

# DRAFT INDIVIDUAL ENVIRONMENTAL REPORT

## LAKE PONTCHARTRAIN AND VICINITY, CHALMETTE LOOP LEVEE

### ST. BERNARD PARISH, LOUISIANA

IER # 10



**US Army Corps  
of Engineers®**

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# 1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report (IER) # 10 to evaluate the potential impacts associated with the proposed flood protection improvements to the Lake Pontchartrain and Vicinity (LPV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) in St. Bernard Parish, Louisiana. The proposed action is located in southeastern Louisiana, southeast of New Orleans.

The project area is located on the south bank of the Mississippi River Gulf Outlet (MRGO)<sup>1</sup>, in the northwest portion of St. Bernard Parish. Dominant physiographic features in the vicinity include the drained and developed area between the Mississippi River and the Forty Arpent Canal, Mississippi River Gulf Outlet, Lake Borgne, and extensive marshes. The communities of Chalmette, Meraux, Violet, and others make up the area along the Mississippi River to be protected by the project (figure 1).



**Figure 1: Study Area for IER # 10 - Chalmette Loop**

The proposed action is a project for improvement of the existing flood protection system of earthen levees and flood control structures commonly referred to as the “Chalmette Loop” in St. Bernard Parish, Louisiana. A large portion of the existing levee alignment is located parallel to the MRGO and then turns south crossing Highway 46 and west almost to Caernarvon and the Mississippi River. For the purposes of this IER, the Chalmette Loop LPV HSDRRS has been divided into four reaches, and each reach is identified by a project identification number. Figure 2 illustrates the location of LPV 145, LPV 146, LPV 147, and LPV 148.

<sup>1</sup> the MRGO Federal navigation channel between Mile 60 at the southern bank of the GIWW to the Gulf of Mexico at Mile - 9.4 is deauthorized.



**Figure 2: IER # 10 Reaches LPV 145-LPV 148. Reach LPV 144.02 is described in IER #8 and LPV 149 is described in IER #9.**

IER # 10 has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's Regulations (40 CFR §1500-1508), as reflected in the 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 (33 CFR §230) Procedures for Implementing the NEPA and pursuant to the Council on Environmental Quality (CEQ) NEPA Implementation Regulations (40 CFR §1506.11). The Alternative Arrangements can be found at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov), and are herein incorporated by reference.

The CEMVN implemented Alternative Arrangements on 13 March 2007 under the provisions of the Council on Environmental Quality Regulations for Implementing the 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 the HSDRRS, formerly known as the Hurricane Protection System (HPS), authorized and funded by Congress and the Administration. The 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 St. Bernard Parish. The proposed action results from a defined need to reduce flood risk and storm damage to residences, businesses, and other infrastructure from hurricanes (100-year storm events) and other high water events. The majority of levees in this system were damaged due to overtopping during Hurricane Katrina. The damaged levees have been repaired to the pre-Katrina design height. The completed HSDRRS would lower the risk of harm to citizens and minimize 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 risk reduction that 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.

## **1.2 AUTHORITY FOR THE PROPOSED ACTION**

The authority for the proposed action was provided as part of a number of hurricane protection projects spanning southeastern Louisiana, including the Lake Pontchartrain and Vicinity (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 that gave additional authority to the USACE to construct 100-year HSDRRS projects.

The LPV Project was authorized under the Flood Control Act of 1965 (PL [Public Law] 89-298, Title II, Sec. 204) which amended, authorized a “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 (PL 93-251, Title I, Sec. 92); 1986 (PL 99-662, Title VIII, Sec. 805); 1990 (PL 101-640, Sec. 116); 1992 (PL 102-580, Sec. 102); 1996 (PL 104-303, Sec. 325); 1999 (PL 106-53, Sec. 324); and 2000 (PL 106-541, Sec. 432); and the Energy and Water Development Appropriations Acts of 1992 (PL 102-104, Title I, Construction, General); 1993 (PL 102-377, Title I, Construction, General); and 1994 (PL 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 - PL 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 - PL 109-234, Title II, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorized 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 U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability

Appropriations Act of 2007 (5th Supplemental - PL 110-28, Title IV, Chapter 3, Flood Control and Coastal Emergencies).

### 1.3 PRIOR REPORTS

A number of studies and reports on water resources development in the proposed project area have been prepared by the USACE, other Federal, state, and local agencies, research institutes, and individuals. Pertinent studies, reports and projects are discussed below:

- 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 GNOSDRRS.
- On 21 October 2008, the CEMVN signed a Decision Record on IER # 11 Tier 2 Borgne entitled “Improved Protection on the Inner Harbor Navigation Canal (IHNC), 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. One additional Tier 2 document discussing alignment alternatives and designs of the navigable and structural barriers, and the impacts associated with exact footprints at Lake Pontchartrain and the IHNC, are being completed.
- 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 5 June 2008, a Chief’s Report on the Deep-Draft De-Authorization Study entitled “Integrated Final Report to Congress and Legislative Environmental Impact Statement for the Mississippi River Gulf Outlet Deep Draft De-Authorization Study” was transferred to Congress. This action deauthorized the channel and construction of a plug has been initiated near Bayou La Loutre.
- 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 as a result of excavation borrow areas for use in construction of the HSDRRS.
- 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. This document also cites specific prior reports for MRGO projects and Coastal Wetlands Planning Protection Restoration projects. 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.
- Supplemental Information Report (SIR) # 25 entitled “LPV Hurricane Protection – Chalmette Area Plan, Alternate Borrow Area 1C-2A” was signed by the CEMVN on 12 June 1987. The report addresses the use of an alternate contractor furnished borrow area for LPV construction.
- SIR # 27 entitled “LPV Hurricane Protection – Alternate Borrow Site for Chalmette Area Plan” was signed by the CEMVN on 12 June 1987. The report addresses the use of an alternate contractor furnished borrow area for LPV construction.
- In December 1984, an SIR to complement the Supplement to the 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 the 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, 70<sup>th</sup> Congress, 1<sup>st</sup> 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, the CEMVN is preparing a draft Comprehensive Environmental Document (CED) that will describe the work completed and 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. 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](http://www.nolaenvironmental.gov), or can be requested by contacting the 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**

Throughout southern Louisiana, one of the greatest areas of public concern is reducing the risk of hurricane, storm, and flood damage for businesses and residences, and enhancing public safety during major storm events. Hurricane Katrina forced residents from their homes, temporarily closed many businesses, and due to extensive flooding, made returning to their homes and businesses in a timely manner unsafe.

Public meetings were held periodically during this study at selected sites in Orleans and St. Bernard parishes. The location of the public meeting generally affected attendance, with meetings in St. Bernard Parish well-attended by citizens and stakeholders who would be affected by the Chalmette Loop project. Public meetings were held on the following dates: 12 June 2007, 21 August 2007, 24 October 2007, 17 January 2008, 17 April 2008, and 17 July 2008.

During the public meetings, citizens expressed concern over inadequate hurricane and storm damage risk reduction and the uncertainty of rebuilding their homes and businesses. The following key issues specifically related to IER # 10 were expressed by citizens and stakeholders at the noted public meetings:

- Closure of the MRGO is needed and should be expedited.
- Status of Deauthorization Plan for MRGO and the implementation schedule for this action.
- Location of fill material sources for berm alternatives. The quantity of fill material needed cannot come from St. Bernard Parish alone without impacting areas to be protected. Large amounts of borrow needed from the interior of IER # 10 study area may have substantial trade-off impacts.
- The Right-of-way (ROW) acquisition process should be clearly explained to all.
- The progress of the levee improvements should be publicized to help recovering areas attract displaced, returning residents.
- Air quality impacts during construction.

- Wetland impacts between the non-Federal levee system and the Federal levee system east of Paris Road.
- Residential impacts to those areas adjacent to the non-Federal levee.
- Having both the Federal levee system improved, as well as the non-federal levee system is preferable for system redundancy. Need to have more than one line of defense for an effective storm protection system.

Additional opportunities for public involvement will be provided as part of the 30-day public review and comment period for this draft IER and comments will be included within appendix B of the final IER.

## **1.6 DATA GAPS AND UNCERTAINTIES**

At the time of completion of this report, complete engineering designs and documentation had not been completed for all of the alternatives. This environmental impact analysis is based on preliminary designs and best professional judgment by the technical experts regarding the proposed actions and alternatives. Final engineering details of the proposed action could vary based on the final design.

Estimates of materials necessary to construct the project were developed from best professional judgment and preliminary design reports. The alternative features and associated numbers developed were used to quantify the magnitude of the proposed actions and not to prescribe detailed materials, quantities, or design specifications.

Uncertainty in the final engineering design and construction as well as slight changes to existing conditions in the future could change the impact assessments as discussed in this document. For example, access routes to the construction areas are dependent upon many variables that frequently change (weather, traffic conditions, road conditions, construction materials used, fuel prices, etc.) Large quantities of construction materials would be delivered to the project area, as well as to other ongoing 100-year level of risk reduction projects in the New Orleans metropolitan area. The sources of these materials and the transportation routes for delivering them have not been fully determined. Transportation of materials to construction sites could have localized short-term impacts to transportation corridors. Long-term impacts to road surfaces cannot be fully quantified at this time until the sources of all materials and transportation routes have been fully defined. All applicable new data will be reviewed as they become available; the CEMVN is currently completing a system-wide transportation analysis to better quantify these impacts.

Complete design information was not available for use in preparing the draft engineering alternative report for the study area. The conceptual engineering analysis was limited to the following data: aerial images; existing construction plans; as-built drawings; limited topographic surveys; Digital Elevation Models (DEMs); bathymetric surveys of the MRGO and the existing borrow pits that are located on the protected side of the levee; limited geotechnical analyses; and engineering judgment. Due to the multiple sources of data, the survey datum was not consistent between the data obtained. Detailed topographic surveys to define horizontal and vertical control points will be required prior to preliminary and final design of the proposed action. Additional geotechnical investigations could also be required for further design of the selected alternatives.

IER # 10 evaluates anticipated effects of alternatives based on a conceptual design of alternatives only. Design alternatives were developed to address risk of a range of storm events (i.e., 152 storms of various probabilities) modeled by the USACE Interagency Performance Evaluation Task Force. Storm damage risk assumes all system repairs and improvements are in place as of June 2011; however, not all storms were modeled, and the IER # 10 alternatives will not protect against all storm events.

The current proposed action for LPV 147 would be the construction of a T-wall on top of the existing levee and construction of a bridge over the T-wall to maintain the traffic flow on Highway 46. However additional constructability, scheduling, and cost analysis is being evaluated for potential construction of a gate alternative. If found that a gate alternative would provide improved constructability, scheduling and cost savings; additional NEPA documentation may be required. The gate alternative being evaluated would fall within the same footprint (or smaller) as the area impacted by the current proposed action for LPV 147.

## **2. ALTERNATIVES**

### **2.1 ALTERNATIVES DEVELOPMENT AND PRELIMINARY SCREENING CRITERIA**

NEPA requires that a Federal agency analyzing alternatives to a proposed action consider an alternative of “No Action.” Likewise, Section 73 of the WRDA of 1974 (PL 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 2.2 and 2.5.1, respectively.

In addition to the alternatives mandated by NEPA and WRDA, a range of reasonable alternatives was formulated through input by the CEMVN PDT, Value Engineering Team, engineering and design consultants, as well as affected local governments, the public, and resource agencies for each of the reaches described in this IER. The “action” alternatives are comprised of alternative alignments for each flood risk reduction corridor. Within each of these alignment alternatives, several scales were considered to encompass various flood risk reduction design alternatives that could be utilized within that alignment.

The following standard set of alignment alternatives and scales within these alignments were initially considered for each reach. Examples of the alternatives are illustrated in this section.

Alternatives:

- Existing alignment with straddle.
- Flood-side shift (all toe-to-toe growth occurs on flood side of levee).
- Protected-side shift (all toe-to-toe growth occurs on protected side of levee).

Alternative Scales:

- Earthen Levee

- T-wall Floodwall
- Earthen Levee with T-wall Floodwall Cap
- Earthen Levee using Deep Soil Mixing
- Earthen Levee Using Stability Berms with Staged Construction and Wick Drains.

This standard set of action alternatives is common to all reaches, and other alternatives were formulated to address reach-specific opportunities and constraints. All alternatives 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 alternatives which would proceed through further analysis. The criteria used to make this determination included engineering effectiveness, economic efficiency, environmental protection and social acceptability. Those alternatives which did not adequately meet these criteria were considered infeasible and therefore 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 individual reach alternative decisions to be made in a manner cognizant of unique local circumstances. At the same time, the alternatives analysis and selection remain integrated and comprehensive, considering reaches in relation to one another and 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, noting those alternatives that are common among all reaches. Each reach is identified by a project identification number (e.g., LPV 145).

## **2.3 PROPOSED ACTION**

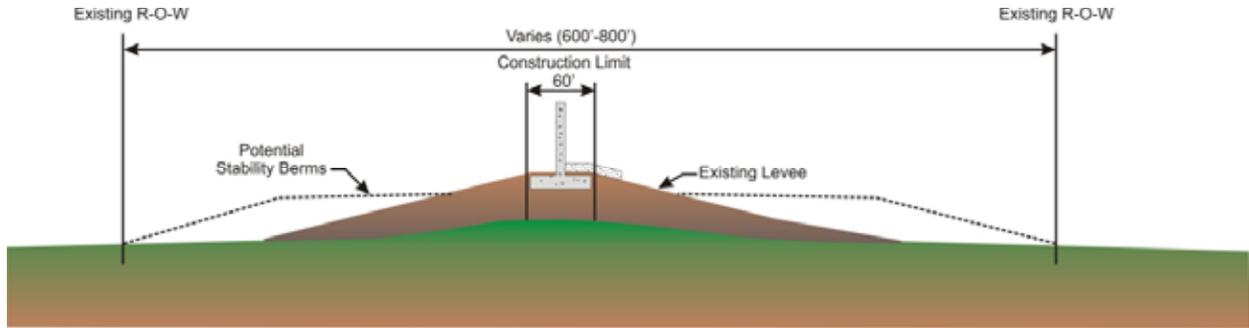
The proposed action is a part of the overall Chalmette Loop Levee system that includes connections to IER # 11 - Tier 2 Borgne, IER # 8 - the Bayou Dupre Flood Gate (LPV 144.02), and IER # 9 - the Caernarvon Floodwall project (LPV 149). The proposed action is described below with regard to the entire Chalmette Loop Levee system and the adjacent LPV reaches (figure 3).



**Figure 3: Chalmette Loop Levee LPV 141 through LPV 149**

**2.3.1 LPV 145, LPV 146 and LPV 148: Proposed Action (T-wall on Existing Levee)**

The proposed action for LPV 145, LPV 146 and LPV 148 consists of the construction of a T-wall on top of the existing levee as illustrated in figure 4. The 100-year level of risk reduction for the Chalmette Loop area would be achieved, in combination with other CEMVN projects. To construct the T-wall, the existing levee would be slightly raised in some portions of these reaches. Some excavation would be necessary to place the T-wall foundations, which are typically embedded approximately 3.0 feet into the crown, for erosion protection. The T-wall design is anticipated to be within the existing right of way (ROW) of the project. The proposed top of T-wall elevation would be constructed to approximately EL ±29.0, except for LPV 145 where the T-wall elevation would vary from 29.0 to 31.0. Stability berms may be incorporated into the final design. These berms will likely extend past the toe of the existing levee, but would not extend past the existing ROW. For the purpose of this impacts analysis, the largest possible footprint for these berms, extending to the existing ROW on both sides of the new T-wall, was assumed. The actual area of disturbance and impacts due to the construction of the proposed action berms will likely be less than this largest possible footprint. Specific conditions and construction requirements of the proposed action within each of these reaches is described below.



**Figure 4: Typical Section of T-wall on Existing Levee**

**2.3.1.1 LPV 145 - Bayou Bienvenue to Bayou Dupre: Proposed Action (T-wall on Existing Levee)**

LPV 145 is located between the Bayou Bienvenue Flood Gate and the Bayou Dupre Flood Gate and extends from USACE Baseline Stations 370+00 to 703+98, a distance of approximately 6.3 miles. There are six pipelines within the reach that could have to be relocated or repositioned at the interface of the levee alignment to accommodate a T-wall structure.

The existing levee ROW is approximately 600 feet wide, extending 350 feet from the levee centerline on the flood side and 250 feet from the levee centerline on the protected side. The existing levee is located immediately adjacent to the MRGO, and in some areas the ROW extends into the MRGO. Section 2.4.3 presents graphics depicting the conceptual ROW limits for each LPV.

As an additional feature, armoring would be incorporated to protect against erosion and scour on the protected and/or flood sides of critical portions of levees and floodwalls. These critical areas include transition points (where levees transition into any hardened feature such as gates), that may be exposed to wave and surge overtopping during a 500-year hurricane storm event. The proposed method of armoring would be one of the following: cast-in-place reinforced concrete slabs, concrete slope paving, or articulated concrete blocks (ACB). The armoring would be incorporated into the floodwall footprint and no additional environmental impacts would be anticipated.

In order to accommodate terrestrial wildlife movement, the construction of access areas for wildlife to traverse the T-wall would be required. This feature would consist of the construction of two earthen ramps within LPV 145.

It is anticipated that construction of the proposed action would begin in fall of 2009 and last for approximately 33 months. A significant amount of construction equipment would be required to conduct the work, including, but not limited to, generators, cranes, dump trucks, flatbed trucks, bull dozers, excavators, pile hammers, graders, tractors, front end loaders, welding machines, and concrete trucks. The estimated volume of construction material is provided in table 1.

**Table 1: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 145**

<b>Material</b>	<b>Units</b>	<b>Estimated Quantity</b>
Compacted Fill	Cubic Yard	298,976
Clearing	Acre	90.3
Rip Rap	Cubic Yard	161,136
Silt Fence	Feet	66,796
T-wall Concrete	Cubic Yard	60,237
Stabilization Slab Concrete	Cubic Yard	4,700
T-wall Sheet Pile	Square Yard	273,612
T-wall Pile	Feet	1,293,791

Construction access for LPV 145 would only be possible via a new bridge across Bayou Dupre and/or Bayou Bienvenue or by barge. The potential exists that the reach may be accessible via navigable sections of the MRGO. Two primary staging areas for the proposed action could be established. Approximately 18 acres, located on both the flood side and protected side adjacent to Bayou Bienvenue, have been identified as potential staging areas for LPV 145 (figure 5). Within this area, four individual parcels of land suitable for staging areas are proposed. In addition, approximately 7 acres, located on both the flood side and protected side adjacent to Bayou Dupre, have been identified as potential staging areas for LPV 145 and LPV 146 (figure 6). The staging areas would occur primarily on the existing levee or on dredge spoils deposited during construction of the MRGO.



**Figure 5: Staging Areas near Bayou Bienvenue for LPV 145**



**Figure 6: Staging Areas near Bayou Dupre for LPV 145 and LPV 146**

Figure 7 is a photograph of the existing Bayou Dupre Flood Gate, which is identified as LPV 144 in figure 3, and is the subject of a separate, but related IER (IER # 8). A permanent pontoon bridge that could swing in place is being evaluated in IER # 8 as part of the Bayou Dupre sector gate structure. The southern segment of LPV 145 terminates at Bayou Dupre, while the northern segment of LPV 146 begins at Bayou Dupre.



**Figure 7: Bayou Dupre Flood Gate (LPV 144) Adjacent to LPV 145 and LPV 146**

#### 2.3.1.2 LPV 146 - Bayou Dupre to Highway 46: Proposed Action (T-wall on Existing Levee)

LPV 146 extends between the Bayou Dupre Flood Gate and Highway 46 near Verret from Station 708+65 to Station 1115+00, a distance of approximately 7.7 miles. Between Station 708+65 and Station 1008+00, the levee parallels the MRGO. At approximately Station 1008+00, the levee alignment turns 90 degrees and continues in a southwesterly direction to Highway 46 (figure 2). There are two pipelines within the reach that could have to be relocated or repositioned at the interface of the levee alignment to accommodate a T-wall structure.

The existing levee ROW parallel to the MRGO is approximately 600 feet wide which extends 350 feet from the levee centerline on the flood side and 250 feet from the levee centerline on the protected side. The existing levee is located immediately adjacent to the MRGO, and in some areas the ROW extends into the MRGO. From the MRGO to Highway 46, the existing levee ROW is approximately 800 feet wide which extends equally 400 feet from the levee centerline on the flood side and on the protected side. Construction of the proposed action could be implemented within the existing ROW. Section 2.4.3 presents graphics depicting the conceptual ROW limits for each LPV.

As an additional feature, armoring would be incorporated to protect against erosion and scour on the protected and/or flood sides of critical portions of levees and floodwalls. These critical areas include transition points (where levees transition into any hardened

feature such as gates), that may be exposed to wave and surge overtopping during a 500-year hurricane storm event. The proposed method of armoring would be one of the following: cast-in-place reinforced concrete slabs, concrete slope paving, or articulated concrete blocks (ACB). The armoring would be incorporated into the floodwall footprint and no additional environmental impacts would be anticipated.

In order to accommodate terrestrial wildlife movement, the construction of access areas for wildlife to traverse the T-wall would be required. This feature would consist of the construction of two earthen ramps within LPV 146.

It is anticipated that construction would begin in fall of 2009 and last for approximately 25 months. A significant amount of construction equipment would be required to conduct the work, including, but not limited to generators, cranes, dump trucks, flatbed trucks, bull dozers, excavators, pile hammers, graders, tractors, front end loaders, welding machines, and concrete trucks. The estimated volume of construction materials is provided in table 2.

**Table 2: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 146**

<b>Material</b>	<b>Units</b>	<b>Estimated Quantity</b>
Compacted Fill	Cubic Yard	306,828
Clearing	Acre	109.1
Rip Rap	Cubic Yard	197,061
Silt Fence	Feet	81,270
T-wall Concrete	Cubic Yard	66,541
Stabilization Slab Concrete	Cubic Yard	5,176
T-wall Sheet Pile	Square Yard	270,790
T-wall Pile	Feet	1,326,664

Construction access for LPV 146 is a major constraint. There is one overland access point at Highway 46. Material could also be delivered by barge via the navigable portions of the MRGO. Two primary staging areas for the proposed action could be established. As previously shown in figure 6, approximately 7 acres, located on both the flood side and protected side adjacent to Bayou Dupre, have been identified as potential staging areas for LPV 146. The staging area at Bayou Dupre occurs primarily on the existing levee or on dredge spoils deposited during construction of the MRGO. In addition, approximately 6 acres located on both the flood side and protected side, just north of Highway 46, have been identified as potential staging areas for LPV 146 (figure 8). The two individual parcels of land suitable for staging areas north of Highway 46 are both located within existing levee ROW.

