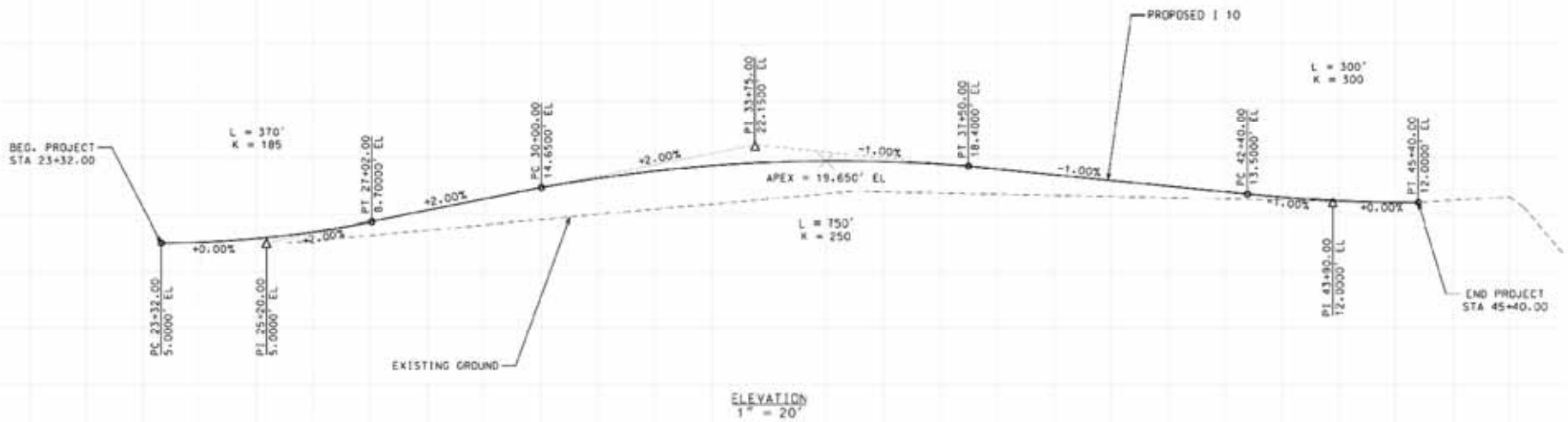
Source: URS

Figure F2: Typical Levee Cross-Section for LPV109



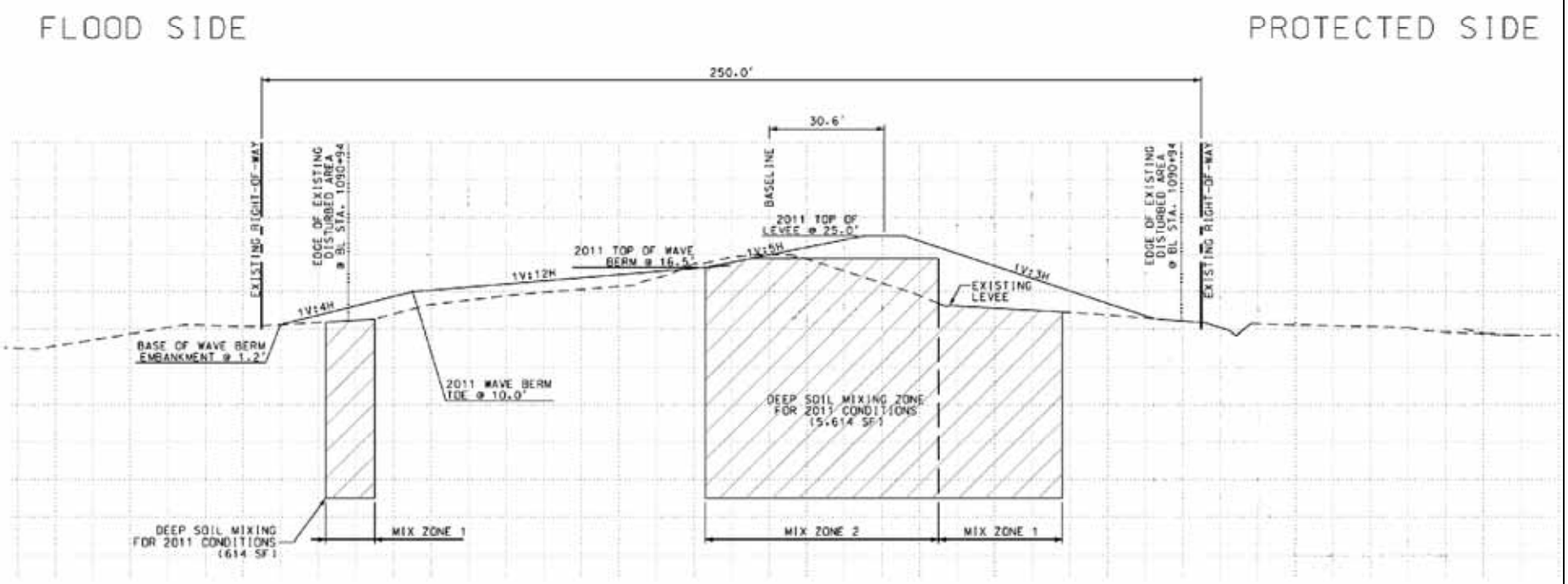
Source: URS

Figure F3: Typical Cross-Section of I-10 Bridge Over the LPV109 T-Wall



Source: URS

Figure F4: Typical Cross-Section for I-10 Ramp/Embankment Over LPV109 Levee



Source: URS

Figure F5: Typical Cross-Section for LPV111 Levee