2.3.1.3 LPV 148 - Verret to Caernarvon: Proposed Action (T-wall on Existing Levee)

LPV 148 extends between Verret and the Caernarvon Floodwall in Braithwaite from USACE Baseline Stations 1125+00 to 1552+50, a distance of approximately 8.1 miles. The Jourda Canal parallels the existing levee on the protected side for the majority of its length, while the Creedmore Canal parallels the levee on the flood side. Just south of LPV 149, which is addressed in a separate IER (IER # 9), the levee alignment turns and continues in a northwesterly direction. The Caernarvon Canal parallels the flood side of the levee within this segment (figure 3). There are 11 pipelines and three overhead power lines within the reach that could have to be relocated or repositioned at the interface of the levee alignment to accommodate a T-wall structure.

The existing levee ROW is generally 400 feet to 410 feet wide, and widens at existing utility crossings. It extends approximately 200 feet from the levee centerline on the flood side and the protected side. The numerous utility crossings in this levee segment would be relocated and/or adjusted by the respective utility owner. Construction of the proposed action could be implemented within the existing ROW. Section 2.4.3 presents graphics depicting the conceptual ROW limits for each LPV.



**Figure 8: Staging Areas near Highway 46 for LPV 146 and LPV 147**

The two other flood risk reduction structures evaluated in this reach are St. Mary's Pump Station and the Creedmore Drainage Structure. The existing pump station fronting walls (T-wall monoliths and I-walls that connect them to the levee) would be replaced with new T-walls. The proposed action also includes the removal of the existing Creedmore Drainage Structure. This structure is used on extremely rare occasions, such as after the flooding associated with Hurricane Katrina; it is not regularly used to maintain or alter the existing drainage patterns of the area. Therefore, adverse impacts to the existing drainage pattern of the area would not be anticipated due to the removal of this structure.

As an additional feature, armoring, would be incorporated to protect against erosion and scour on the protected and/or flood sides of critical portions of levees and floodwalls. These critical areas include transition points (where levees transition into any hardened feature such as gates) that may be exposed to wave and surge overtopping during a 500-year hurricane storm event. The proposed method of armoring would be one of the following: cast-in-place reinforced concrete slabs, concrete slope paving, or articulated concrete blocks (ACB). The armoring would be incorporated into the floodwall footprint and no additional environmental impacts would be anticipated.

In order to accommodate terrestrial wildlife movement, the construction of access areas for wildlife to traverse the T-wall would be required. This feature would consist of the construction of two earthen ramps within LPV 148.

It is anticipated that construction of the proposed action would begin fall of 2009 and last for approximately 46 months. A significant amount of construction equipment would be required to conduct the work, including, but not limited to, generators, cranes, dump trucks, flatbed trucks, bull dozers, excavators, pile hammers, graders, tractors, front end loaders, welding machines, and concrete trucks. The estimated volume of construction materials for LPV 148 is provided in table 3 and the material for St. Mary's Pump Station is provided in table 4.

**Table 3: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 148**

<b>Material</b>	<b>Units</b>	<b>Estimated Quantity</b>
Compacted Fill	Cubic Yard	998,643
Clearing	Acre	140
Rip Rap	Cubic Yard	255,164
Silt Fence	Feet	87,050
T-wall Concrete	Cubic Yard	68,839
Stabilization Slab Concrete	Cubic Yard	4,275
T-wall Sheet Pile	Square Yard	520,830
T-wall Pile	Feet	2,025,630

**Table 4: Estimated Construction Material Quantities Required to Complete the Proposed Action for St. Mary's Pump Station**

<b>Material</b>	<b>Units</b>	<b>Estimated Quantity</b>
T-wall Concrete	Cubic Yard	1,461
Stabilization Slab Concrete	Cubic Yard	44
T-wall Sheet Pile	Square Yard	2,384
T-wall Pile	Feet	23,523

Construction access for LPV 148 would not be a major constraint due to existing access points at both ends of the levee section. Bayou Road provides access at the eastern end and River Road (Highway 39) provides access at the western end. Secondly, a haul road would be constructed on top of an existing private airstrip, with a ramp over the railroad adjacent to the airstrip (figure 9). The road would have a top width sufficient for two, 12-foot driving lanes plus shoulders, as required, to provide a stable embankment and safe driving environment.

Approximately 3 acres have been identified as potential staging areas for LPV 148, including 2 acres on two individual parcels of land adjacent to St. Mary's Pump Station (figure 10) and 1 acre on the protected side at the western end near Caernarvon (figure 11). The staging areas are all located within existing levee ROW.



Figure 9: Limits of Work for Haul Road on Existing Airstrip



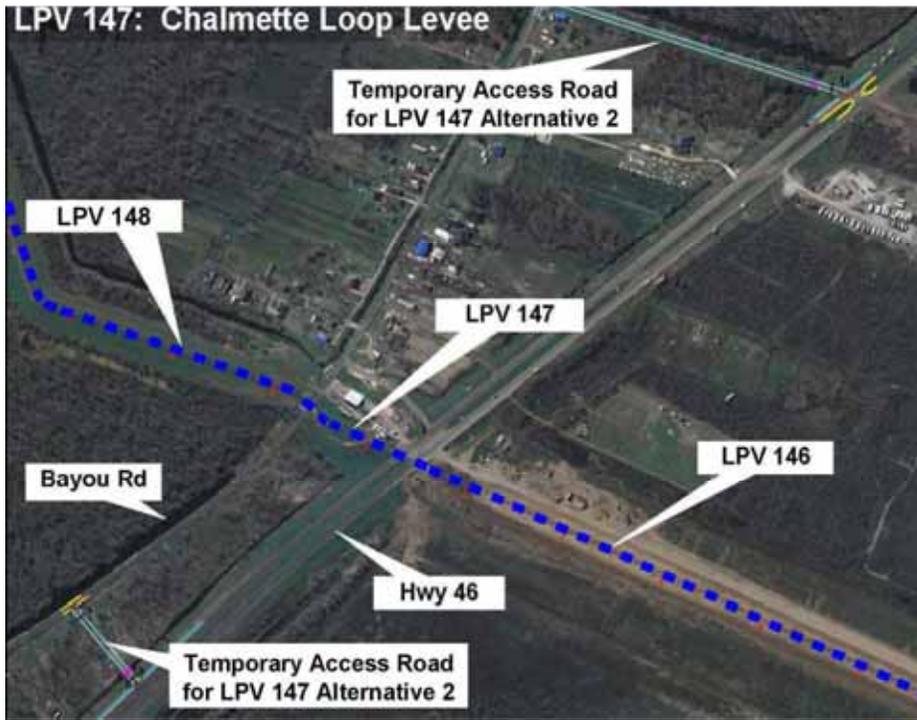
Figure 10: Staging Areas near St. Mary's Pump Station for LPV 148



**Figure 11: Staging Areas near Caernarvon for LPV 148**

**2.3.2 LPV 147 – Proposed Action (Highway 46 over T-wall with Overpass)**

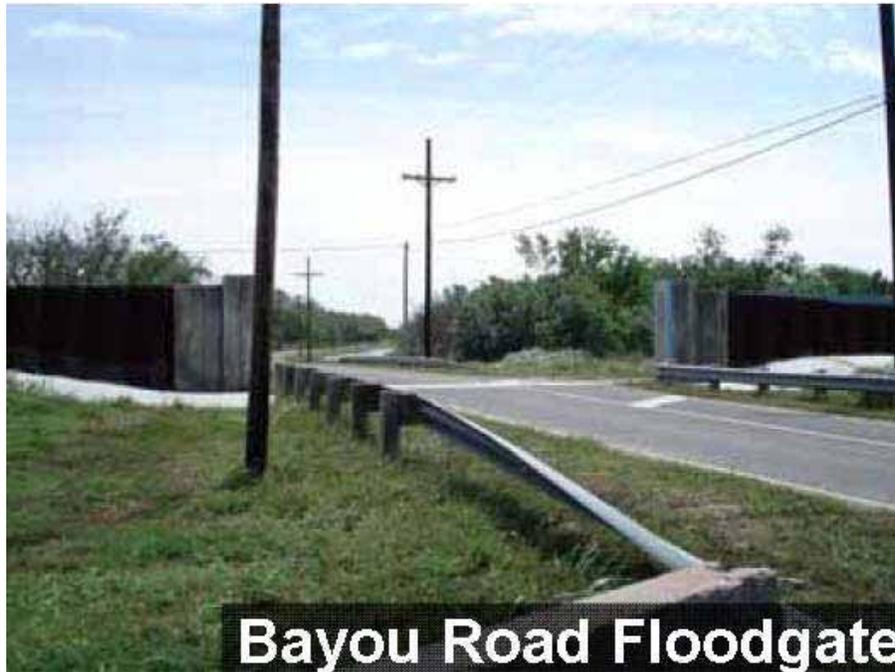
Figure 12, figure 13, and figure 14 illustrate existing conditions within LPV 147. Roads include Highway 46, a four-lane divided arterial and Bayou Road, a two-lane local road adjacent to Highway 46. The offset between these parallel roadways is approximately 400 feet at the risk reduction crossing. Flood risk reduction within LPV 147 currently consists of a levee section at Highway 46 with the roadway elevated over the levee, and a flood gate at Bayou Road. Two overhead power lines and other local utilities including water, gas, and drainage are located parallel to Bayou Road and could require relocation under the proposed action.



**Figure 12: LPV 147 Vicinity Map**

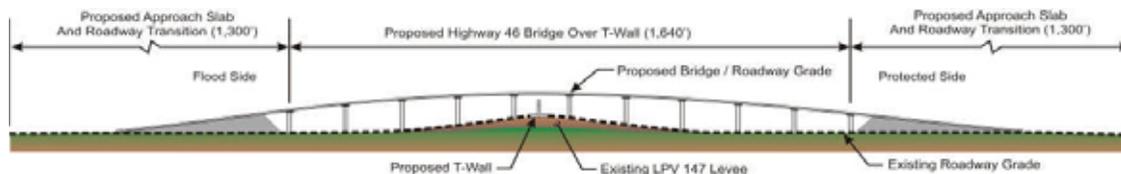


**Figure 13: Highway 46 Crossing over Hurricane Protection Levee**



**Figure 14: Existing Bayou Road Flood Gate**

LPV 147 consists of the levee section at the Highway 46 crossing and Bayou Road Flood Gate between USACE Baseline Stations 1115+00 to 1125+00, a distance of approximately 0.2 miles. The proposed action for LPV 147 would be the construction of a T-wall on top of the existing levee, as illustrated in figure 4, between LPV 146 and LPV 148 and construction of a flood gate at Bayou Road. Construction of the T-wall levee would be similar in design technique with LPV 148. It is not desirable to utilize flood gates across Highway 46 due to the excessive size of the gate that would be required to span the four-lane divided roadway and the additional danger accompanying the presence of gate storage monoliths adjacent to the travel way. Consequently, a bridge would be constructed over the T-wall. A partial view of the proposed Highway 46 bridge spanning the proposed T-wall is shown in figure 15. The total length of the bridge is estimated to be 1,640 feet long. The existing gate across Bayou Road would also be replaced by a taller gate. The T-wall, bridge and Bayou Road Flood Gate are anticipated to be within the existing ROW of the project. An access road of up 2,000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The new T-wall levee would be built to a height of approximately  $\pm 31$  ft (NAVD88) and would serve the same purpose as existing earthen levees in the area, to provide hurricane and storm damage risk reduction for St. Bernard Parish.



**Figure 15: LPV 147 Proposed Action Highway 46 Bridge over T-wall**

As an additional feature, armoring would be incorporated to protect against erosion and scour on the protected and/or flood sides of critical portions of levees and floodwalls.

These critical areas include transition points (where levees transition into any hardened feature such as gates), that may be exposed to wave and surge overtopping during a 500-year hurricane storm event. The proposed method of armoring would be one of the following: cast-in-place reinforced concrete slabs, concrete slope paving, or articulated concrete blocks (ACB). The armoring would be incorporated into the floodwall footprint and no additional environmental impacts would be anticipated.

Terrestrial wildlife movement within LPV 147 would be provided through the Bayou Road Flood Gate.

It is anticipated that construction of the proposed action would begin in fall of 2009 and last for approximately 18 months. A significant amount of construction equipment would be required to conduct the work, including, but not limited to, generators, cranes, dump trucks, flatbed trucks, bull dozers, excavators, pile hammers, graders, tractors, front end loaders, welding machines, and concrete trucks. The estimated volume of construction materials for the proposed T-wall / bridge is provided in table 5.

**Table 5: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 147**

<b>Material</b>	<b>Units</b>	<b>Estimated Quantity</b>
<b>T-wall Portion</b>		
Compacted Fill	Cubic Yard	88,000
Clearing	Acre	3.5
Silt Fence	Feet	2,200
T-wall Concrete	Cubic Yard	1,800
Stabilized Slab Concrete	Cubic Yard	125
T-wall Sheet Pile	Cubic Yard	12,225
T-wall Pile	Feet	48,000
<b>Bridge Portion</b>		
Precast Concrete Piles - 24"	Feet	19,380
Class A Concrete (Bents)	Cubic Yard	720
Class AA Concrete (Deck)	Cubic Yard	3,043
Concrete Girders (Type III)	Feet	16,400

Note: Bayou Road Flood Gate quantities not available.

Construction access for LPV 147 would not be a major constraint due to access points at both ends of the levee section. Highway 46 would provide access at the northern end and Bayou Road would provide access at the southern end. As previously shown in figure 8, approximately 2 acres have been identified as potential staging areas for LPV 147, including 1 acre on the protected side and 1 acre on the flood side. The staging areas are all located within existing levee ROW.

## **2.4 ALTERNATIVES TO THE PROPOSED ACTION**

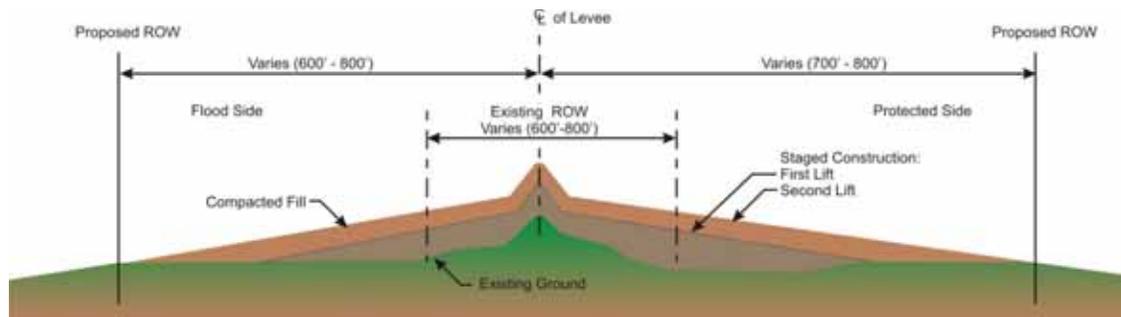
### **2.4.1 LPV 145, LPV 146 and LPV 148**

Four alternatives to the proposed action were considered in detail for LPV 145, LPV 146 and LPV 148. These alternatives were no action, earthen levee using stability berms, earthen levee using deep soil mixing and landside shift, and earthen levee using stability berms with staged construction and wick drains. Section 2.4.3 presents graphics depicting the conceptual ROW limits for each LPV.

No Action. Under the no action alternative the current levee reaches, flood gates, and associated structures would remain at the originally authorized grade rather than the 100-year level of risk reduction. Although there would be no change made to the height of these reaches, some construction may be necessary to bring these structures up to current, post-Katrina design standards. It is assumed that such construction would occur within the existing right-of-way of the project.

#### 2.4.1.1 Alternative 2 (Earthen Levee using Stability Berms)

Alternative 2 consists of earthen levee using stability berms (figure 16). The strength of weak soils generally improves as the soil is consolidated or compressed over a staged construction period. Consolidation can be effected by application of load above the soils. If the added load is applied gradually to improve the bearing strength of the soils, then computed safety factors against failure can be maintained at, or above, minimum required levels. By applying lifts of fill in stages, it is possible to construct the levees with steeper side slopes or with smaller stability berms and to construct the levees with narrower footprints.



**Figure 16: Levee with Stability Berms and Staged Construction**

For this alternative, slope stability analyses were conducted for existing conditions (2011 design elevations) and for future conditions (2057 design elevations). Initially, each levee reach would be raised to meet the 2011 design elevation. This would be accomplished by adding between 2.0 feet to 5.0 feet of compacted fill over the levee. To raise the levee from 2011 to 2057 elevations, an additional lift would be required. Between 2.5 feet and 4.0 feet of additional compacted fill would be required to meet the 2057 elevation. The depth of compacted fill between lifts, and in the final lift, would take into account settlement that may occur over time.

The time frame between the first and second lift would be 3 years for LPV 145, and 5 years for LPV 146. Within LPV 148, construction is on-going to raise the existing levee to the levels authorized prior to Hurricane Katrina (lift 1). In about a year and a half, the 2011 elevation (lift 2) would be constructed. During this phase of construction, the proposed levee centerline would be shifted from its current location 100 feet to 150 feet to the protected side to prevent filling in the Creedmore Canal on the flood side. To bring the levee from 2011 to 2057 elevations, lift 3 would be completed in 10 years, which is 8.5 years between the 2011 and 2057 elevations. The Jourda Canal would be relocated approximately 200 feet from its current alignment on the protected side of the levee under this alternative.

For both 2011 and 2057 design elevations, the crown of the levee would be approximately 10 feet wide with 4 horizontal (H) to 1 vertical (V) [4H:1V] side slopes

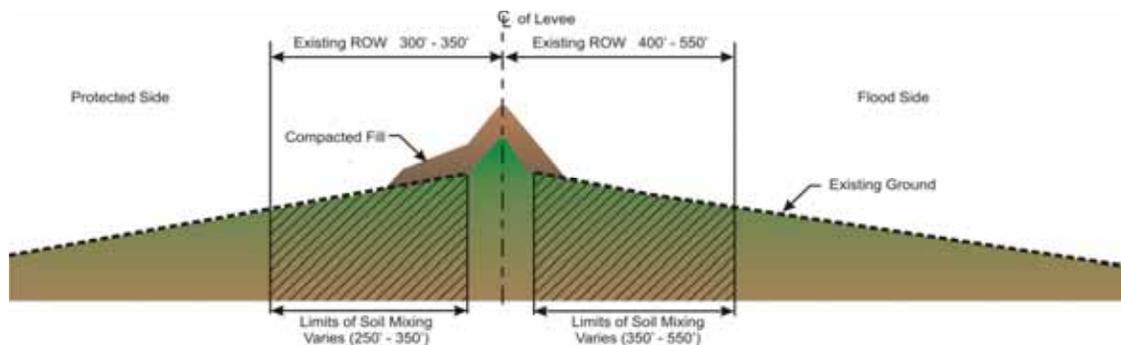
to intersect with the stability berm on the protected side within LPV 145 and LPV 146. Within LPV 148, 5H:1V side slopes are proposed due to the narrow existing ROW. Wave berms are proposed on the flood side within LPV 145, LPV 146, and LPV 148.

Additional ROW would be required for each reach as listed below:

- LPV 145 – 24 feet to 107 feet on the protected side for the 2011 and 2057 design elevations requiring approximately 77 acres of ROW.
- LPV 146 – 45 feet on the flood side for a short segment (0.8 miles) for the 2057 design elevation requiring approximately 7 acres of ROW.
- LPV 148 – 300 feet to 350 feet on the protected side for the 2011 and 2057 design elevations requiring approximately 580 acres of ROW.

#### 2.4.1.2 Alternative 3 (Earthen Levee using Deep Soil Mixing and Landside Shift)

Alternative 3 consists of earthen levee using deep soil mixing and landside shift (figure 17). The strength of weak subgrade soils can be improved by using a deep soil mixing construction technique by mixing cement grout with the soils. Mechanical mixing of the grout with the soils is typically performed using augers with mixing paddles that are penetrated from the surface down through the soils. As the augers are advanced, grout is pumped through the hollow shaft of the auger stem feeding out at the tip of the auger. Mixing paddles are arrayed along the shaft of the auger to provide mixing and blending of the grout with the soils. The intent of the process is to modify the properties of the weak soils to states similar to those of soft rock or lightly cemented sandstone.



**Figure 17: Alternative 3 (Earthen Levee using Deep Soil Mixing and Landside Shift)**

According to the preliminary engineering analysis, the centerline of the proposed levee would be shifted towards the landside from the existing levee centerline as part of the deep soil mixing alternative in order to construct the soil mixed columns. The approximate landside shift that would be required for each reach is listed below:

- LPV 145 – 120 feet to the protected side of the levee.
- LPV 146 – between 104 to 111 feet to the protected side of the levee depending on the hydraulic reach.

- LPV 148 – 114 feet to 127 feet to the protected side of the levee depending on the hydraulic reach.

The location of the deep soil mixing would occur between the existing levee protected side toe to the proposed new levee protected side toe. The approximate soil mixing regions that would be required for each reach are listed below:

- LPV 145 – 190 feet to 215 feet wide at an average depth of 64.5 feet.
- LPV 146 – 200 feet to 215 feet wide with average depths ranging from 23 feet to 65 feet depending on the hydraulic reach.
- LPV 148 – 209 feet to 221 feet wide with average depths ranging from 32 feet to 60 feet depending on the hydraulic reach.

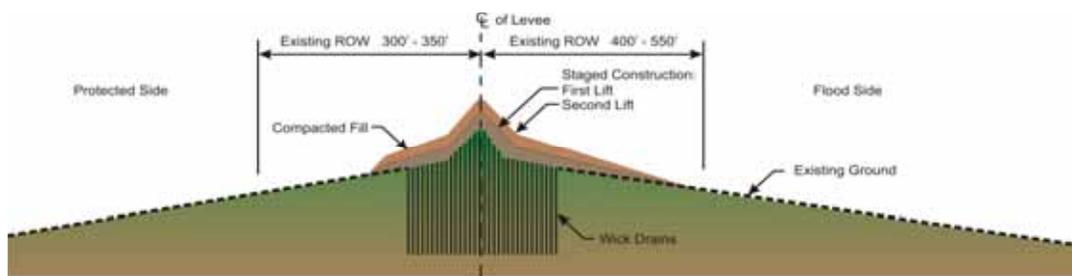
Additional ROW would be required for each reach as listed below:

- LPV 145 – approximately 7 acres of ROW.
- LPV 146 – no additional ROW anticipated.
- LPV 148 – approximately 72 acres of ROW.

Numerous utilities would need to be relocated, the existing St. Mary’s Pump Station fronting walls (T-wall monoliths and I-walls that connect them to the levee) would be replaced with new T-walls, and the Creedmore Drainage Structure would be demolished in LPV 148.

#### 2.4.1.3 Alternative 4 (Earthen Levee using Stability Berms with Staged Construction and Wick Drains)

Alternative 4 consists of earthen levee using stability berms with staged construction and wick drains (figure 18). The wick drain construction technique was considered because in most cases, the physical properties and thicknesses of weak soil layers would not allow the soils to consolidate at a fast enough rate under added load to allow simple stage construction to be effective. In such cases, it is sometimes possible to install vertical wick drains down through the weak soil mass to expedite the consolidation process. The wick drains provide conduits for drainage of the soil’s pore water that must take place for the soils to consolidate and strengthen more quickly than would occur without the drain.



**Figure 18: Alternative 4 (Earthen Levee using Stability Berms with Staged Construction and Wick Drains)**

For various hydraulic reaches within each reach, between 2.0 feet to 5.0 feet of overbuild would be required to account for settlement. The crown of the levee would be approximately 10 feet wide with 4H to 1V side slopes to intersect with the existing ground surface on the protected side within all reaches. Wave berms are proposed on the flood side within all reaches as well.

Staged construction was considered as part of alternative 4. By applying lifts of fill in stages, it is possible to construct the levees with steeper side slopes or with smaller stability berms and thereby be able to generally construct the levees with narrower footprints. The staged construction would be anticipated to be constructed in a total of two lifts. The first lift would be raised to an elevation varying from 26.0 to 29.0 and allowed to settle for one year. At the end of one year, the strength gain due to the surcharge would be calculated based on the degree of consolidation in the soil layer, considering the effect of the wick drains in place. The time frame between the first and second lift would be 3 years for LPV 145, 5 years for LPV 146, and 10 years for LPV 148.

The conceptual design parameters associated with the wick drain that would be required for each reach are listed below:

- LPV 145: 81 wick drains placed at 5-foot intervals for a total width of approximately 405 feet with the wick drain TIP EL at -39.5 feet. The TIP elevation (TIP EL) refers to the depth the wick drains would be embedded to.
- LPV 146: 45 wick drains placed at 5-foot intervals for a total width of approximately 225 feet with the wick drain TIP EL at -39.0 feet; and 48 wick drains placed at 5-foot intervals for a total width of approximately 240 feet with the wick drain TIP EL at -50.0 feet; and 51 wick drains placed at 5-foot intervals for a total width of approximately 264 with the wick drain TIP EL at -38.0 feet.
- LPV 148: 47 wick drains placed at 5-foot intervals for a total width of approximately 230 feet with the wick drain TIP EL at -27.5 feet; and 58 wick drains placed at 5-foot intervals for a total width of approximately 240 feet with the wick drain TIP EL at -26.5 feet.

Additional ROW would be required for each reach as listed below:

- LPV 145 – approximately 106 acres of ROW.
- LPV 146 – approximately 2 acres of ROW.
- LPV 148 – approximately 303 acres of ROW.

The wick drain alternative would have no impact on the MRGO within LPV 146.

Numerous utilities would need to be relocated in LPV 148.

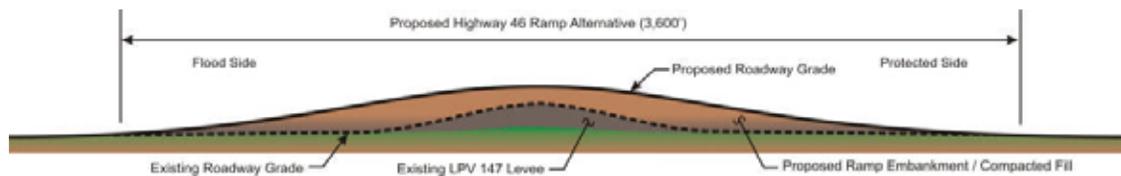
#### **2.4.2 LPV 147**

In addition to the proposed action, the no action alternative and building a ramp over Highway 46 were considered in detail for LPV 147.

No Action. Under the no action alternative the current levee reaches, flood gates, and associated structures would remain at the originally authorized grade rather than the 100-year level of risk reduction.

#### 2.4.2.1 Alternative 2 (Earthen Levee, Highway 46 over Levee with Overbuild)

Alternative 2 consists of elevating Highway 46 over a raised earthen levee. The roadway typical section would include approximately 4 inches of asphalt over 9 inches of rock base. A preliminary settlement analysis indicates that in order to get the risk reduction design height to approximately EL  $\pm 29.0$ , the roadway would need to be raised to EL 34.2. The proposed vertical curve of this alternative is shown in figure 19.



**Figure 19: LPV 147 Alternative 2 (Highway 46 over Levee with Overbuild)**

Temporary access roads are proposed to be constructed to maintain traffic flow between Highway 46 and Bayou Road during construction as shown in figure 12. The construction of the Highway 46 ramp could be staged to maintain one lane of traffic in each direction during construction.

Approximately 25 acres of additional ROW would be needed for this alternative. The fire station and residential structure located on Bayou Road would need to be acquired and relocation assistance would be necessary for these impacted structures. Additional ROW and relocations would be the result of the height of embankment coupled with required design criteria for side slopes.

#### **2.4.3 LPV 146 Through LPV 148 Summary**

Figure 20, figure 21, and figure 22 are a series of three aerial maps that depict the estimated ROW limits for the proposed action and other alternatives considered within LPV 145, LPV 146, LPV 147, and LPV 148. Major physiographic features, such as the MRGO, flood control structures, and adjacent canals as discussed above are also shown.



**Federal Levee Alternatives**

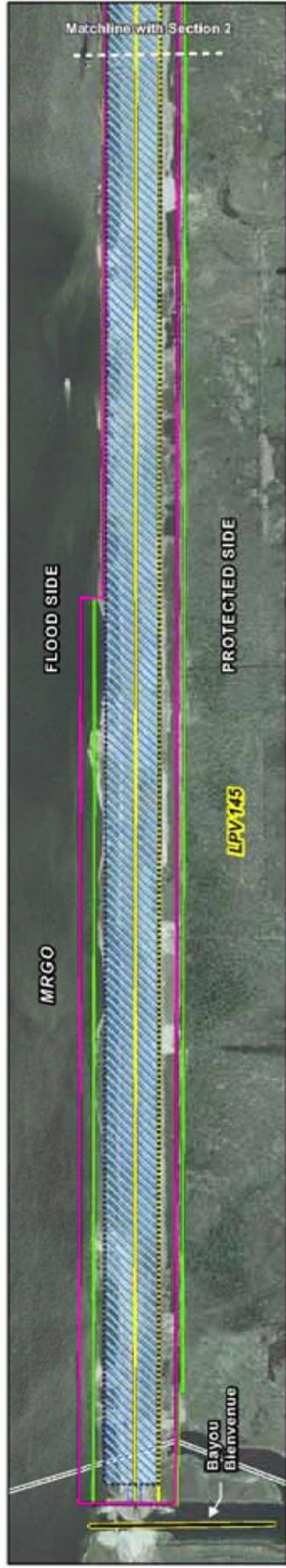
- T-wall structure
- Earthen levee
- Deep soil mix
- Earth wick drains

0 500 1,000 Feet

Parish Boundary

Existing R-O-W

LPV 145 - Section 1



LPV 145 - Section 2



Figure 20: IER #10 Federal Levee System Design Alternatives – LPV 145

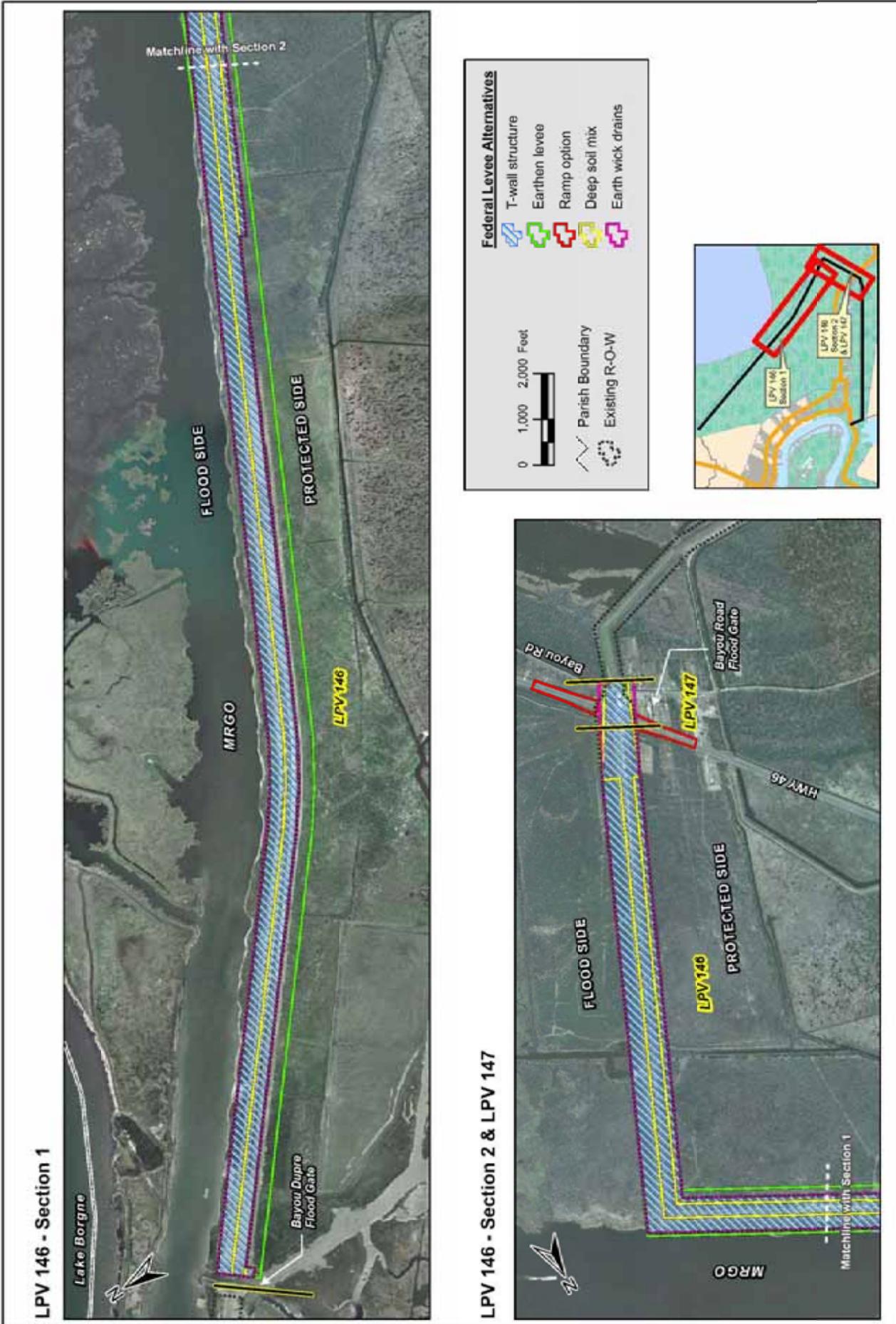
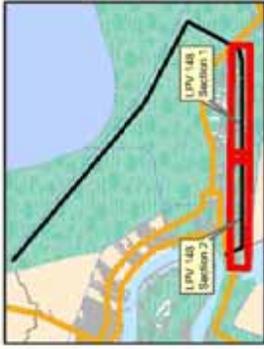


Figure 21: IER #10 Federal Levee System Design Alternatives – LPV 146 and LPV 147



**Federal Levee Alternatives**

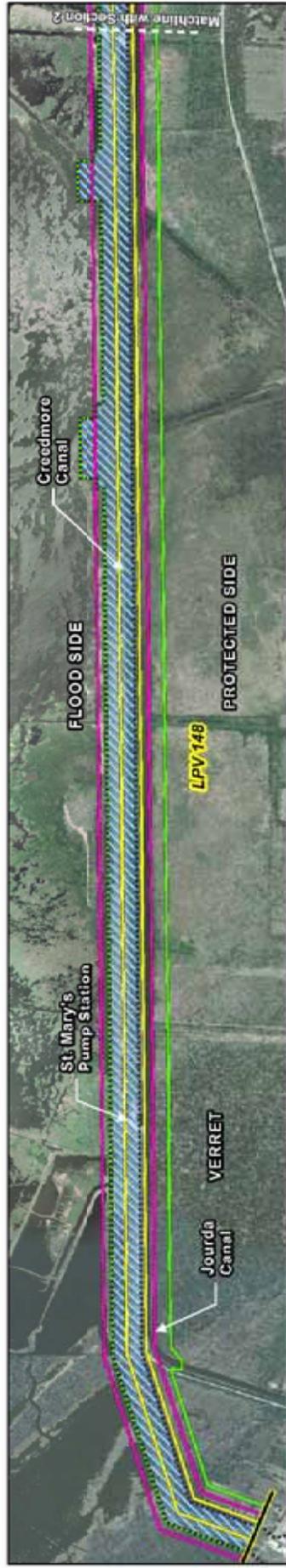
- T-wall structure
- Earthen levee
- Deep soil mix
- Earth wick drains

0 500 1,000 Feet

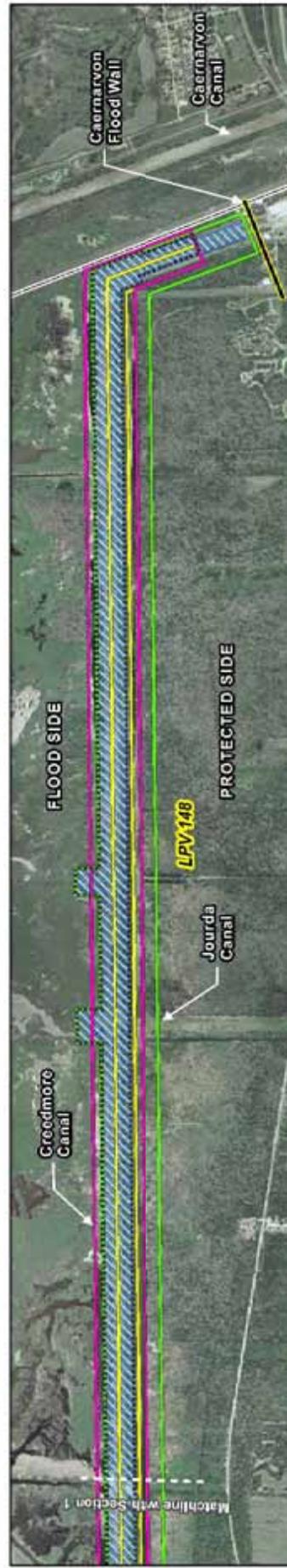
Parish Boundary

Existing R-O-W

**LPV 148 - Section 1**



**LPV 148 - Section 2**



**Figure 22: IER #10 Federal Levee System Design Alternatives – LPV 148**

## **2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION**

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

### **2.5.1 Nonstructural Alternatives**

In accordance with Section 73 of WRDA, ER 1105-2-100 states that nonstructural measures can be considered independently or in combination with structural measures (USACE 2000). Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from nonstructural measures is accomplished by changing the use of the floodplains, or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocation of structures, flood warning and preparedness systems (including associated emergency measures), and regulation of floodplain uses. Orleans and St. Bernard Parishes already have flood warning systems and evacuation plans in place and regulation of floodplain uses is addressed by the National Flood Insurance Program (NFIP); therefore, only flood proofing and relocation were considered as nonstructural measures. The flood proofing nonstructural measures evaluated in this analysis are raising structures in place and the relocation of structures subject to flooding through a property acquisition and relocation assistance program.

The below description of the nonstructural alternatives focus on St. Bernard Parish, as the majority of residences and businesses protected by the IER #10 projects are located with that Parish. It should be noted, however, that a small portion of Orleans Parish would be protected by these project; in particular, the Lower 9<sup>th</sup> Ward is located within the Chalmette Loop sub-basin and would be afforded risk reduction by these projects.

#### 2.5.1.1 Raise in Place

Flood proofing would require elevating all residential and commercial properties subject to flooding in the study area above the expected levels of flooding. This option of the nonstructural alternative would also have to consider elevating roadways, public buildings, and some forms of public infrastructure that need to continue operations during and after a storm event. Some facilities such as roadways, railroads, and runways might remain at grade when repair from storm damage would be less costly than the construction, operation, and maintenance of them on elevated structures. The average cost of elevating residential structures in the study area has been estimated at approximately \$95 per square foot (USACE 2007). This includes the cost of administration, design, inspection, cost estimating, project management, and all other associated costs of elevating the structures, as well as, the costs of the occupants of the residential structures being relocated to temporary housing during the time that the structures are being elevated. Approximately 20,000 homes in St. Bernard Parish were damaged by flooding from Hurricane Katrina (U.S. Department of Housing and Urban Development [HUD] 2006). Although Hurricane Katrina was greater than a 100-year storm and not all of this flooding was a product of breaching or overtopping of the

HSDRRS, this figure is reasonably representative of the magnitude of homes in these parishes that are vulnerable to storm surge induced flooding. At \$95 per square foot, the cost to raise the average 1,600 square-foot residence above the expected level of flooding would be approximately \$152,000. Based on this figure, the cost of raising flood-prone homes could be estimated at approximately \$3 billion in St. Bernard parish.

Other costs associated with flood proofing would include elevating non-residential buildings, roads and railroads, and other infrastructure. No information is available on the cost of elevating commercial, industrial, and public buildings because these buildings are so non-homogeneous that information would have to be developed for each individual building.

However, it can reasonably be expected that it would easily equal the costs of elevating the residential structures and bring the total to more than \$6 billion.

Elevating the area's roadways would be equivalent to converting all roadways and railroads to bridges. The costs for repairing all roads and railroads would be much more reasonable, and these costs were estimated based on highway design assumptions and current unit prices. A nonstructural alternative that left roads and railroads at existing elevations would result in these structures having to be repaired after each storm event. Costs for repairing two-lane asphalt roads with shoulders were estimated at \$400,000 per mile. There are approximately 1 363 miles of two-lane roads in St. Bernard parish. Roughly 100 percent of these roads in St. Bernard Parish were flooded during Hurricane Katrina. Therefore, repair costs would be approximately \$145.2 million in St. Bernard Parish for each storm event that exceeded the 100-year level of risk reduction. Repair costs are greater for railroads (\$100 per linear foot<sup>2</sup>) and four-lane roadways (\$800,000 per mile). There are approximately 42 miles of four-lane highway and 24 miles of railroad in St. Bernard Parish.

No information is available on the costs for elevating other infrastructure, such as electrical distribution and transmission grids, gas distribution lines, drainage, sewage and water distribution facilities, communication networks, public transit, and waterborne navigation facilities.

The total estimated costs as outlined above for elevating all flood-damaged properties in the study area could likely approach, if not exceed, \$9.5 billion, which greatly exceeds the funds allocated to achieve the purpose and need of the Chalmette Loop 100-year HSDRRS. However, because these costs are based on the number of homes flooded as a result of Hurricane Katrina, this cost clearly overestimates the cost to raise those homes susceptible to flooding from the 100-year storm. Nonetheless, even if the cost of this alternative were reduced by 50 percent to account for the differences between pre-Katrina and post-Katrina population estimates and the difference between flooding potential from a Katrina-like event and a 100-year event, this cost would still greatly exceed funds allocated for the 100-year HSDRRS in the Chalmette Loop.

#### 2.5.1.2 Real Estate Acquisition and Relocation Assistance

Mandatory public acquisition of properties in areas subject to flooding is one way to reduce the damages from storms and hurricanes. Acquisition of these properties as part of a Federal project and for projects where there is Federal financial assistance would be subject to the provisions of the Uniform Relocation Assistance and Real Property

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<sup>2</sup> RS Means Construction Cost Estimating Guides & 2006 Construction Cost Data. The demolition and repair costs were based upon factoring the installation cost.

Acquisition Policies Act of 1970, 42 USC Section 4601, et seq., as amended (the Uniform Act). Accordingly, a nonstructural alternative based on 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 Act for the displacement of individuals, families, businesses, farms, and non-profit organizations.

There are several options that could be offered for the acquisition and relocation option of the non-structural alternative, such as acquisition of the site and home or commercial structure by the local sponsor for demolition and relocation of the displaced residents and business in accordance with the Uniform Act or, acquisition of the site by the local sponsor and relocation of the structure to a comparable site outside the area of flooding.

The most recent average sale price of a single-family in St. Bernard Parish was \$75,000 (Brookings 2007). Multiplying this price by the 20,000 homes damaged from flooding in St. Bernard Parish, the total cost for acquisition of residential properties would be approximately \$1.5 billion. This does not include the cost of Uniform Relocation Assistance benefits which are due for displaced residents. Another option would be to relocate all these structures. Assuming an average value of \$25,000 in St. Bernard Parish ([Louisianaatoz.com](http://Louisianaatoz.com), 2007) plus an average cost of moving and re-siting a 1,600 square-foot structure of \$30,000, the cost of this option of the nonstructural alternative for residential properties only damaged by flooding would be \$1.1 billion. Under this alternative, the affected property owners would relinquish title to their existing lot in exchange for ownership of the property to which they were relocated.

The above costs are not inclusive of the real estate transaction costs. In addition, the Uniform Act states that displaced persons may be eligible for residential and/or business relocation assistance benefits, which may include reimbursement of expenses for moving themselves and their personal or business-related property, limited expenses in searching for a replacement business or farm, and reasonable and necessary expenses for reestablishment of a displaced farm, nonprofit organization, or small business at its new location.

As in the “Raise in Place” non-structural alternative, these numbers are based on flooding as a result of Katrina and therefore could be an overestimate. Nonetheless, they are a reasonable means to represent the magnitude of the homes vulnerable to flooding from storm surge events. The acquisition and relocation option of the non-structural alternative is a complex, costly, and time-consuming process. Acquired properties would have to remain in the public domain or, at best, be developed with features that could withstand flooding, the cost of which could be an undesired impact to the local sponsor. Moreover, there could be indirect impacts of this alternative to the local economy, such as a reduced tax base from the reduced population.

### **2.5.2 Create Wetlands**

This alternative would consist of construction of wetlands near Lake Borgne. It is generally perceived that wetland functions include flood reduction, water quality improvement, and in some limited instances storm surge reduction. However, because the ability of wetlands to achieve surge reduction varies from location to location, and depends on a variety of variables whose effect has not been clearly quantified by science, it would be inappropriate to extrapolate wetland data and estimate surge reduction potential for the study area.

Although wetland creation can provide ecological benefits, the engineering effectiveness and design requirements to achieve the 100-year level of risk reduction from wetlands creation would not be considered feasible for this project. However, the CEMVN, as well as other agencies and interests, is pursuing other large-scale wetlands development projects. For example, the Louisiana Coastal Protection and Restoration (LACPR) study is investigating storm surge protection by increasing wetlands, barrier islands, and hurricane protection system features between coastal Louisiana and the Gulf of Mexico. The measures investigated and implemented by this and other projects and plans such as Coastal Protection, and Restoration Authority (CPRA) of Louisiana's Master Plan, Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) projects and the Louisiana Coastal Area (LCA) Ecosystem Restoration Study all represent potential additional lines of defense in reducing the risk of coastal Louisiana from potentially catastrophic events.

The nonstructural and create wetlands alternatives were eliminated from further consideration because neither would accomplish the purpose and need of the project. The nonstructural alternative would likely greatly exceed the funding appropriated for the entire 100-year HSDRRS. This alternative would also have socially unacceptable impacts such as disruption of the local economy and an extreme economic burden on the local sponsor. The create wetlands alternative was not considered an effective engineering solution to provide 100-year hurricane risk reduction.

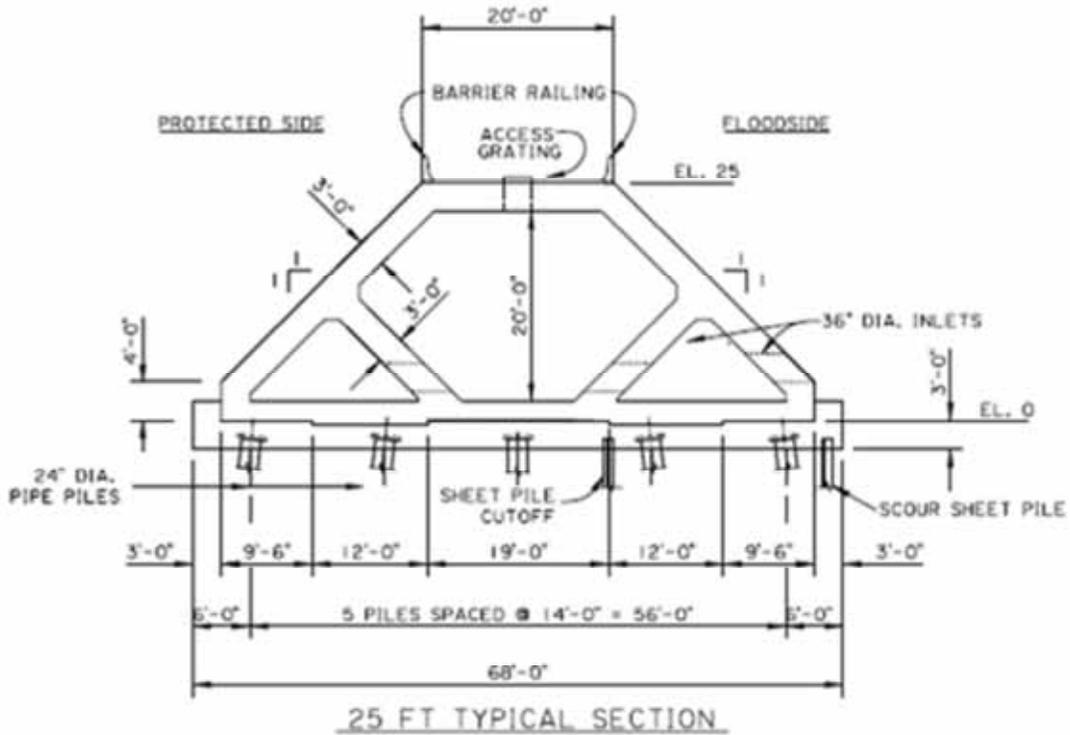
### **2.5.3 Hollow Core Levee**

For each of the levee reaches that include the potential for a new levee, a hollow core levee was considered and eliminated from further consideration. The concept of the hollow concrete levee system is such that the section fills with water from the bottom as the 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.

The hollow concrete levees would be comprised of trapezoidal shapes similar to that of earthen levees. The levee superstructure sections would be comprised of sloped side walls with a flat bottom slab with access to the interior via steel grating or manholes in the crest. Water inlets or ports would be 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 were designed to protect against sliding under design loading conditions. The substructure consists of a concrete base slab or pad that would be supported by steel pipe piles. It is anticipated that excavation and granular backfill would be required to construct the pile supported concrete pad. The concrete base slab serves a two-fold purpose. It distributes loads to the pile foundations as well as serves as a "roadway" for cast-in-place construction. A typical section is shown in figure 23.

The incorporation of a hollow core levee was eliminated from further consideration because of cost. Based on a March 2007 report prepared by a local Engineering firm for the USACE, the costs associated with the construction of a Hollow Core Levee would be prohibitive. The estimate of probable costs of a Hollow Core Levee with a crest elevation of 30 feet is \$343,040,000 per mile. This equates to \$2,229,760,000 for LPV

145 and \$2,744,320,000 for LPV 146 ad LPV 148. The estimated construction costs of a Hollow Core Levee for these three reaches is \$7,718,400,000.



**Figure 23: Hollow Core Levee – Typical Section**

#### 2.5.4 Height Alternatives

Table 6 displays all alternatives considered for each reach under consideration for the Chalmette Loop. On 10 October 2007, after initial effects analyses were completed, the Project Delivery Team (PDT) convened to conduct a preliminary screening of the Federal system universe of alternatives identified for study. Key reasons why alternatives were eliminated from further consideration included:

- Unacceptable wetland impacts compared to other alternatives under consideration that have no other apparent disadvantages.
- Constructability issues regarding schedule or method.
- Failure to meet the flood risk reduction purpose and need for the project.

Specific alternatives eliminated from further consideration are listed along with the reasons for elimination in table 6.

**Table 6: Alternatives Eliminated from Further Consideration**

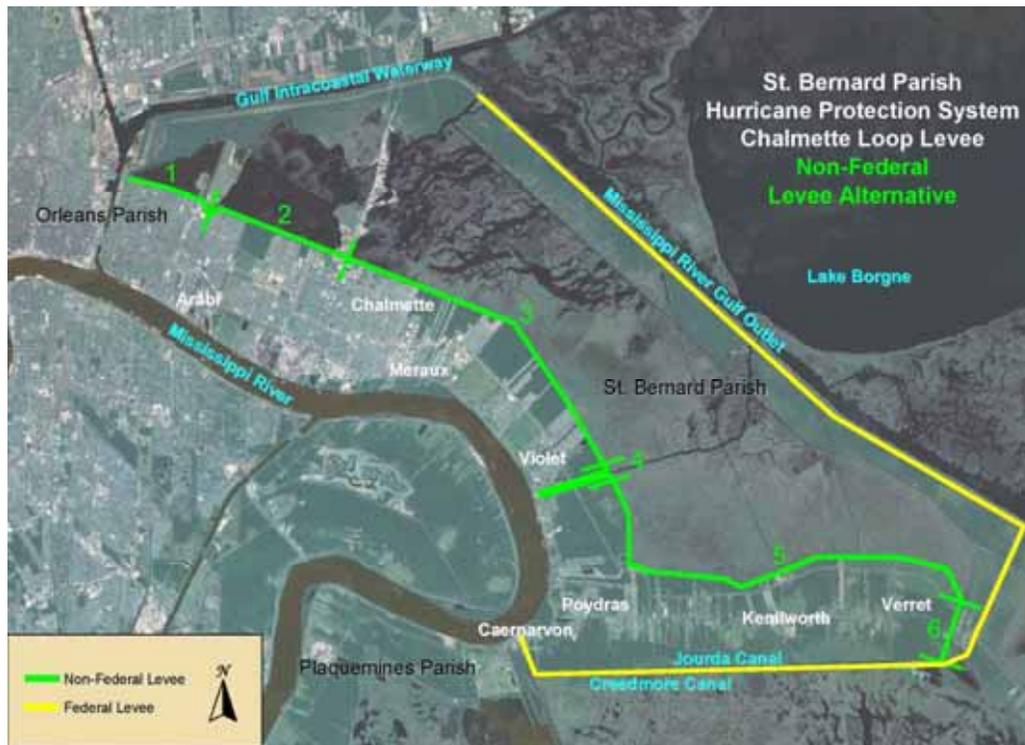
<b>Reach</b>	<b>Alternatives</b>	<b>Explanation for Elimination</b>
LPV 145	Earthen levee using stability berm (EL 26)	The alternatives' construction limits are located within the MRGO
	Earthen levee using stability berms with floodside levee shift and high-strength geotextile (EL 26)	
LPV 146	Earthen levee using stability berm (EL 22.5)	Both alternatives were eliminated because they do not meet the Purpose and Need; height was not adequate to achieve 100-year level of risk reduction
	Earthen levee using deep soil mixing (EL 22.5)	
	Earthen levee using stability berm (EL 26)	The alternatives' construction limits are located within the MRGO
	Earthen levee using stability berm with floodside shift (EL 26)	
LPV 146 (MRGO to Highway 46)	Earthen levee using stability berm (EL 22.5)	Both alternatives were eliminated because they do not meet the Purpose and Need; height was not adequate to achieve 100-year level of risk reduction
	Earthen levee using deep soil mixing (EL 22.5)	
	Earthen levee using stability berm with floodside shift (EL 26)	Alternatives were eliminated because they have greater adverse wetland impacts than the reasonable straddle alternative
	Earthen levee using stability berm with landside shift (EL 26)	
LPV 147	Earthen levee with stability berm with landside shift, Highway 46 over levee with overbuild (EL 26)	Alternatives were eliminated because they have greater adverse wetland impacts than the reasonable straddle alternative
	Earthen levee with stability berm with floodside shift, Highway 46 over levee with overbuild (EL 26)	
LPV 148	Earthen levee using stability berm with landside shift (EL 26)	Alternatives were eliminated because they have greater adverse wetland impacts than the reasonable straddle alternative
	Earthen levee using stability berm with floodside shift (EL 26)	
Non-Structural	Raise in place	Estimated cost is significantly high compared to benefits and exceeds congressional appropriations
	Real estate acquisition and relocation assistance	Implementation process is costly, complex and time consuming
Create Wetlands	Create Wetlands	Does not meet purpose and need to provide 100-year level of risk reduction

Source: Developed by URS from the USACE Draft Preliminary Engineering Report, New Orleans Hurricane Protection St. Bernard Parish LPV 144-149, 10 August 2007.

### 2.5.5 Non-Federal System

A number of non-federal levee system alternatives were also considered for the Chalmette area within IER # 10. The non-federal levee system for Chalmette consists of the secondary line of protection that separates marshland from the populated areas of Chalmette. Six individual reaches were considered (figure 24).

Table 7 displays all alternatives initially identified for each non-federal section under consideration for the Chalmette Loop. As shown, raising the levee system to both the 13.5 and 17.0 elevations were considered. On 10 October 2007, after initial effects analyses were completed, the PDT convened to conduct a preliminary screening of the non-federal levee system universe of alternatives. Specific non-federal system alternatives eliminated from further consideration of this IER are listed along with the specific reasons for elimination in table 7.



**Figure 24: Non-Federal Levee Alternative**

Due to the fact that the non-federal levee system alternatives were eliminated from further consideration at an early stage of the evaluation process, no resource impacts were evaluated or quantified for any non-federal levee alternatives.

**Table 7: Non-Federal System Alternatives Eliminated from Further Consideration**

Reach	Universe of Alternatives	Explanation for Elimination
<b>Non-Federal Levee – El 13.5 Raise</b>		
1	Straddle raise	Eliminated due to constructability issues because of the railroad tracks and Florida Ave extension
	Protected-side raise	
	New Levee between railroad and Florida Ave.	
2	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
3	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
4	Protected-side raise with T-wall on north-side, west of bridge	In order to maintain access numerous gates cause maintenance issues
	Flood-side raise with T-wall on north-side, west of bridge	
5	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
6	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
<b>Non-Federal Levee – El 17.0 Raise</b>		
1	Straddle raise	Eliminated due to constructability issues because of the railroad tracks and Florida Ave extension
	Protected-side raise	
	New Levee between railroad and Florida Ave.	
2	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
3	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
4	Protected-side raise with T-wall on north-side, west of bridge	In order to maintain access numerous gates cause maintenance issues
	Flood-side raise with T-wall on north-side, west of bridge	
	Protected-side raise to EL 13.5, then T-wall to EL 17.0	Large amount of wetland and residential impacts
	Flood-side raise to EL 13.5, then T-wall to EL 17.0	

<b>Reach</b>	<b>Universe of Alternatives</b>	<b>Explanation for Elimination</b>
5	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	
6	Protected-side levee raise	Large amount of wetland and residential impacts
	Flood-side levee raise	

Following the initial screening of the non-federal system alternatives, it was determined that all non-federal system alternatives would be entirely eliminated as part of this IER due to the following reasons:

- A special congressional authorization would be required to re-classify the non-federal system to the Federal system. If re-classified, Congress would then have to approve additional funding; however, it is not known what the required funding is for upgrading all the non-federal levee system as conceptual design has not been conducted.
- The 40 Arpent Canal is located immediately adjacent to the entire non-federal levee system on the protected side. Any improvements would have to be constructed on the flood side to avoid relocating the 40 Arpent Canal which could have substantial wetland impacts.
- Potential conflicts with the proposed Florida Avenue roadway extension project are proposed on the protected side, with St. Bernard Highway nearby. Due to the potential for limited ROW, a T-wall would be required for the entire limits.
- Utility relocations would be significant.
- Six existing pump stations located along the non-federal levee would require demolition and rebuilding to the 100-year elevation.
- Use of the 40 Arpent alignment alone would leave a gap between the St. Bernard Hurricane and Storm Damage Risk Reduction System and the Lake Borgne Storm Surge Barrier described in IER #11 Tier 2 Borgne, Improved Protection on the Inner Harbor Navigation Canal.

## **2.6 SUMMARY TABLE**

Table 8 provides a summary of the preliminary alternative screening results.

**Table 8: Preliminary Alternative Screening Results**

Alternative	Scale	Reach 145	Reach 146	Reach 147	Reach 148
<b>No Action</b>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Non-Structural</b>		X	X	X	X
<b>Create Wetlands</b>		X	X	X	X
<b>Existing Alignment</b>					
	Earthen Levee	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	T-wall Floodwall	X	X	X	X
	Earthen Levee using Stability Berms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
	Earthen Levee using Deep Soil Mixing	N/A	N/A	N/A	N/A
	Earthen Levee using Stability Berms with Wick Drains	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
<b>Flood-side Shift</b>					
	Earthen Levee	X	X	X	X
	T-wall Floodwall	N/A	N/A	N/A	N/A
	Earthen Levee using Stability Berms	N/A	N/A	N/A	N/A
	Earthen Levee using Deep Soil Mixing	N/A	N/A	N/A	N/A
	Earthen Levee using Stability Berms with Wick Drains	N/A	N/A	N/A	N/A
<b>Protected-side Shift</b>					
	Earthen Levee	N/A	N/A	X	X
	T-wall Floodwall	N/A	N/A	N/A	N/A
	Earthen Levee using Stability Berms	N/A	N/A	N/A	N/A
	Earthen Levee using Deep Soil Mixing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
	Earthen Levee using Stability Berms with Wick Drains	N/A	N/A	N/A	N/A

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

### 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

#### 3.1 ENVIRONMENTAL SETTING

The project area is located in the northwest portion of St. Bernard Parish, with much of the project along the south bank of the MRGO. Dominant physiographic features in the vicinity include the MRGO, Lake Borgne, the Mississippi River, and extensive marshes of the Central Wetlands Area (CWA) as well as outside the Chalmette Loop Levee System. The communities of Chalmette, Meraux, Violet, and others that comprise much of the area to be protected by the project are located along the Mississippi River on the western side of the project area.

The shallow subsurface beneath, and immediately adjacent to, the HSDRRS is composed of marsh, interdistributary, prodelta, and Pleistocene deposits. Marsh deposits are found at the surface and are approximately 10 feet thick. Marsh deposits are composed of very soft to soft organic clays with peat. Interdistributary deposits up to 40 feet thick are found beneath marsh deposits. Interdistributary deposits are characterized by very soft to soft clay with silt strata and shells. Prodelta deposits up to 30 feet thick are located below interdistributary deposits and are generally composed of medium clay with minor amounts of silt. Pleistocene deposits composed of stiff, oxidized clays, silts, and sand are located beneath prodelta deposits. The study site contains Lafitte-Clovelly soils which are level, very poorly drained soils that have a thick or moderately thick mucky surface layer and clayey underlying material; in brackish marshes (US Soil Conservation Service, 1983). Long-term relative subsidence resulting mainly from compaction of Holocene sediments is estimated at 0.5 feet per century. Eustatic sea level is predicted to rise an additional 1.3 feet over the next century (IPCC, 2001). Therefore, the natural, long-term, relative subsidence rate at the project site is estimated to be 1.8 feet per century.

### **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, 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](http://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 9 shows those significant resources found within the project area, and notes whether they would be impacted by any of the alternatives analyzed in this IER.

**Table 9: Significant Resources in Project Study Area**

<b>Significant Resource</b>	<b>Impacted</b>	<b>Not Impacted</b>
Wetlands	X	
Upland Communities	X	
Wildlife	X	
Essential Fish Habitat	X	
Aquatic Communities	X	
Threatened and Endangered Species		X
Water Quality	X	
Soils	X	
Floodplains and Drainage	X	
Utilities	X	
Air Quality	X	
Noise	X	
Transportation	X	
Cultural Resources		X
Aesthetic (Visual) Resources		X
Recreation		X
Socioeconomic		X
Environmental Justice		X
HTRW		X

### **3.2.1 Wetlands**

#### Existing Conditions

The proposed project is located within the Mississippi River alluvial delta and sits at or below sea level. The majority of the habitat in the project area is wetlands. There are five major wetland types found within the project area including bottomland hardwood (BLH) forest, cypress swamp, shrub/scrub, and brackish and fresh/intermediate marsh. Along with these wetland types, there is also a large amount of open water along the Federal levee system in the form of shallow borrow pits and canals.

All of the areas of BLH forest are located within the protected side of the flood protection with the majority located in LPV 148. BLH forests are considered to be significant because of their economic value for forest products and their wildlife habitat value. They are also considered to be significant because of their wetland characteristics. BLH forests are productive ecosystems that depend on water fluctuations for the maintenance of their structure and function. Almost all of the BLH in the area has been protected by levees, drained by pumping for a number of years, and has lost much of its non-habitat wetland value and functions. Although wetland values may be significantly lost when these forests are drained, this does not mean that the wildlife habitat value becomes insignificant.

The area of St. Bernard Parish between the Federal and non-federal levee systems, known as the CWA, consists of an old cypress swamp that has almost completely converted into brackish marsh and open water due to cypress logging in the early 1900s, hydrologic alterations such as canal dredging, saltwater intrusion, and subsidence, see figure 24. There are a few small pockets of living cypress trees along the non-federal levee. In LPV 145 and a portion of LPV 146, the flood side of the levee is bordered by the MRGO, and no alternatives are being considered that would encroach upon this waterway. On the protected side, there are several borrow pits and varying wetland types, including brackish marsh and shrub/scrub habitat, located in the old spoil spank from the creation

and dredging of the MRGO. Along the portion of LPV 146 from the MRGO to Highway 46 and LPV 147, the wetland areas consist of scrub/shrub habitat. The final section of the Federal levee along LPV 148 consists of brackish marsh on the flood side and bottomland hardwood, pastureland, and urban development on the protected side.

Wetland information contained in table 10 for the proposed action is based on USFWS data that was quantified and classified through the use of Habitat Assessment Methodology (HAM) and Wetland Value Assessment (WVA). All wetland acreage information for the remaining alternatives is based on data obtained from the USGS. The USGS data is based on 2000 Louisiana Coastal Habitat data.

**Table 10: Wetland Impacts for the Proposed Action and Alternatives by LPV (acres)**

	<b>Fresh Marsh</b>	<b>Intermediate Marsh</b>	<b>Brackish Marsh</b>	<b>Shrub/Scrub Wetland</b>	<b>Forested Wetland</b>	<b>Total Wetland</b>	<b>Open Water</b>	<b>Upland</b>
<b>LPV 145</b>								
Proposed Action	0	0.08	87.86	0	0	87.94	11	332
Alternative 2	13	0	0	128	0	141	34	549
Alternative 3	1	0	0	0	0	1	1	197
Alternative 4	10	0	0	125	0	135	67	497
<b>LPV 146</b>								
Proposed Action	0	60.02	181.98	0	6.33	248.33	21	436
Alternative 2	56	0	0	133	0	189	24	627
Alternative 3	0	0	0	1	0	1	7	248
Alternative 4	39	0	0	126	0	165	20	433
<b>LPV 147</b>								
Proposed Action	0	0	0	0	0.5	0.5	0	8
Alternative 2	7	0	0	0	0	7	1	15
<b>LPV 148</b>								
Proposed Action	46.45	53.2	0	0	66.8	166.45	18	305
Alternative 2	2	285	0	7	52	346	101	382
Alternative 3	0	48	0	2	0	50	33	190
Alternative 4	1	209	0	5	11	226	135	347

## Discussion of Impacts

### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Therefore, there is less of a risk for intertidal marsh areas continuing to be affected by natural forces such as wind, tidal fluctuation, and wave action than under existing conditions. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 400 acres of various wetland habitats are located within the existing right-of-way and would be potentially impacted by construction activities.

### LPV 145

#### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Wetlands*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. The T-wall structure would be constructed on the existing earthen levee and 0.08 acres of intermediate marsh habitat and 87.86 acres brackish marsh habitat located within the existing ROW could be potentially impacted through the placement of fill material under the proposed action.

##### *Indirect Impacts to Wetlands*

Potential indirect impacts on wetlands from the proposed action would consist mainly of effects from increased turbidity on the wetland areas along the MRGO, as well as pocket wetland areas along the MRGO levee and the larger CWA from construction related runoff. These impacts would be minimized with Best Management Practices (BMPs) and compliance with regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and those along the MRGO are part of the larger Lake Borgne watershed. The potential indirect, adverse impacts to the wetlands from the proposed action could be minimized by the small area affected relative to the size of the wetland areas associated with the CWA and Lake Borgne and the temporary nature of these impacts.

##### *Cumulative Impacts to Wetlands*

Potential cumulative impacts on the wetlands within the project area from the proposed action could involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The MRGO Operation and Maintenance EIS focused on the elimination of maintenance dredging along the MRGO and related affects to the wetland communities along the channel. Projects such as the CWPPRA PO-01 and PO-08 for wetland restoration and PO-30 for shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; MRGO Ecosystem Restoration; as well as other wetland restoration projects completed by community groups could positively impact the habitat within the CWA and Lake Borgne. While the unavoidable impacts associated with proposed action

project activities could permanently impact wetlands within the project area, these impacts would be mitigated.

#### Alternative 2 for LPV 145 Earthen Levee

##### *Direct Impacts to Wetlands*

Alternative 2 could potentially impact approximately 13 acres of fresh marsh and 128 acres of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 2.

##### *Indirect Impacts to Wetlands*

With the implementation of alternative 2, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger acreage of disturbance from this alternative (table 10). Alternative 2 would have a larger footprint than the proposed action and would impact approximately 53 more acres of various wetland habitats.

##### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 could result in greater unavoidable direct loss of wetland habitat. Alternative 2 has a larger footprint resulting in increased impacts as well as a longer construction duration which could result in additional runoff and associated impacts.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Wetlands*

Alternative 3 would potentially impact approximately 1 acre of fresh marsh wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 3.

##### *Indirect Impacts to Wetlands*

With the implementation of alternative 3, indirect impacts to wetlands from increased turbidity would be similar to, but less than, those described under the proposed action due to the smaller acreage of disturbance from this alternative (table 10). Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 86 less acres of various wetland habitats.

##### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of wetland habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Wetlands*

Alternative 4 would potentially impact approximately 10 acres of fresh marsh and 125 acres of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with this alternative.

*Indirect Impacts to Wetlands*

With the implementation of alternative 4, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger acreage of disturbance from this alternative (table 10). Alternative 4 would have a larger footprint than the proposed action and would impact approximately 47 more acres of various wetland habitats.

*Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of wetland habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration which could result in additional runoff and associated impacts.

LPV 146

Proposed Action for LPV 146 T-wall on Existing Levee

*Direct Impacts to Wetlands*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. The T-wall structure would be constructed on the existing earthen levee and 60.02 acres of intermediate marsh, 181.98 acres of brackish marsh, and 6.33 acres of forested wetland habitat located within the existing ROW would be potentially impacted through the placement of fill material under the proposed action.

*Indirect Impacts to Wetlands*

Potential indirect impacts on wetlands from the proposed action would consist mainly of effects from increased turbidity to the wetland areas along the MRGO as well as pocket wetland areas within the spoil bank and the larger CWA from construction related runoff. However, these impacts would be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and those along the MRGO are part of the larger Lake Borgne watershed. The potential indirect adverse impacts to the wetlands from the proposed action would be minimized by the small area affected relative to the size of the wetland areas associated with the CWA and Lake Borgne and the temporary nature of these impacts.

### *Cumulative Impacts to Wetlands*

Potential cumulative impacts on the wetlands within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The MRGO Operation and Maintenance EIS focused on the elimination of maintenance dredging along the MRGO and related affects to the wetland communities along the channel. Projects such as CWPPRA PO-01 and PO-08, wetland restoration and PO-24, hydrologic restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; MRGO Ecosystem Restoration; as well as other wetland restoration projects completed by community groups would positively impact the habitat within the CWA and Lake Borgne. While, the actions associated with the proposed action could permanently impact wetlands within the project area, these impacts would be mitigated.

#### Alternative 2 for LPV 146 Earthen Levee

##### *Direct Impacts to Wetlands*

Alternative 2 would potentially impact approximately 56 acres of fresh marsh and 133 acres of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 2.

##### *Indirect Impacts to Wetlands*

With the implementation of alternative 2, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger acreage of disturbance from this alternative (table 10). Alternative 2 would have a larger footprint than the proposed action; however, it would impact approximately 59 fewer acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of wetland habitat. Alternative 2 would have a larger footprint than the proposed action, which would cause increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts.

#### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Wetlands*

Alternative 3 would potentially impact approximately 1 acre of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 3.

### *Indirect Impacts to Wetlands*

With the implementation of alternative 3, indirect impacts to wetlands from increased turbidity would be similar to, but less than, those described under the proposed action due to the smaller acreage of disturbance from this alternative (table 10). Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 247 less acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of wetland habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts

### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Wetlands*

Alternative 4 would potentially impact approximately 39 acres of fresh marsh and 126 acres of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 4.

#### *Indirect Impacts to Wetlands*

With the implementation of alternative 4, indirect impacts to wetlands from increased turbidity would be similar to, but less than, those described under the proposed action due to the smaller acreage of disturbance from this alternative (table 10). Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 83 less acres of various wetland habitats.

#### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in fewer unavoidable direct losses of wetland habitat. Alternative 4 would have a larger footprint than the proposed action; however, the amount of direct wetland impacts would be approximately 13 acres less than the proposed action.

### LPV 147

#### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct Impacts to Wetlands*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up 2000 feet in length parallel to

Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The T-wall structure would be constructed on the existing earthen levee and 0.5 acres of forested wetland habitat located within the existing ROW would be potentially impacted through the placement of fill material under the proposed action.

#### *Indirect Impacts to Wetlands*

Potential indirect impacts on wetlands from the proposed action would consist mainly of effects from increased turbidity to the wetland areas along the flood-side of LPV 147 as well as pocket wetland areas within the spoil bank and the larger CWA from construction related runoff. However, these impacts would be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and those along the flood-side of LPV 147 are part of the larger Lake Borgne watershed. The potential indirect adverse impacts to the wetlands from the proposed action would be minimized by the small area affected relative to the size of the wetland areas associated with the CWA and Lake Borgne and the temporary nature of these impacts.

#### *Cumulative Impacts to Wetlands*

Potential cumulative impacts on the wetlands within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The MRGO Operation and Maintenance EIS focused on the elimination of maintenance dredging along the MRGO and related affects to the wetland communities along the channel. Projects such as CWPPRA PO-01 and PO-08, wetland restoration and PO-24, hydrologic restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; MRGO Ecosystem Restoration; as well as other wetland restoration projects completed by community groups could positively impact the habitat within the CWA and Lake Borgne. While, the actions associated with the proposed action would permanently impact wetlands within the project area, these impacts would be mitigated.

#### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct Impacts to Wetlands*

Alternative 2 would potentially impact approximately 7 acres of fresh marsh wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 2.

#### *Indirect Impacts to Wetlands*

With the implementation of alternative 2, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger area of disturbance from this alternative (table 10). Alternative 2 would have a larger footprint than the proposed action and would impact approximately 6 more acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of wetland habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts.

### LPV 148

#### Proposed Action for LPV 148 T-wall on Existing Levee

##### *Direct Impacts to Wetlands*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. The T-wall structure would be constructed on the existing earthen levee and 46.45 acres of fresh marsh, 53.2 acres of intermediate marsh, and 66.8 acre of forested wetlands located within the existing ROW would potentially be impacted through the placement of fill material under the proposed action.

##### *Indirect Impacts to Wetlands*

Potential indirect impacts on wetlands from the proposed action would consist mainly of effects from increased turbidity to the wetland areas in the Lake Lery marsh on the flood side area and also the drainage canals that parallel both sides of the levee from construction related runoff. However, these impacts would be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger Caernarvon and Lake Lery marsh area. The potential indirect adverse impacts to the wetlands and the drainage canals from the proposed action would be minimized by the small area affected relative to the size of the wetland areas associated with the Caernarvon and Lake Lery marsh and the temporary nature of these impacts.

##### *Cumulative Impacts to Wetlands*

Potential cumulative impacts on the wetlands within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. Projects such as CWPPRA BS-03a and BS-16, outfall management; the Caernarvon freshwater diversion project; as well as other wetland restoration projects completed by community groups would positively impact the habitat within the Caernarvon and Lake Lery marsh area. While the actions associated with the proposed action would permanently impact wetlands within the project area, these impacts would be mitigated. Along with the mitigation for direct impacts, the overall size of the wetland areas within the project area and all of the restoration projects would partially offset the anticipated impacts.

## Alternative 2 for LPV 148 Earthen Levee

### *Direct Impacts to Wetlands*

Alternative 2 would potentially impact approximately 2 acres of fresh marsh, 285 acres of intermediate marsh, 7 acres of shrub/scrub wetlands, and 52 acres of forested wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 2.

### *Indirect Impacts to Wetlands*

With the implementation of alternative 2, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger area of disturbance from this alternative (table 10). Alternative 2 would have a larger footprint than the proposed action and would impact approximately 180 more acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of wetland habitat. Alternative 2 would have a larger footprint, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts.

## Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Wetlands*

Alternative 3 would potentially impact approximately 48 acres of intermediate marsh and 2 acres of shrub/scrub wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 3.

### *Indirect Impacts to Wetlands*

With the implementation of alternative 3, indirect impacts to wetlands from increased turbidity would be similar to, but less than, those described under the proposed action due to the smaller area of disturbance from this alternative (table 10). Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 116 less acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of wetland habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts.

## Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

### *Direct Impacts to Wetlands*

Alternative 4 would potentially impact approximately 1 acre of fresh marsh, 209 acres of intermediate marsh, 5 acres of shrub/scrub wetlands, and 11 acres of forested wetlands. There would be a permanent loss of some existing wetlands because of additional ROW requirements and construction activities associated with alternative 4.

### *Indirect Impacts to Wetlands*

With the implementation of alternative 4, indirect impacts to wetlands from increased turbidity would be similar to, but greater than, those described under the proposed action due to the larger area of disturbance from this alternative (table 10). Alternative 4 would have a larger footprint than the proposed action and would impact approximately 60 more acres of various wetland habitats.

### *Cumulative Impacts to Wetlands*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of wetland habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts.

## **3.2.2 Upland Communities**

### Existing Conditions

The upland vegetation within the project area is located within the developed areas between the Mississippi River and the non-Federal levee system. The only upland areas located within the Federal levee system corridors are the levees themselves. The Federal levee corridors are primarily maintained turf grasses consisting of Bahia grass (*Paspalum notatum*) with occasional pockets of natural vegetation along the interface between the maintained levee and wetland areas. These pockets include several tree species including sugarberry/hackberry (*Celtis laevigata*), tallowtree (*Triadica sebifera*), and American elm (*Ulmus americana*). While a large percentage of the upland area is developed, there are several substantial pockets of undeveloped lands either in use as pasture or wooded. The wooded areas consist of sugarberry, American elm, red maple (*Acer rubrum*), water oak (*Quercus nigra*), and live oak (*Quercus virginiana*) in the upperstory. The midstory and herb layers include elderberry (*Sambucus canadensis*), common privet (*Ligustrum vulgare*), trumpet creeper (*Campsis radicans*), tallowtree, poison ivy (*Toxicodendron radicans*), and various grass species.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. These areas would be subject to a lesser risk for temporary impacts than under existing conditions.

These temporary impacts include mainly flooding from the inundation of brackish water during a storm event, which would result in some of the vegetation suffering stress or mortality. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 1,081 acres of various upland habitats are located within the existing right-of-way and would be temporarily lost to wildlife mainly during construction.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to Upland Communities*

The proposed action would impact approximately 328 acres of pasture/maintained turf grass and four acres of upland shrub/scrub habitat within the existing ROW. This would result in temporary and permanent impacts to upland habitat due to the raising of the levees and installation of T-wall structures. These impacts would be temporary, as the slopes of the new levee and ROW would be replanted and allowed to revegetate following completion of construction. Construction of impermeable surfaces from the construction of the T-wall would result in permanent loss of upland habitat.

###### *Indirect Impacts to Upland Communities*

Potential indirect impacts on upland communities from the proposed action would involve the temporary removal of expanses of turf grass that comprise the levee from the immediate project area during construction. Pockets of upland shrub/scrub habitat would also be cleared to allow for staging areas and other construction related activities. After construction is complete, the levees would be reseeded and the pasture/maintained turf grass habitat would be restored. Areas within the ROW, but not maintained by grass cutting, would reestablish as upland shrub/scrub habitat in just a few years. Therefore, any indirect impacts to upland habitat with the proposed action would be temporary.

###### *Cumulative Impacts to Upland Communities*

Potential cumulative impacts on the upland communities within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. Most of the upland habitat that would be impacted is frequently mowed turf grass that covers the ROWs along the HSDRRS throughout the area. These impacts would be temporary and a majority of the upland habitat would be restored after construction activities are completed. While the combination of all the IER projects would remove a large amount of upland shrub/scrub and pasture habitat, there are fairly large pockets of these habitats within the overall area including the MRGO spoil bank that would benefit from the increased hurricane and storm damage risk reduction and reduced erosion impacts the HSDRRS would provide.

## Alternative 2 for LPV 145 Earthen Levee

### *Direct Impacts to Upland Communities*

Alternative 2 would impact approximately 473 acres of pasture/maintained turf grass, 69 acres of upland shrub/scrub, and 7 acres of upland forest habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats, including upland shrub/scrub and forested habitat, would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

### *Indirect Impacts to Upland Communities*

With the implementation of alternative 2, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 217 more acres of various upland habitats.

### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain upland habitat types. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

## Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Upland Communities*

Alternative 3 would impact approximately 193 acres of pasture/maintained turf grass and 4 acres of upland shrub/scrub habitat within the existing ROW and the proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat, would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

### *Indirect Impacts to Upland Communities*

With the implementation of alternative 3, indirect impacts to upland communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 135 less acres of various upland habitats.

### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain upland habitat types. Alternative 3 would have a smaller footprint than the proposed action, which would result in fewer impacts as well as a smaller area being converted to pasture/maintained turf grass habitat.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Upland Communities*

Alternative 4 would impact approximately 439 acres of pasture/maintained turf grass, 53 acres of upland shrub/scrub, and 5 acres of upland forest habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats, including upland shrub/scrub and forested habitat, would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

#### *Indirect Impacts to Upland Communities*

With the implementation of alternative 4, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 165 more acres of various upland habitats.

### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of certain upland habitat types. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct Impacts to Upland Communities*

The proposed action would impact approximately 431 acres of pasture/maintained turf grass and 5 acres of upland shrub/scrub habitat within the existing ROW, which would result in temporary and permanent impacts to upland habitat due to the raising of the levees and installation of T-wall structures. These impacts would be temporary, as the slopes of the new levee and ROW would be replanted and allowed to revegetate following completion of construction. Construction of impermeable surfaces from the construction of the T-wall would result in permanent loss of upland habitat.

### *Indirect Impacts to Upland Communities*

Potential indirect impacts on upland communities from the proposed action would involve the temporary removal of expanses of turf grass that comprise the levee from the immediate project area during construction. Pockets of upland shrub/scrub habitat would also be cleared to allow for staging areas and other construction related activities. After construction is complete, the levees would be reseeded and the pasture/maintained turf grass habitat would be restored. Areas within the ROW, but not maintained by grass cutting, would reestablish as upland shrub/scrub habitat in just a few years. Therefore, any indirect impacts to upland habitat with the proposed action would be temporary in nature.

### *Cumulative Impacts to Upland Communities*

Potential cumulative impacts on the upland communities within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. Most of the upland habitat that would be impacted is frequently mowed turf grass that covers the ROWs along the HSDRRS throughout the area. These impacts would be temporary and a majority of the upland habitat would be restored after construction activities are completed. While the combination of all the IER projects could remove a large amount of upland shrub/scrub and pasture habitat, there are fairly large pockets of these habitats within the overall area including the MRGO spoil bank that would benefit from the increased risk reduction and reduced erosion impacts the HSDRRS would provide.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Upland Communities*

Alternative 2 would impact approximately 603 acres of pasture/maintained turf grass and 24 acres of upland shrub/scrub habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

#### *Indirect Impacts to Upland Communities*

With the implementation of alternative 2, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 191 more acres of various upland habitats.

#### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain upland habitat types. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct Impacts to Upland Communities*

Alternative 3 would impact approximately 244 acres of pasture/maintained turf grass and 4 acres of upland shrub/scrub habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

*Indirect Impacts to Upland Communities*

With the implementation of alternative 3, indirect impacts to upland communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 188 less acres of various upland habitats.

*Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain upland habitat types. Alternative 3 would have a smaller footprint than the proposed action, which would result in fewer impacts as well as a smaller area being converted to pasture/maintained turf grass habitat.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Upland Communities*

Alternative 4 would impact approximately 427 acres of pasture/maintained turf grass and 6 acres of upland shrub/scrub habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

*Indirect Impacts to Upland Communities*

With the implementation of alternative 4, indirect impacts to upland communities would be similar to those described under the proposed action. Alternative 4 would have a slightly smaller footprint than the proposed action and would impact approximately 3 less acres of various upland habitats.

### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in fewer unavoidable direct losses of certain upland habitat types. Alternative 4 would have a larger footprint than the proposed action; however, the amount of direct upland habitat impacts would be approximately 3 acres less than the proposed action.

### LPV 147

#### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

##### *Direct Impacts to Upland Communities*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up to 2000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. Approximately three acres of upland scrub/shrub located south of Highway 46 could be potentially impacted by the access road. The T-wall structure would be constructed on the existing earthen levee and approximately 5 acres of pasture/maintained turf grass habitat would be impacted. These impacts would be temporary as the slopes of the new levee and ROW would be replanted and allowed to revegetate following completion of construction. Construction of impermeable surfaces from the construction of the T-wall and access roadway would result in permanent impacts.

##### *Indirect Impacts to Upland Communities*

Potential indirect impacts on upland communities from the proposed action would involve the temporary removal of expanses of turf grass that comprise the levee from the immediate project area during construction. Pockets of upland shrub/scrub habitat would also be cleared to allow for staging areas and other construction related activities. After construction is complete, the levees would be reseeded and the pasture/maintained turf grass habitat would be restored. Areas within the ROW, but not maintained by grass cutting, would reestablish as upland shrub/scrub habitat in just a few years. Therefore, any indirect impacts to upland habitat with the proposed action would be temporary.

##### *Cumulative Impacts to Upland Communities*

Potential cumulative impacts on the upland communities within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. Most of the upland habitat impacted is frequently mowed turf grass that covers the ROWs along the HSDRRS throughout the area. These impacts would be temporary and a majority of the upland habitat would be restored after construction activities are completed. While the combination of all the IER projects would remove a large amount of upland shrub/scrub and pasture habitat, there are fairly large pockets of these habitats within the overall area including undeveloped areas along Bayou Road and Highway 46 that would benefit from the increased hurricane and storm damage risk reduction and reduced erosion impacts the HSDRRS would provide.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct Impacts to Upland Communities*

Alternative 2 would impact approximately 15 acres of pasture/maintained turf grass habitat within the existing ROW and proposed new ROW. There would be no permanent impacts to upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

*Indirect Impacts to Upland Communities*

With the implementation of alternative 2, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 7 more acres of various upland habitats.

*Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action for alternative 2. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

LPV 148

Proposed Action for LPV 148 T-wall on Existing Levee

*Direct Impacts to Upland Communities*

The proposed action would impact approximately 291 acres of pasture/maintained turf grass, 11 acres of upland shrub/scrub, and 3 acres of upland forest habitat within the existing ROW, which would result in temporary and permanent impacts to upland habitat due to the raising of the levees and installation of T-wall structures. These impacts would be temporary, as the slopes of the new levee and ROW would be replanted and allowed to revegetate following completion of construction. Construction of impermeable surfaces from the construction of the T-wall would result in permanent loss of upland habitat.

*Indirect Impacts to Upland Communities*

Potential indirect impacts on upland communities from the proposed action would involve the temporary removal of expanses of turf grass that comprise the levee from the immediate project area during construction. Pockets of upland shrub/scrub habitat would also be cleared to allow for staging areas and other construction related activities. After construction is complete, the levees would be reseeded and the pasture/maintained turf grass habitat would be restored. Areas within the ROW, but not maintained by grass cutting, would reestablish as upland shrub/scrub habitat in just a few years. Therefore, any indirect impacts to upland habitat with the proposed action would be temporary.

### *Cumulative Impacts to Upland Communities*

Potential cumulative impacts on the upland communities within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. Most of the upland habitat impacted is frequently mowed turf grass that covers the ROWs along the HSDRRS throughout the area. These impacts would be temporary and a majority of the upland habitat would be restored after construction activities are completed. While the combination of all the IER projects would remove a large amount of upland shrub/scrub and pasture habitat, there are fairly large pockets of these habitats within the overall area including undeveloped areas between LPV 148 and Bayou Road that would benefit from the increased hurricane and storm damage risk reduction and reduced erosion impacts the HSDRRS would provide.

#### Alternative 2 for LPV 148 Earthen Levee

##### *Direct Impacts to Upland Communities*

Alternative 2 would impact approximately 328 acres of pasture/maintained turf grass, 14 acres of upland shrub/scrub, and 40 acres of upland forest habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

##### *Indirect Impacts to Upland Communities*

With the implementation of alternative 2, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 77 more acres of various upland habitats.

#### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain upland habitat types. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

#### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Upland Communities*

Alternative 3 would impact approximately 180 acres of pasture/maintained turf grass, 4 acres of upland shrub/scrub, and 6 acres of upland forest habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be

replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats, including upland shrub/scrub and forested habitat, would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

#### *Indirect Impacts to Upland Communities*

With the implementation of alternative 3, indirect impacts to upland communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 115 less acres of various upland habitats.

#### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain upland habitat types. Alternative 3 would have a smaller footprint than the proposed action, which would result in fewer impacts as well as a smaller area being converted to pasture/maintained turf grass habitat.

#### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Upland Communities*

Alternative 4 would impact approximately 328 acres of pasture/maintained turf grass, 13 acres of upland shrub/scrub, and 6 acres of upland forest habitat within the existing ROW and proposed new ROW. While there would be no permanent impacts to some upland habitat types because turf grasses would be replanted and allowed to revegetate on the new levee slopes and expanded ROW, other upland habitats including upland shrub/scrub and forested habitat would be converted to pasture/maintained turf grass habitat. Conversion of wetland areas within the new ROW would increase the upland habitat within the project area.

#### *Indirect Impacts to Upland Communities*

With the implementation of alternative 4, indirect impacts to upland communities would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 42 more acres of various upland habitats.

#### *Cumulative Impacts to Upland Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of certain upland habitat types. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area being converted to pasture/maintained turf grass habitat.

### 3.2.3 Wildlife

#### Existing Conditions

The diversity and abundance of wildlife inhabiting the project area are dependent on the quality and extent of suitable habitats available. Terrestrial wildlife habitat along the MRGO consists principally of swamp (BLH and shrub/scrub) as well as upland shrub/scrub and herbaceous communities on higher ground created by dredge spoils deposited during construction of the waterways and fill deposited during construction of the levees. The vegetation communities in the areas along the levees and floodwalls consist mainly of planted grasses with herbs and scattered shrubs and small trees. The grass habitats along the levees are subject to periodic mowing and provide limited cover or other habitat components supportive of wildlife. Thus, habitats for terrestrial wildlife are present within the project area predominantly in swamp and shrub/scrub communities on the protected side of the levees and, in some places, between the levees and waterways. Another large area of terrestrial wildlife habitat is the area between Highway 46 and Bayou Road. While a fairly large portion of the area is developed, there remain several tracts of undeveloped land composed of BLH forest and upland shrub/scrub habitat. The majority of the project area is covered predominantly by brackish and saline marsh and open water, which provides habitat for aquatic and semi-aquatic wildlife, especially wading birds, waterbirds, and waterfowl.

Wildlife that typically inhabit terrestrial or brackish aquatic habitats such as those in the CWA and flood side of LPV 148 include a diverse assemblage of amphibians, reptiles, birds, and mammals. Species from each of these classes that may occur in the habitats of the project area can be identified based on the geographical ranges and habitat preferences of each species. An amphibian that may occur in these habitats is the Gulf Coast toad (*Bufo valliceps*). Reptiles that may utilize project area habitats include the American alligator (*Alligator mississippiensis*), Mississippi diamondback terrapin (*Malaclemys terrapin pileata*), common snapping turtle (*Chelydra serpentina*), green anole (*Anolis carolinensis*), Gulf salt marsh snake (*Nerodia clarkia clarkia*), marsh brown snake (*Storeria dekayi limnetes*), and rough green snake (*Opheodrys aestivus*) (Dundee and Rossman 1996). Sea turtles, which could occur in the open water habitats along the MRGO, are protected species discussed in section 3.2.6.

Mammals that may occur in the project area include the nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), swamp rabbit (*Sylvilagus aquaticus*), marsh rice rat (*Oryzomys palustris*), cotton mouse (*Peromyscus gossypinus*), golden mouse (*Ochrotomys nuttalli*), least shrew (*Cryptotis parva*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) (Lowery 1981).

Birds that may inhabit the project area include both nonmigratory residents of the region and migratory species that are present only part of the year. Nonmigratory species that may use these habitats include the anhinga (*Anhinga anhinga*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea Herodias*), great egret (*Ardea alba*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), black-crowned night heron (*Nycticorax nycticorax*), green heron (*Butorides virescens*), white ibis (*Eudocimus albus*), barred owl (*Strix varia*), downy woodpecker (*Picoides pubescens*), common crow (*Corvus brachyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), and northern cardinal (*Cardinalis cardinalis*). Migratory birds that may occur in the area only during the spring/summer breeding season include the Acadian flycatcher (*Empidonax virescens*) and barn swallow (*Hirundo rustica*). Migratory birds that may occur in the area only during winter include the gray catbird (*Dumetella carolinensis*), rusty blackbird

(*Euphagus carolinus*), swamp sparrow (*Melospiza georgiana*), song sparrow (*Melospiza melodia*), mallard (*Anas valisineria*), blue-winged teal (*Anas discors*), and diving ducks that winter in the open waters of the marsh, such as lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), canvasback (*Aythya valisineria*), and redhead (*Aythya Americana*) (Bull and Farrand 1993).

Another important species found within the project area is the bald eagle (*Haliaeetus leucocephalus*) which has recently been delisted by the USFWS as a protected species and is now protected under the Bald and Golden Eagle Protection Act. The bald eagle is the second largest North American bird of prey with an average 7-foot wingspan. It has a distinctive white head and white tail offset against a dark brown body and wings in adult birds. The bald eagle generally nests at the top of large trees, especially cypress snags in swamps, near open water bodies which are used for foraging. This habitat is found in abundance within the project area. The LDWF records search indicated that there are three bald eagle nests located within the project area. All bald eagle nests (active, inactive, or seemingly abandoned) are subject to protection and no major activities should occur within a 660-foot radius of a nest tree at any time. Close coordination with the USFWS will be required in the areas where hurricane and storm damage risk reduction activities will be within close proximity to these nest sites and any others that may be found within the project area.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade. The area would continue to be affected by the lack of 100-year risk reduction; however temporary impacts, mainly flooding from the inundation of brackish water during a storm event, would be less than under existing conditions. These impacts would potentially result in some of the vegetation suffering stress or mortality.

The existing ROW contains wildlife grazing habitat and any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 1,536 acres of terrestrial wildlife habitat within the footprint of the proposed Chalmette Loop HSDRRS would be potentially impacted and lost to wildlife such as small mammals, amphibians, reptiles, birds, and larger mammals.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of the proposed levees, approximately 465 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh areas to the east of the proposed

project area, which would provide suitable temporary habitat during construction.

The T-wall structure would pose an impenetrable barrier to wildlife movement in the project area, particularly in the immediate vicinity of the HSDRRS. Earthen ramps are being designed to facilitate the movement of terrestrial wildlife across the T-wall structure. The earthen ramps would allow terrestrial wildlife to cross the T-wall and access habitat on either side of the HSDRRS. Two earthen ramps would be constructed within LPV 145 ROW to facilitate wildlife movement.

#### *Indirect Impacts to Wildlife*

Potential indirect impacts on wildlife from the proposed action would involve the displacement of wildlife populations, predominantly birds or small mammals, which utilize the expanses of turf grass that comprise the levee from the immediate project area. Movement of the limited numbers of wildlife that currently inhabit the existing levee into nearby habitats, including the CWA and scrub/shrub habitat of the spoil bank, would not be expected to put added pressure on these large terrestrial and aquatic habitats. Therefore, the small populations and actual habitat impacted as well as the amount of adjacent, extensive surrounding habitat would minimize the potential indirect impacts associated with the proposed action.

#### *Cumulative Impacts to Wildlife*

Potential cumulative impacts on wildlife within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The displacement of the majority of terrestrial wildlife would be temporary during construction activities and most displaced wildlife would return following project completion. Most of the upland habitat impacted is frequently mowed turf grass of the ROWs along the HSDRRS throughout the area.

While the proposed action would create a permanent obstacle to the movement of terrestrial wildlife in the project area, overall impacts would be offset by earthen ramps, which would aid in the movement of terrestrial wildlife over the T-wall structure. These access structures would also offset impacts to wildlife from adjoining HSDRRS projects by providing an access point for wildlife movement. The extensive amount of available habitat adjacent to the proposed action would also minimize impacts by providing ample habitat to support terrestrial wildlife that might be displaced.

#### Alternative 2 for LPV 145 Earthen Levee

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 2, approximately 724 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, thus potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing

and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

#### *Indirect Impacts to Wildlife*

With the implementation of alternative 2, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 259 more acres of various wildlife habitats.

#### *Cumulative Impacts to Wildlife*

With the implementation of alternative 2, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 259 more acres of various wildlife habitats. However, there would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 3, approximately 199 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

#### *Indirect Impacts to Wildlife*

With the implementation of alternative 3, indirect impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 266 less acres of various wildlife habitats.

#### *Cumulative Impacts to Wildlife*

With the implementation of alternative 3, cumulative impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 266 less acres of various wildlife habitats. There would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 4, approximately 699 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

*Indirect Impacts to Wildlife*

With the implementation of alternative 4, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 234 more acres of various wildlife habitats.

*Cumulative Impacts to Wildlife*

With the implementation of alternative 4, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 234 more acres of various wildlife habitats. However, there would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

LPV 146

Proposed Action for LPV 146 T-wall on Existing Levee

*Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of the proposed levees, approximately 635 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh areas to the east of the proposed project area, which would provide suitable temporary habitat during construction.

The T-wall structure would pose an impenetrable barrier to wildlife movement in the project area, particularly in the immediate vicinity of the HSDRRS. Earthen ramps are being designed to facilitate the movement of terrestrial

wildlife across the T-wall structure. The earthen ramps would allow terrestrial wildlife to cross the T-wall and access habitat on either side of the HSDRRS. Two earthen ramps would be constructed within LPV 146 ROW to facilitate wildlife movement.

#### *Indirect Impacts to Wildlife*

Potential indirect impacts on wildlife from the proposed action would involve the displacement of wildlife populations, predominantly birds or small mammals, which utilize the expanses of turf grass that comprise the levee from the immediate project area. Movement of the limited numbers of wildlife that currently inhabit the existing levee into nearby habitats, including the CWA and scrub/shrub habitat of the spoil bank, would not be expected to put added pressure on these large terrestrial and aquatic habitats. Therefore, the small populations and actual habitat impacted as well as the amount of adjacent, extensive surrounding habitat would minimize the potential indirect impacts associated with the proposed action.

#### *Cumulative Impacts to Wildlife*

Potential cumulative impacts on wildlife within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The displacement of the majority of terrestrial wildlife would be temporary during construction activities and most displaced wildlife would return following project completion. Most of the upland habitat impacted is frequently mowed turf grass of the ROWs along the HSDRRS throughout the area.

While the proposed action would create a permanent obstacle to the movement of terrestrial wildlife in the project area, overall impacts would be offset by earthen ramps, which would aid in the movement of terrestrial wildlife over the T-wall structure. These access structures would also offset impacts to wildlife from adjoining HSDRRS projects by providing an access point for wildlife movement. The extensive amount of available habitat adjacent to the proposed action would also minimize impacts by providing ample habitat to support terrestrial wildlife that might be displaced.

#### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 2, approximately 840 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

### *Indirect Impacts to Wildlife*

With the implementation of alternative 2, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 205 more acres of various wildlife habitats.

### *Cumulative Impacts to Wildlife*

With the implementation of alternative 2, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 205 more acres of various wildlife habitats. However, there would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 3, approximately 256 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

### *Indirect Impacts to Wildlife*

With the implementation of alternative 3, indirect impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 379 less acres of various wildlife habitats.

### *Cumulative Impacts to Wildlife*

With the implementation of alternative 3, cumulative impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 379 less acres of various wildlife habitats. There would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 4, approximately 618 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

*Indirect Impacts to Wildlife*

With the implementation of alternative 4, indirect impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 17 less acres of various wildlife habitats.

*Cumulative Impacts to Wildlife*

With the implementation of alternative 4, cumulative impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 17 less acres of various wildlife habitats. There would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Wildlife*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate, would be anticipated to occur within the existing ROW. An access road of up 2000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The T-wall structure would be constructed on the existing earthen levee and approximately 15 acres of various terrestrial habitat types would be impacted. These impacts would be temporary as the slopes of the new levee and ROW would be replanted and allowed to revegetate following completion of construction. Construction of impermeable surfaces from the construction of the T-wall would result in permanent impacts.

The T-wall structure would pose an impenetrable barrier to wildlife movement in the project area, and more importantly in the immediate vicinity of the HSDRRS. Earthen ramps were considered to facilitate the movement of terrestrial wildlife across the T-wall structure. Due to the short distance of this

LPV, no earthen ramps are being designed; however, the overpass would allow a travel corridor for wildlife allowing safe movement under Highway 46.

#### *Indirect Impacts to Wildlife*

Potential indirect impacts on wildlife from the proposed action would involve the displacement of wildlife populations, predominantly birds or small mammals, which utilize the expanses of turf grass that comprise the levee from the immediate project area. Movement of the limited numbers of wildlife that currently inhabit the existing levee into nearby habitats, including the CWA and scrub/shrub habitat of the spoil bank, would not be expected to put added pressure on these large terrestrial and aquatic habitats. Therefore, the small populations and actual habitat impacted as well as the amount of adjacent, extensive surrounding habitat would minimize the potential indirect impacts associated with the proposed action.

#### *Cumulative Impacts to Wildlife*

Potential cumulative impacts on wildlife within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The displacement of the majority of terrestrial wildlife would be temporary during construction activities and most displaced wildlife would return following project completion. Most of the upland habitat impacted is frequently mowed turf grass of the ROWs along the HSDRRS throughout the area.

While the proposed action would create a permanent obstacle to the movement of terrestrial wildlife in the project area, overall impacts would be offset by earthen ramps, which would aid in the movement of terrestrial wildlife over the T-wall structure. These access structures would also offset impacts to wildlife from adjoining HSDRRS projects by providing an access point for wildlife movement. The extensive amount of available habitat adjacent to the proposed action would also minimize impacts by providing ample habitat to support terrestrial wildlife that might be displaced.

#### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 2, approximately 37 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, thus potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction.

### *Indirect Impacts to Wildlife*

With the implementation of alternative 2, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 22 more acres of various wildlife habitats.

### *Cumulative Impacts to Wildlife*

With the implementation of alternative 2, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 22 more acres of various wildlife habitats.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of the proposed levees, approximately 421 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh areas to the east of the proposed project area, which would provide suitable temporary habitat during construction.

The T-wall structure would pose an impenetrable barrier to wildlife movement in the project area, particularly in the immediate vicinity of the HSDRRS. Earthen ramps are being designed to facilitate the movement of terrestrial wildlife across the T-wall structure. The earthen ramps would allow terrestrial wildlife to cross the T-wall and access habitat on either side of the HSDRRS. Two earthen ramps would be constructed within LPV 148 ROW to facilitate wildlife movement.

#### *Indirect Impacts to Wildlife*

Potential indirect impacts on wildlife from the proposed action would involve the displacement of wildlife populations, predominantly birds or small mammals, which utilize the expanses of turf grass that comprise the levee from the immediate project area. Movement of the limited numbers of wildlife that currently inhabit the existing levee into nearby habitats, including the Lake Lery marsh area and scrub/shrub and forest habitat along Bayou Road, would not be expected to put added pressure on these large terrestrial and aquatic habitats. Therefore, the small populations and actual habitat impacted as well as the amount of adjacent, extensive surrounding habitat would minimize the potential indirect impacts associated with the proposed action.

### *Cumulative Impacts to Wildlife*

Potential cumulative impacts on wildlife within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. The displacement of the majority of terrestrial wildlife would be temporary during construction activities and most displaced wildlife would return following project completion. Most of the upland habitat that would be impacted is frequently mowed turf grass of the ROWs along the HSDRRS throughout the area.

While the proposed action would create a permanent obstacle to the movement of terrestrial wildlife in the project area, overall impacts would be offset by earthen ramps, which would aid in the movement of terrestrial wildlife over the T-wall structure. These access structures would also offset impacts to wildlife from adjoining HSDRRS projects by providing an access point for wildlife movement. The extensive amount of available habitat adjacent to the proposed action would also minimize impacts by providing ample habitat to support terrestrial wildlife that might be displaced.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 2, approximately 833 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

#### *Indirect Impacts to Wildlife*

With the implementation of alternative 2, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 412 more acres of various wildlife habitats.

#### *Cumulative Impacts to Wildlife*

With the implementation of alternative 2, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 412 more acres of various wildlife habitats. However, there would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

*Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 3, approximately 274 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, thus potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

*Indirect Impacts to Wildlife*

With the implementation of alternative 3, indirect impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 147 less acres of various wildlife habitats.

*Cumulative Impacts to Wildlife*

With the implementation of alternative 3, cumulative impacts to wildlife species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 147 less acres of various wildlife habitats. There would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Wildlife*

Terrestrial wildlife habitat within the footprint of alternative 4, approximately 711 acres of various habitat types, would be temporarily lost to wildlife mainly during construction. Increases in noise, traffic, and lighting levels would also temporarily affect wildlife species in the area, thus potentially increasing stress to these species. Some smaller, less mobile wildlife, such as small mammals, amphibians, and reptiles, would likely experience direct mortality during clearing and grading activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate construction area, perhaps relocating to the nearby forested or marsh area, which would provide suitable temporary habitat during construction. This alternative would not pose an impenetrable barrier to wildlife movement in the project area.

*Indirect Impacts to Wildlife*

With the implementation of alternative 4, indirect impacts to wildlife species would be similar to, but greater than, those described under the proposed action.

Alternative 4 would have a larger footprint than the proposed action and would impact approximately 290 more acres of various wildlife habitats.

#### *Cumulative Impacts to Wildlife*

With the implementation of alternative 4, cumulative impacts to wildlife species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 290 more acres of various wildlife habitats. However, there would be no permanent obstacle to the movement of terrestrial wildlife in the project area with implementation of this alternative.

### **3.2.4 Essential Fish Habitat**

#### Existing Conditions

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSFCMA) established a definition of Essential Fish Habitat (EFH). EFH are “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity”. The MSFCMA also established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. EFH is publicly significant because of the high value that the public places on the seafood and the recreational and commercial opportunities EFH provides. Specific categories of EFH include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (sea grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). EFH may include both water column and benthic habitats that support the different life stages of managed fishery resources.

The *Gulf of Mexico Fishery Management Plan* (FMP) designates the fresh, estuarine, and marine waters in St. Bernard Parish as EFH. These habitat types include open waters, bottom substrates, and intertidal marshes of Lake Borgne which are considered EFH under the estuarine component. The primary categories of EFH occurring in the project area include the open water with mud bottoms of abandoned borrow pits and emergent marsh (both marsh edge and inner marsh) associated with the CWA and flood side habitats. Several fisheries species are managed under the FMP occurring in St. Bernard Parish or adjoining waters including brown shrimp, white shrimp, red drum, gray snapper, and Spanish mackerel. In addition, coastal wetlands provide nursery and foraging habitat that supports economically important marine fishery species such as spotted sea trout, southern flounder, Atlantic croaker, gulf menhaden, striped mullet, and blue crab. These species serve as prey for federally managed fish species such as mackerels, snappers, groupers, billfishes, and sharks.

#### Discussion of Impacts

##### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. The intertidal marsh areas that contain the EFH would remain at risk from natural forces such as wind, tidal fluctuation, and wave action; however, these impacts would be reduced from the level experienced under existing conditions. The existing water quality within the CWA and the project area as a whole, discussed in further detail in section

3.2.7, is greatly affected by nonpoint source pollution due in large part to the fact that after any rain event, storm water from St. Bernard parish is pumped into the area.

Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 195 acres of open water and emergent marsh habitat are located within the existing right-of-way and would be potentially impacted by construction activities.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to Essential Fish Habitat*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 11 acres of open water habitat located within this ROW. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

###### *Indirect Impacts to Essential Fish Habitat*

Indirect impacts on EFH and EFH species may occur during construction due to changes in water characteristics and loss of marsh habitat. Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary. Most organisms would be expected to relocate from areas with unfavorable conditions until construction activities are complete.

###### *Cumulative Impacts to Essential Fish Habitat*

Potential cumulative impacts on EFH and EFH species within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-

01 and PO-08, wetland restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the EFH within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure of the MRGO at Bayou La Loutre, and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to EFH and EFH species throughout the project area.

#### Alternative 2 for LPV 145 Earthen Levee

##### *Direct Impacts to Essential Fish Habitat*

Alternative 2 would potentially impact approximately 34 acres of open water habitat and 13 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 2. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

##### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 2, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 36 more acres of various EFH.

##### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of EFH. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts to EFH and EFH species.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Essential Fish Habitat*

Alternative 3 would potentially impact approximately 1 acre of open water habitat and 1 acre of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 3. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 3, indirect impacts to EFH and EFH species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 9 less acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of EFH. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts to EFH and EFH species.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Essential Fish Habitat*

Alternative 4 would potentially impact approximately 67 acres of open water habitat and 10 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 4. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

#### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 4, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 66 more acres of various EFH.

#### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 could result in greater unavoidable direct loss of EFH. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be which could result in additional runoff and associated impacts to EFH and EFH species.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct Impacts to Essential Fish Habitat*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 21 acres of open water habitat and 46 acres

of emergent marsh habitat located within this ROW. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

#### *Indirect Impacts to Essential Fish Habitat*

Indirect impacts on EFH and EFH species may occur during construction due to changes in water characteristics and loss of marsh habitat. Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth, and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary. Most organisms would be expected to relocate from areas with unfavorable conditions until construction activities are complete.

#### *Cumulative Impacts to Essential Fish Habitat*

Potential cumulative impacts on EFH and EFH species within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the EFH within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure of the MRGO at Bayou La Loutre and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to EFH and EFH species throughout the project area.

## Alternative 2 for LPV 146 Earthen Levee

### *Direct Impacts to Essential Fish Habitat*

Alternative 2 would potentially impact approximately 24 acres of open water habitat and 56 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 2. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 2, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 13 more acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of EFH. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts to EFH and EFH species.

## Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Essential Fish Habitat*

Alternative 3 would potentially impact approximately 7 acres of open water habitat. There would be a permanent loss of some existing EFH as a result of additional ROW requirements and construction activities associated with alternative 3. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 3, indirect impacts to EFH and EFH species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 60 less acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of EFH. Alternative 3 would have a smaller footprint than the proposed action,

which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts to EFH and EFH species.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Essential Fish Habitat*

Alternative 4 would potentially impact approximately 20 acres of open water habitat and 39 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 4. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

*Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 4, indirect impacts to EFH and EFH species would be similar to, but less than, those described under the proposed action. Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 8 less acres of various EFH.

*Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in fewer unavoidable direct losses of EFH. Alternative 4 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the large amount of fill and earth moving involved would result in additional runoff and associated impacts to EFH and EFH species.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Essential Fish Habitat*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up 2,000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The T-wall structure would be constructed on the existing earthen levee and 2 acres of emergent marsh habitat located within the existing ROW would potentially be impacted through the placement of fill material under the proposed action.

*Indirect Impacts to Essential Fish Habitat*

Indirect impacts on EFH and EFH species may occur during construction due to changes in water characteristics and loss of marsh habitat. Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems,

dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth, and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary. Most organisms would be expected to relocate from areas with unfavorable conditions until construction activities are complete.

#### *Cumulative Impacts to Essential Fish Habitat*

Potential cumulative impacts on EFH and EFH species within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the EFH within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure of the MRGO at Bayou La Loutre and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to EFH and EFH species throughout the project area.

#### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct Impacts to Essential Fish Habitat*

Alternative 2 would potentially impact approximately 1 acre of open water habitat and 7 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH as a result of additional ROW requirements and construction activities associated with alternative 2.

#### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 2, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 6 more acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of EFH. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts to EFH and EFH species.

### LPV 148

#### Proposed Action for LPV 148 T-wall on Existing Levee

##### *Direct Impacts to Essential Fish Habitat*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 18 acres of open water habitat and 97 acres of emergent marsh habitat located within this ROW. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

##### *Indirect Impacts to Essential Fish Habitat*

Indirect impacts on EFH and EFH species may occur during construction due to changes in water characteristics and loss of marsh habitat. Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary. Most organisms would be expected to relocate from areas with unfavorable conditions until construction activities are complete.

##### *Cumulative Impacts to Essential Fish Habitat*

Potential cumulative impacts on EFH and EFH species within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects

throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the EFH within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure of the MRGO at Bayou La Loutre and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to EFH and EFH species throughout the project area.

#### Alternative 2 for LPV 148 Earthen Levee

##### *Direct Impacts to Essential Fish Habitat*

Alternative 2 would potentially impact approximately 101 acres of open water habitat and 287 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 2. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

##### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 2, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 273 more acres of various EFH.

##### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of EFH. Alternative 2 has a larger footprint resulting in increased impacts as well as a longer construction duration, which would result in additional runoff and associated impacts to EFH and EFH species.

#### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Essential Fish Habitat*

Alternative 3 would potentially impact approximately 33 acres of open water habitat and 48 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 3. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 3, indirect impacts to EFH and EFH species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 34 less acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of EFH. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts to EFH and EFH species.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

### *Direct Impacts to Essential Fish Habitat*

Alternative 4 would potentially impact approximately 135 acres of open water habitat and 210 acres of emergent marsh habitat. There would be a permanent loss of some existing EFH because of additional ROW requirements and construction activities associated with alternative 4. Although there would be permanent impacts on EFH and EFH species as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats.

### *Indirect Impacts to Essential Fish Habitat*

With the implementation of alternative 4, indirect impacts to EFH and EFH species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 230 more acres of various EFH.

### *Cumulative Impacts to Essential Fish Habitat*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of EFH. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts to EFH and EFH species.

## **3.2.5 Aquatic Communities**

### Existing Conditions

Aquatic habitats that occur within the project area include wetlands (fresh/intermediate, brackish, and salt marsh), open water, estuarine bottom (under open water), and submerged aquatic vegetation (SAV). The open water habitat includes over a dozen named bayous and their tributaries, the MRGO, and Lake Borgne. Water quality of

the open water resources is discussed in detail in section 3.2.7 and wetlands are discussed in section 3.2.1.

All of the aquatic communities in the project area play an important role in the cycling of nutrients and food energy through coastal ecosystems. These communities produce detritus that is transferred as food energy for higher trophic levels by way of zooplankton, bivalves, crustaceans, and small fish species. Some of the organisms that serve as intermediate stages of the food web utilize open water, benthic, epibenthic, and near shore habitats that occur within the vicinity of the project area. Many of the aquatic communities within in the study area are used and play a vital role for both the commercial seafood industry and recreational fishing.

Dominant motile benthic species likely to occur in the shallow fringes of these aquatic communities include serpulid worms (polychaetes), gastropods, such as the oyster drill (*Thais haemostoma*) and moon snail (*Polinices lewisii*), and crustaceans, such as the hermit crab (*Clibanarius vittatus*) and mud crabs (*Rhithropanopeus harrisi*, *Neopanope texana*, and *Panopeus herbstii*). Economically important crustacean species that occur throughout the project area include blue crabs (*Callinectes sapidus*), brown shrimp (*Litopenaeus setiferus*), and white shrimp (*Farfantepenaeus duorarum*). Other common invertebrates that may occur within the project area are bivalves, such as the common rangia (*Rangia cuneta*) and American Oyster (*Crassostrea virginica*). Another common species found throughout the project area occurring on hard surfaces, such as pilings, rock jetties, and other structures are acorn barnacles (*Balanus* sp.). Many of these species are dominant food items in the diet of numerous fish species.

SAV communities in the Lake Borgne Basin and adjacent waters are comprised primarily of widgeon grass (*Ruppia maritima*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), grassleaf mudplantain (*Heteranthera dubia*), Eurasian watermilfoil (*Myriophyllum spicatum*), wild celery (*Vallisneria americana*), and sago pondweed (*Potamogeton pectinatus*). There are several SAV beds located within the project study area along the non-federal levee within the CWA. These SAV beds are in poor condition due to water quality and consist almost exclusively of widgeon grass and a few single coontail plants.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. The intertidal marsh areas that contain the SAV would remain at risk from natural forces such as wind, tidal fluctuation, and wave action; however, these impacts would be reduced from the level experienced under existing conditions. The existing water quality within the CWA and the project area as a whole, discussed in further detail in section 3.2.7, is subject to nonpoint source pollution due in large part to the fact that after any rain event, storm water from St. Bernard parish is pumped into the area.

Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 195 acres of aquatic habitat, including SAV, are located within the existing right-of-way and would be potentially impacted by construction activities.

## LPV 145

### Proposed Action for LPV 145 T-wall on Existing Levee

#### *Direct Impacts to Aquatic Communities*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 11 acres of aquatic habitat located within this ROW. Although there would be permanent impacts on aquatic communities as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but are not limited to, the use of stacked hay bails, silt fences, mulching, and reseeded, use of buffer zones and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

Stormwater runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth, and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary.

#### *Cumulative Impacts to Aquatic Communities*

Potential cumulative impacts on the aquatic resources within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the aquatic habitat within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure

of the MRGO at Bayou La Loutre, and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to aquatic habitats and their associated species throughout the project area.

#### Alternative 2 for LPV 145 Earthen Levee

##### *Direct Impacts to Aquatic Communities*

Alternative 2 would require permanent filling of approximately 47 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeded, use of buffer zones and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

##### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 2, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 36 more acres of aquatic habitat.

##### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of aquatic habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be which could result in additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Aquatic Communities*

Alternative 3 would require permanent filling of approximately 2 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeded, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource,

where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 3, indirect impacts to aquatic communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 9 less acres of aquatic habitat.

#### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of aquatic habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

#### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Aquatic Communities*

Alternative 4 would require permanent filling of approximately 77 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 4, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 66 more acres of aquatic habitat.

#### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of aquatic habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct Impacts to Aquatic Communities*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 67 acres of aquatic habitat located within this ROW. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary.

#### *Cumulative Impacts to Aquatic Communities*

Potential cumulative impacts on the aquatic resources within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-24, hydrologic restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the aquatic habitat within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other

projects, including IER # 11, the closure of the MRGO at Bayou La Loutre, and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to aquatic habitats and their associated species throughout the project area.

#### Alternative 2 for LPV 146 Earthen Levee

##### *Direct Impacts to Aquatic Communities*

Alternative 2 would require permanent filling of approximately 80 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities as the result of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

##### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 2, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 13 more acres of aquatic habitat.

##### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of aquatic habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

#### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

##### *Direct Impacts to Aquatic Communities*

Alternative 3 would require permanent filling of approximately 7 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones and the collection and treatment of storm water runoff prior to discharge into an aquatic resource,

where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 3, indirect impacts to aquatic communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 60 less acres of aquatic habitat.

#### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of aquatic habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

#### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Aquatic Communities*

Alternative 4 would require permanent filling of approximately 59 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 4, indirect impacts to aquatic communities would be similar to, but less than, those described under the proposed action. Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 8 less acres of aquatic habitat.

#### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in fewer unavoidable direct losses of aquatic habitat. Alternative 4 would have a larger footprint than the proposed action; however, the amount of direct aquatic habitat impacts would be approximately 8 acres less than the proposed action. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct Impacts to Aquatic Communities*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up 2,000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The T-wall structure would be constructed on the existing earthen levee and 2 acres of aquatic habitat located within the existing ROW would potentially be impacted through the placement of fill material under the proposed action. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth, and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, resulting in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary.

#### *Cumulative Impacts to Aquatic Communities*

Potential cumulative impacts on the aquatic resources within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-24, hydrologic restoration and

PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the aquatic habitat within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects, including IER # 11, the closure of the MRGO at Bayou La Loutre, and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to aquatic habitats and their associated species throughout the project area.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct Impacts to Aquatic Communities*

Alternative 2 would require permanent filling of approximately eight acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeded, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

*Indirect Impacts to Aquatic Communities*

With the implementation of alternative 2, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 6 more acres of aquatic habitat.

*Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of aquatic habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits could occur from restoration projects detailed under the proposed action.

LPV 148

Proposed Action for LPV 148 T-wall on Existing Levee

*Direct Impacts to Aquatic Communities*

The proposed action would occur within the existing ROW and would require permanent filling of approximately 115 acres of aquatic habitat located within this ROW. Although there would be permanent impacts on aquatic communities

because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeded, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

#### *Indirect Impacts to Aquatic Communities*

Storm water runoff would result in increased nutrient loads or sedimentation to aquatic systems, dependent on the types and concentrations of constituents associated with the suspended materials. Significant concentrations of nutrients or sediments would cause decreases in survival, growth, and reproduction of aquatic organisms receiving sufficient exposure. In addition, re-suspension of soil particles would increase turbidity, which would result in impacts to both sessile and mobile aquatic species. Increases in turbidity physiologically affect aquatic resources (e.g., aquatic invertebrates, fish) through mechanical abrasion of surface membranes, delayed larval and embryonic development, reduced bivalve pumping rates, or interference with respiratory functions. In addition, fish would be affected behaviorally through interference with feeding for sight-foraging fish and area avoidance. Reduced visibility of predatory fish would also lower vulnerability to predation for prey species. Settling of soil particles over existing bottom sediments (if significant) would result in loss of habitat for sessile species of invertebrates and plants and would also disrupt oxygen transport mechanisms for many species. Effects such as those from construction activities would be minimized by the use of BMPs to control sediment transport. The area of temporarily impaired habitat would be fairly small compared to the remaining similar habitat in the project area and most indirect impacts would be temporary.

#### *Cumulative Impacts to Aquatic Communities*

Potential cumulative impacts on the aquatic resources within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration and PO-24, hydrologic restoration and PO-30, shoreline protection; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would reduce potential adverse cumulative impacts by positively affecting the aquatic habitat within the project area. While these restoration projects would help to offset habitat loss from the proposed action, the combined effects of other projects including IER # 11, the closure of the MRGO at Bayou La Loutre, and the Violet Diversion would result in altered hydrology and water characteristics throughout the project area. Changes in hydrology and water characteristics would lead to substantial long term cumulative impacts to aquatic habitats and their associated species throughout the project area.

## Alternative 2 for LPV 148 Earthen Levee

### *Direct Impacts to Aquatic Communities*

Alternative 2 would require permanent filling of approximately 388 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 2, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 273 more acres of aquatic habitat.

### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of aquatic habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

## Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Aquatic Communities*

Alternative 3 would require permanent filling of approximately 81 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 3, indirect impacts to aquatic communities would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 34 less acres of aquatic habitat.

### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of aquatic habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

### *Direct Impacts to Aquatic Communities*

Alternative 4 would require permanent filling of approximately 345 acres of aquatic habitat. Although there would be permanent impacts on aquatic communities because of project construction, the proposed mitigation, in combination with mitigation for intertidal wetland losses, would compensate for these impacts through the creation of habitats. BMPs would also be implemented to prevent sediment runoff during construction. These BMPs would include, but would not be limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into an aquatic resource, where appropriate. After construction is completed, the levees would revegetate and all storm related runoff would return to existing conditions.

### *Indirect Impacts to Aquatic Communities*

With the implementation of alternative 4, indirect impacts to aquatic communities would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 230 more acres of aquatic habitat.

### *Cumulative Impacts to Aquatic Communities*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of aquatic habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a longer construction duration. Consequently, there would be additional runoff and associated impacts. These impacts would be mitigated and additional positive benefits would occur from restoration projects detailed under the proposed action.

### **3.2.6 Threatened and Endangered Species**

#### Existing Conditions

In accordance with the provisions of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 USC 1531 et seq.), the CEMVN requested information on protected, proposed, and candidate species and critical habitat that may occur in the vicinity of IER # 10 from the USFWS. The USFWS responded in a letter 6 December 2007, which stated that no federally listed species were likely to be adversely affected by the proposed project.

The USFWS maintains lists of rare plants and wildlife known to be potentially present in each county of the United States. This list is based on historical siting records and existing preferred habitat. There are several species listed for St. Bernard Parish that have the potential to occur within the project area. These species include the brown pelican (*Pelecanus occidentalis*), the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), the Loggerhead sea turtle (*Caretta caretta*), and the West Indian manatee (*Trichechus manatus*). Along with the USFWS list, the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program, maintains its own electronic records of recorded sitings of threatened and endangered species within the state. Through close coordination with the LDWF, it has been verified that there is one threatened species known to occur within the project area: Gulf sturgeon. While there is a potential for the Loggerhead turtle to occur in the MRGO, the placement of the rock closure structure could prohibit the movement of the turtle into the portion of the MRGO within the project area.

#### Brown Pelican

The adult brown pelican is a large dark gray-brown water bird with white about the head and neck. Immatures are gray-brown above and on the neck, with white underparts. This species can reach up to 8 pounds and larger individuals have a wing spread of over 7 feet. Brown pelicans forage in shallow estuarine and inshore waters for fishes, especially menhaden, mullet, sardines, pinfish, and anchovies.

The brown pelican has a large range extending from North America to South America. The eastern brown pelican occurs in North Carolina, South Carolina, Florida, Louisiana, Mississippi, Texas, and in the Barrier Islands. Habitat of the brown pelican is mainly coastal and these birds are rarely seen inland or far out at sea. They typically feed in shallow estuarine waters less than 40 miles from shore. Pelicans make extensive use of sand spits, offshore sand bars, and islets. Dry roosting sites are essential and some roosting sites eventually may become nesting areas. Nests are usually located on coastal islands that are free of most predators (such as raccoons) and human disturbance, and are located on the ground or in small bushes and trees. Pelicans may shift between different breeding sites in response to changing food supply distributions and to erosion and flooding of nesting sites.

Brown pelican populations are extremely vulnerable to chemical/pesticide pollution, disturbance of nesting birds by humans, declining food sources, and increased turbidity. Human disturbance not only disrupts reproductive success, but may affect distribution patterns and age structure of pelicans using roosting sites. Habitat degradation affects both roosting and nesting patterns.

## Gulf Sturgeon

The Gulf sturgeon is typically found in saltwater habitats during the non-breeding period and in large freshwater rivers which empty into the Gulf of Mexico during the spawning season. Critical habitat for the species in Louisiana includes Lake Borgne which is adjacent to the project area.

The Biological Assessment (BA), "Impacts of Navigational Channel Dredging on the Gulf Sturgeon", dated March 15, 2001, reported that no recent catches or sightings of Gulf sturgeon within the MRGO have been found in available resources. Studies conducted in Louisiana coastal waters from 1990 to 1993 by the Louisiana Department of Wildlife and Fisheries and reports of incidental catches and sightings of sturgeon show that Gulf sturgeon exists within several coastal waterways in southeast Louisiana, including Lake Borgne.

The USFWS and NOAA Fisheries published a final rule on March 19, 2003, 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.

## Loggerhead Sea Turtle

The loggerhead sea turtle has a reddish brown carapace with a large, block like head. The turtle spends the majority of its life in marine open deep water and marine open shallow water, especially with submerged sea grass beds, salt marshes, bays, and tidal passes. Primarily found in the warm waters of the Atlantic basin, the turtle has been found throughout the coastal region of Louisiana, but has only been recorded nesting on the Chandeleur Islands.

The major threat to the Loggerhead sea turtle includes erosion of barrier islands critical for nesting, taking of eggs and young for human consumption, and incidental take of the turtles by fishing and shrimping gear.

## West Indian Manatee

The West Indian manatee is a large, slow-moving marine mammal found in lagoons, rivers, estuaries, and coastal areas along the east and west coasts of Florida. It feeds primarily on submergent, emergent, and floating vegetation. During colder winter months, manatees move south into southern Florida and the keys, and during warmer summer months, they move north and west in the Gulf of Mexico. Its range extends as far west on the Gulf of Mexico coast as Louisiana.

Collisions with powerboats or outboard propellers pose a significant threat to manatees. Watercraft collisions account for approximately 25 percent of all manatee deaths. Boats traveling faster than 15 mph are capable of injuring or killing a manatee. Manatees can also be injured or entangled in locks, flood control structures, and fishing nets.

## Discussion of Impacts

### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Therefore, there is a risk for intertidal marsh areas continuing to be affected by natural forces such as wind, tidal fluctuation, and wave action. However, these areas would be less susceptible to temporary impacts, mainly flooding, than under existing conditions.

Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the foraging habits and potentially increase stress to threatened and endangered species.

### LPV 145

#### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Threatened and Endangered Species*

The construction of the proposed action would not be likely to adversely affect federally or state listed threatened and endangered species, marine mammals, or migratory birds.

Implementation of the proposed action would have no effect on the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since none of the project would be constructed or encroach in the MRGO. All construction related activity, fill, and staging areas would be located to the protected side of the rock shoreline protection which runs along the bank of the MRGO and no activities would encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

##### *Indirect Impacts to Threatened and Endangered Species*

Potential indirect impacts on federally or state listed threatened and endangered species from the proposed action could mainly consist of temporary effects from siltation and suspended sediment in adjacent water bodies and increased noise levels from construction activities. Effects from construction activities associated with the proposed action would be minimized by BMPs to control sediment transport, adherence to regulations governing stormwater runoff at construction sites, and the temporary nature of noise impacts. Thus, indirect impacts on federally or state listed threatened and endangered species from the

proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

### *Cumulative Impacts*

Potential cumulative impacts on federally or state listed threatened and endangered species from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other HSDRRS projects throughout the area. These species are mobile and would avoid project areas during the construction period, and the displaced individuals would return to the temporarily impacted areas following project completion. The permanently impacted aquatic and wetland habitats would be relatively small pockets in the spoil bank and along the MRGO. Neither manatees, Loggerhead sea turtles, nor Gulf sturgeon would be anticipated to utilize the shallow water areas within the IER # 10 project area where construction activities would take place and extensive, similar aquatic and benthic habitat exists where the brown pelican, manatee, Loggerhead sea turtle, and Gulf sturgeon could forage or swim. Thus, cumulative impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

### Alternative 2 for LPV 145 Earthen Levee

#### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 2 could adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since a portion of the proposed ROW would encroach in the MRGO. There is the potential for construction related activity, fill, and staging areas to encroach beyond the rock shoreline protection which runs along the bank of the MRGO and possibly encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

#### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 2, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 259 more acres of overall land area.

### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and a reduced amount of potential breeding habitat being converted to HSDRRS use.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 3 would not likely adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since none of the project would be constructed or encroach in the MRGO. All construction related activity, fill, and staging areas would be located to the protected side of the rock shoreline protection, which runs along the bank of the MRGO, and no activities would encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 3, indirect impacts to threatened and endangered species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 266 less acres of overall land area.

### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain foraging habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in fewer impacts to foraging habitat and a reduced amount of potential breeding habitat being converted to HSDRRS use.

#### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 4 could adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since a portion of the proposed ROW would encroach in the MRGO. There is the potential for construction related activity, fill, and staging areas to encroach beyond the

rock shoreline protection, which runs along the bank of the MRGO, and possibly encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

#### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 4, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 234 more acres of overall land area.

#### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and a reduced amount of potential breeding habitat being converted to HSDRRS use.

### LPV 146

#### Proposed Action for LPV 146 T-wall on Existing Levee

##### *Direct Impacts to Threatened and Endangered Species*

The construction of the proposed action would not be likely to adversely affect federally or state listed threatened and endangered species, marine mammals, or migratory birds.

Implementation of the proposed action would have no effect on the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since none of the project would be constructed or encroach in the MRGO. All construction related activity, fill, and staging areas would be located to the protected side of the rock shoreline protection, which runs along the bank of the MRGO, and no activities would encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species.

Normal construction activities, including pile driving should not affect the brown pelican.

#### *Indirect Impacts to Threatened and Endangered Species*

Potential indirect impacts on federally or state listed threatened and endangered species from the proposed action would mainly consist of temporary effects from siltation and suspended sediment in adjacent water bodies and increased noise levels from construction activities. Effects from construction activities associated with the proposed action would be minimized by BMPs to control sediment transport, adherence to regulations governing stormwater runoff at construction sites, and the temporary nature of noise impacts. Thus, indirect impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

#### *Cumulative Impacts*

Potential cumulative impacts on federally or state listed threatened and endangered species from the proposed action would involve the combined adverse effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. These species are mobile and would avoid project areas during the construction period, and the displaced individuals would return to the temporarily impacted areas following project completion. The permanently impacted aquatic and wetland habitats would be relatively small pockets in the spoil bank and along the MRGO. Neither manatees, Loggerhead sea turtles, nor Gulf sturgeon would be anticipated to utilize the shallow water areas within the IER # 10 project area where construction activities would take place and extensive, similar aquatic and benthic habitat exists where the brown pelican, manatee, Loggerhead sea turtle, and Gulf sturgeon would forage or swim. Thus, cumulative impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

#### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 2 could adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since a portion of the proposed ROW would encroach in the MRGO. There is the potential for construction related activity, fill, and staging areas to encroach beyond the rock shoreline protection, which runs along the bank of the MRGO, and possibly encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species.

Normal construction activities, including pile driving should not affect the brown pelican.

*Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 2, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 205 more acres of overall land area.

*Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and an increased amount of potential breeding habitat being converted to HSDRRS use.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 3 would not be likely to adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since none of the project would be constructed or encroach in the MRGO. All construction related activity, fill, and staging areas would be located to the protected side of the rock shoreline protection, which runs along the bank of the MRGO and no activities would encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving, should not affect the brown pelican.

*Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 3, indirect impacts to threatened and endangered species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 379 less acres of overall land area.

*Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain foraging habitat. Alternative 3 would have a smaller footprint than the

proposed action, which would result in fewer impacts to foraging habitat and a reduced amount of potential breeding habitat being converted to HSDRRS use.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 4 could adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since a portion of the proposed ROW would encroach in the MRGO. There is the potential for construction related activity, fill, and staging areas to encroach beyond the rock shoreline protection, which runs along the bank of the MRGO and possibly encroach on the channel itself.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

*Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 4, indirect impacts to threatened and endangered species would be similar to, but less than, those described under the proposed action. Alternative 4 would have a smaller footprint than the proposed action and would impact approximately 17 less acres of overall land area.

*Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and an increased amount of potential breeding habitat being converted to HSDRRS use.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Threatened and Endangered Species*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up 2000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. The proposed action would have no effect on the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon

since none of the habitat being impacted within the existing ROW is open water or suitable to support these species.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

#### *Indirect Impacts to Threatened and Endangered Species*

Potential indirect impacts on federally or state listed threatened and endangered species from the proposed action would mainly consist of temporary effects from siltation and suspended sediment in adjacent water bodies and increased noise levels from construction activities. Effects from construction activities associated with the proposed action would be minimized by BMPs to control sediment transport, adherence to regulations governing stormwater runoff at construction sites, and the temporary nature of noise impacts. Thus, indirect impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

#### *Cumulative Impacts to Threatened and Endangered Species*

Potential cumulative impacts on federally or state listed threatened and endangered species from the proposed action would involve the combined adverse effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. These species are mobile and would avoid project areas during the construction period, and the displaced individuals would return to the temporarily impacted areas following project completion. The permanently impacted aquatic and wetland habitats would be relatively small pockets in the spoil bank and along the MRGO. Neither manatees, Loggerhead sea turtles, nor Gulf sturgeon would be anticipated to utilize the shallow water areas within the IER # 10 project area where construction activities could take place and extensive, similar aquatic and benthic habitat exists where the brown pelican, manatee, Loggerhead sea turtle, and Gulf sturgeon would forage or swim. Thus, cumulative impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

#### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 2 would not be likely to adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since none of the habitat that would be impacted within the additional ROW is open water or suitable to support these species.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

#### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 2, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 14 more acres of overall land area.

#### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and an increased amount of potential breeding habitat being converted to HSDRRS use.

### LPV 148

#### Proposed Action for LPV 148 T-wall on Existing Levee

##### *Direct Impacts to Threatened and Endangered Species*

The construction of the proposed action would not be likely to adversely affect federally or state listed threatened and endangered species, marine mammals, or migratory birds.

Implementation of the proposed action would have no effect on the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since there is no suitable habitat along LPV 148 that would be potentially accessed or utilized by these species. All construction related activity, fill, and staging areas would be located within the existing ROW.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

### *Indirect Impacts to Threatened and Endangered Species*

Potential indirect impacts on federally or state listed threatened and endangered species from the proposed action would mainly consist of temporary effects from siltation and suspended sediment in adjacent water bodies and increased noise levels from construction activities. Effects from construction activities associated with the proposed action would be minimized by BMPs to control sediment transport, adherence to regulations governing stormwater runoff at construction sites, and the temporary nature of noise impacts. Thus, indirect impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

### *Cumulative Impacts*

Potential cumulative impacts on federally or state listed threatened and endangered species from the proposed action would involve the combined adverse effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. These species are mobile and would avoid project areas during the construction period, and the displaced individuals would return to the temporarily impacted areas following project completion. The permanently impacted aquatic and wetland habitats are relatively small areas in the Caernarvon and Lake Lery marsh areas as well as the Jourda and Creedmore drainage canals. Neither manatees, Loggerhead sea turtles, nor Gulf sturgeon would be anticipated to utilize the shallow water areas within the IER # 10 project area where construction activities would take place and extensive, similar aquatic and benthic habitat exists where the brown pelican, manatee, Loggerhead sea turtle, and Gulf sturgeon could forage or swim. Thus, cumulative impacts on federally or state listed threatened and endangered species from the proposed action in the IER # 10 project area would be unlikely to have permanent adverse effects on these species.

### Alternative 2 for LPV 148 Earthen Levee

### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 2 would not be likely to adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since these species are unlikely to access the Jourda or Creedmore drainage canals which are surrounded by wetlands.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 2, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action and would impact approximately 412 more acres of overall land area.

### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 2 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and an increased amount of potential breeding habitat being converted to HSDRRS use.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

### *Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 3 would not adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since these species are unlikely to access the Jourda or Creedmore drainage canals which are surrounded by wetlands.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

### *Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 3, indirect impacts to threatened and endangered species would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action and would impact approximately 147 less acres of overall land area.

### *Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 3 would result in fewer unavoidable direct losses of certain foraging habitat. Alternative 3 would have a smaller footprint than the proposed action, which would result in fewer impacts to foraging habitat and a reduced amount of potential breeding habitat being converted to HSDRRS use.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Threatened and Endangered Species*

Implementation of alternative 4 would not be likely to adversely impact the West Indian manatee, Loggerhead sea turtle, or the Gulf sturgeon since these species are unlikely to access the Jourda or Creedmore drainage canals which are surrounded by wetlands.

Construction activities may have a temporary impact on foraging habitat. Increases in noise, traffic, and lighting levels would also temporarily affect the brown pelican foraging habits, thus potentially increasing stress to this species. However, given the high mobility of the brown pelican, the lack of nesting habitat at the proposed project location, and the abundance of foraging habitat in the vicinity of the project area, including the Biloxi Wildlife Management Area, the proposed action would not be likely to adversely affect this species. Normal construction activities, including pile driving should not affect the brown pelican.

*Indirect Impacts to Threatened and Endangered Species*

With the implementation of alternative 4, indirect impacts to threatened and endangered species would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action and would impact approximately 290 more acres of overall land area.

*Cumulative Impacts to Threatened and Endangered Species*

Cumulative impacts would be similar to those described under the proposed action; however, alternative 4 would result in greater unavoidable direct loss of certain foraging habitat. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts to foraging habitat and an increased amount of potential breeding habitat being converted to HSDRRS use.

### **3.2.7 Water Quality**

#### Existing Conditions

The water features in the study area consist of numerous interconnected water bodies of varying type and quality. There are numerous bayous within the study area hydrologically linking the associated wetlands to Lake Borgne and the two major man-made channels, the MRGO and the Gulf Intracoastal Waterway. The major source of freshwater into the area is from storm water runoff pumped out of the developed areas into the adjacent wetland areas. The major source of saltwater is the Gulf of Mexico through Lake Borgne. Due to the influx of storm water, salinity levels in the area can fluctuate substantially, but for the most part the area is brackish to saline habitat. The numerous bayous and canals make the area an important recreational area in terms of fishing and other water related activities. The area also supports commercial fishing and shrimping activities.

## Surface Water

The study area is located within 17 Louisiana Department of Environmental Quality (LDEQ) sub segments of the overall Lake Pontchartrain Basin. All of the sub segments found within the study area are listed in the LDEQ 2006 Water Quality Assessment 305(b) Report as fully supporting both Primary and Secondary Contact Recreation. This means that the water quality of the area is deemed safe for recreational activity including swimming, boating, fishing and other water-related activities. While all of the sub segments fully support both Primary and Secondary Contact Recreation, several water bodies are limited for Fish and Wildlife Propagation.

Sub segments LA041802, LA041803, LA041804, LA041805, LA041806, LA041807, and LA041808 are listed on the LDEQ 2006 Water Quality Assessment 305(b) Report as not supporting Fish and Wildlife Propagation. These sub segments are simply a numbering system used to identify water bodies throughout the state. The numbered sub segments correspond to the water bodies listed below. Fish and Wildlife Propagation includes the use of water for preservation and reproduction of aquatic biota such as indigenous species of fish and invertebrates, as well as reptiles, amphibians, and other wildlife associated with the aquatic environment. The water bodies that these sub segments encompass include Bayou Chaperon, Bashman Bayou, Bayou Dupre, Violet Canal, Pirogue Bayou, Terre Beau Bayou, and the New Canal as shown on figure 25. The LDEQ suspects that the cause of impairment to the Fish and Wildlife Propagation designated use is dissolved oxygen levels due to natural conditions for all water bodies except the Violet Canal. The LDEQ suspects the cause of impairment to the Violet Canal to be both natural conditions and package treatment plants or other permitted small flow discharges.

## Ground Water

The primary source of potable water in the study area is the St. Bernard Parish Water Treatment Plant located in Chalmette, Louisiana. The facility treats water drawn from the Mississippi River. Coordination with the Louisiana Water Supply Availability and Use Program confirmed that there are no known groundwater sources of potable water in St. Bernard Parish. The few alluvial aquifers that underlie the project area are hydrologically connected to Lake Borgne and other water features in the study area. Due to these connections, the water in the aquifers is brackish in nature and not used as a water supply.

## Scenic Streams

The Louisiana Scenic Rivers Act of 1988 was established to preserve, protect, and enhance the wilderness qualities, scenic beauties and ecological regimes of rivers and streams in the state. There are seven identified scenic streams located within the project study area. These include Bayou Dupre, Lake Borgne Canal (Violet Canal), Bashman Bayou, Terre Beau Bayou, Pirogue Bayou, Bayou Bienvenue, and Bayou Chaperon as shown on figure 25. During a discussion with Keith Cascio of the Louisiana Department of Wildlife and Fisheries (LDWF) on 24 August 2007, it was documented that any construction within 100 feet of a scenic stream will require a scenic streams permit. In those areas where the construction limits are more than 100 feet from the scenic stream, BMPs would need to be implemented to prevent sediment runoff during construction. These BMPs would include, but are not limited to, the use of stacked hay bails, silt fences, mulching and reseeding, use of buffer zones, and the collection and treatment of storm water runoff prior to discharge into a scenic stream, where appropriate.



**Figure 25: Scenic Streams located within the Project Area**

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade. Regular pumping of storm water from the developed areas of St. Bernard Parish into the surrounding water bodies in response to rainfall events would continue. However, with the lack of the 100-year level of risk reduction, the potential for future flooding of the region from overtopping of the HSDRRS would require dewatering activities that would discharge urban floodwaters potentially include pollutants associated with flooded commercial and industrial facilities. The pumping of such floodwaters into the adjacent water bodies would have a temporary impact on water quality and recreational use.

Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. These construction and levee improvements would disturb soils, which in turn, would increase the probability of sediment migration and impacts to water quality. Some temporary water quality impairments may occur if there is a major rain event during the construction efforts. Groundwater and scenic streams within and adjacent to the project study area would not be expected to have any adverse impacts associated with the no action.

## LPV 145

### Proposed Action for LPV 145 T-wall on Existing Levee

#### *Direct Impacts to Water Quality*

T-wall construction and levee improvement activities, associated with the proposed action, would disturb soils, which in turn, would increase the probability of sediment migration. Some temporary water quality impairments may occur if there is a major rain event during the construction efforts. Construction would require the issuance of a General Storm Water Permit. The issuance of a storm water permit for the proposed action is contingent on the development and approval of a Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI). SWPPP requirements include an outline of the storm water drainage system for each discharge point, actual and potential pollutant contact, and surface water locations. The SWPPP would also incorporate storm water management controls. Compliance with the General Storm Water Permit and the SWPPP would minimize potential impacts from construction activities to surface water quality. Construction equipment and operations may create miscellaneous operational pollution such as oil leaks, mud spatters, and discards from human activities. BMPs for construction site soil erosion would be implemented to prevent the migration of soils, oil and grease, and construction debris into the local stream networks.

There are no known groundwater sources of potable water in St. Bernard Parish; therefore, the proposed action would not be expected to have any adverse effect on groundwater.

There are no designated scenic streams within 100 feet of the proposed action. BMPs would be put in place during construction to prevent soil runoff and turbidity; therefore, no impacts to scenic streams would be anticipated from the proposed action.

#### *Indirect Impacts to Water Quality*

Potential indirect impacts from the proposed action would primarily consist of effects from increased turbidity to the wetland areas on the protected side and the MRGO on the flood side from construction related runoff. However, these impacts would be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and the MRGO is part of the larger Lake Borgne watershed. The potential indirect adverse impacts to the wetlands and the MRGO from the proposed action would be minimized by the small area affected relative to the size of the CWA and Lake Borgne and the temporary nature of these impacts.

#### *Cumulative Impacts to Water Quality*

Potential cumulative impacts on the water bodies within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would positively impact the habitat within the CWA and Lake Borgne.

The actions associated with the proposed action would be mainly temporary during the construction period.

#### Alternative 2 for LPV 145 Earthen Levee

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 2, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

#### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 3, all impacts to water quality, groundwater, and scenic streams would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts as well as a smaller area of construction related activities; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts.

#### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 4, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

### LPV 146

#### Proposed Action for LPV 146 T-wall on Existing Levee

##### *Direct Impacts to Water Quality*

T-wall construction and levee improvement activities, associated with the proposed action, would disturb soils, which in turn, would increase the probability of sediment migration. Some temporary water quality impairments may occur if there is a major rain event during the construction efforts. Construction would require the issuance of a General Storm Water Permit. The issuance of a storm water permit for the proposed action is contingent on the development and approval of a SWPPP and NOI. SWPPP requirements include an outline of the storm water drainage system for each discharge point, actual and potential pollutant contact, and surface water locations. The SWPPP would also incorporate storm water management controls. Compliance with the General Storm Water Permit and the SWPPP would minimize potential impacts

from construction activities to surface water quality. Construction equipment and operations may create miscellaneous operational pollution such as oil leaks, mud spatters, and discards from human activities. BMPs for construction site soil erosion would be implemented to prevent the migration of soils, oil and grease, and construction debris into the local stream networks.

There are no known groundwater sources of potable water in St. Bernard Parish; therefore, the proposed action would not be expected to have any adverse effect on groundwater.

There are no designated scenic streams within 100 feet of the proposed action. BMPs would be put in place during construction to prevent soil runoff and turbidity; therefore, no impacts to scenic streams would be anticipated from the proposed action.

#### *Indirect Impacts to Water Quality*

Potential indirect impacts from the proposed action would primarily consist of effects from increased turbidity to the wetland areas on the protected side and the MRGO on the flood side from construction related runoff. However, these impacts would be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and the MRGO is part of the larger Lake Borgne watershed. The potential indirect adverse impacts to the wetlands and the MRGO from the proposed action would be minimized by the small area affected relative to the size of the CWA and Lake Borgne and the temporary nature of these impacts.

#### *Cumulative Impacts to Water Quality*

Potential cumulative impacts on the water bodies within the project area from the proposed action would involve the combined effects from the multiple LPV section within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would positively impact the habitat within the CWA and Lake Borgne. The actions associated with the proposed action would be mainly temporary during the construction period.

#### Alternative 2 for LPV 146 Earthen Levee

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 2, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 3, all impacts to water quality, groundwater, and scenic streams would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts as well as a smaller area of construction related activities; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 4, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Water Quality*

Floodwall construction and levee improvement activities as well as construction of the Highway 46 overpass, all associated with the proposed action, would disturb soils, which in turn, would increase the probability of sediment migration. Therefore, some temporary water quality impairments may occur if there is a major rain event during the construction efforts. Construction would require the issuance of a General Storm Water Permit. The issuance of a storm water permit for the proposed action is contingent on the development and approval of a SWPPP and NOI. SWPPP requirements include an outline of the storm water drainage system for each discharge point, actual and potential pollutant contact, and surface water locations. The SWPPP would also incorporate storm water management controls. Compliance with the General Storm water Permit and the SWPPP would minimize potential impacts from construction activities to surface water quality. Construction equipment and operations may create miscellaneous operational pollution such as oil leaks, mud spatters, and discards from human activities. BMPs for construction site soil erosion would be implemented to prevent the migration of soils, oil and grease, and construction debris into the local stream networks.

There are no known groundwater sources of potable water in St. Bernard Parish; therefore, the proposed action would not be expected to have any adverse effect on groundwater.

There are no designated scenic streams within 100 feet of the proposed action. BMPs would be put in place during construction to prevent soil runoff and

turbidity. No impacts to scenic streams would be anticipated from the proposed action.

#### *Indirect Impacts to Water Quality*

Potential indirect impacts from the proposed action would primarily consist of effects from increased turbidity to the wetland areas on the protected side and on the flood side from construction related runoff. However, these impacts could be minimized with BMPs and adherence to regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger CWA and the MRGO is part of the larger Lake Borgne watershed. The potential indirect adverse impacts to the wetlands and the MRGO from the proposed action would be minimized by the small area affected relative to the size of the CWA and Lake Borgne and the temporary nature of these impacts.

#### *Cumulative Impacts to Water Quality*

Potential cumulative impacts on the water bodies within the project area from the proposed action would involve the combined effects from the multiple LPV section within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects PO-01 and PO-08, wetland restoration; the Violet freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would positively impact the habitat within the CWA and Lake Borgne. The actions associated with the proposed action would be mainly temporary during the construction period.

#### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 2, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

#### LPV 148

##### Proposed Action for LPV 148 T-wall on Existing Levee

##### *Direct Impacts to Water Quality*

T-wall construction and levee improvement activities, associated with the proposed action, would disturb soils, which in turn, would increase the probability of sediment migration. Some temporary water quality impairments may occur if there is a major rain event during the construction efforts. Construction would require the issuance of a General Storm Water Permit. The issuance of a storm water permit for the proposed action is contingent on the development and approval of a SWPPP and NOI. SWPPP requirements include an outline of the storm water drainage system for each discharge point, actual and potential pollutant contact, and surface water locations. The SWPPP would also incorporate storm water management controls. Compliance with the

General Storm Water Permit and the SWPPP would minimize potential impacts from construction activities to surface water quality. Construction equipment and operations may create miscellaneous operational pollution such as oil leaks, mud spatters, and discards from human activities. BMPs for construction site soil erosion would be implemented to prevent the migration of soils, oil and grease, and construction debris into the local stream networks.

There are no known groundwater sources of potable water in St. Bernard Parish; therefore, the proposed action would not be expected to have any adverse effect on groundwater.

There are no designated scenic streams within 100 feet of the proposed action. BMPs would be put in place during construction to prevent soil runoff and turbidity; therefore, no impacts to scenic streams would be anticipated from the proposed action.

#### *Indirect Impacts to Water Quality*

Potential indirect impacts from the proposed action would primarily consist of effects from increased turbidity to the wetland areas in the Lake Lery marsh on the flood side area and also the drainage canals that parallel both sides of the levee from construction related runoff. However, these impacts would be minimized with BMPs and compliance with regulations governing stormwater runoff at construction sites. These wetland areas are part of the larger Caernarvon and Lake Lery marsh area. The potential indirect adverse impacts to the wetlands and the drainage canals from the proposed action would be minimized by the small area affected relative to the size of the Caernarvon and Lake Lery marsh and the temporary nature of these impacts.

#### *Cumulative Impacts to Water Quality*

Potential cumulative impacts on the water bodies within the project area from the proposed action would involve the combined effects from the multiple LPV reaches within the Chalmette Loop HSDRRS as well as other IER projects throughout the area. However, several projects; such as CWPPRA projects BS-03a and BS-16, outfall management; the Caernarvon freshwater diversion project; MRGO deep-draft deauthorization; and several other wetland restoration projects would positively impact the habitat within the Caernarvon and Lake Lery marsh area. The actions associated with the proposed action would be mainly temporary during the construction period.

#### Alternative 2 for LPV 148 Earthen Levee

##### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 2, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 3, all impacts to water quality, groundwater, and scenic streams would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action, which would result in decreased impacts as well as a smaller area of construction related activities; however, the construction technique of deep soil mixing would result in increased runoff and associated impacts.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Water Quality*

With the implementation of alternative 4, all impacts to water quality, groundwater, and scenic streams would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

## **3.2.8 Soils**

### Existing Conditions

The Farmland Protection Policy Act (7 USC 4201, *et seq*) and its regulations (7 CFR Part 658) establish criteria for identifying and considering the effects of Federal programs on the conversion of farmland to non-agricultural uses. Prime and unique farmland soils are limited within the study area and basically found on the natural levees adjacent to the Mississippi River and Bayou Terre aux Boeufs. There are no prime and unique farmland soils located adjacent to or in close proximity of the Federal levee system in LPV 145, the reach that borders the MRGO. In LPV 146, LPV 147, and LPV 148, there are prime and unique farmland soils located near each reach. Soil data and prime and unique farmland information for the area was obtained from soil surveys, published by the Natural Resource Conservation Service (NRCS), and the NRCS Web Soil Survey. The prime and unique farmland soils within the project area are from the following four soils series described below.

#### **Commerce Series**

The Commerce series consists of level, somewhat poorly drained, mineral soils that are moderately slowly permeable and firm. These soils are formed in loamy alluvium. They are in high and intermediate positions on natural levees along the Mississippi River and its distributaries. The soil has high fertility. Water and air move through the soils at a moderately slow rate and waters runs off the surface slowly. The soil is well suited to cultivated crops and use as pasture. (NRCS, St. Bernard Soil Survey, 1989)

#### **Harahan Series**

The Harahan series consists of level, poorly drained, very permeable soils. These soils formed in clayey alluvium. They are firm in the upper part and slightly fluid in the lower part. These soils are in drained, former swamps in the lower part of the Mississippi River flood plain. They are rarely or frequently flooded. The soil is high in fertility and it has a

very high shrink-swell potential and medium total subsidence potential. The soil is moderately well suited to use as pasture and for crops. (NRCS, St. Bernard Soil Survey, 1989)

### **Sharkey Series**

The Sharkey series consists of poorly drained, mineral soils that are very slowly permeable and firm. These soils formed in clayey alluvium. They are in intermediate and low positions on natural levees and in backswamps on the Mississippi River flood plain. The soil has high fertility. Water and air move through the soils at a very slow rate and waters runs off the surface slowly. The soil is moderately well suited to cultivated crops and use as pasture. (NRCS, St. Bernard Soil Survey, 1989)

### **Vacherie Series**

The Vacherie series consists of somewhat poorly drained, very slowly permeable soils. They are formed in loamy alluvium over clayey alluvium. These soils are in intermediate positions where natural levees of the Mississippi River were breached by former floods. The soil has high fertility. Permeability is moderate in the loamy upper part of the profile and very slow in the clayey lower part. Water runs off the surface very slowly. The soil is well suited to cultivated crops and use as pasture. (NRCS, St. Bernard Soil Survey, 1989)

Mineral resources in the region include natural gas and oil production. A review of the Louisiana Department of Natural Resources electronic database shows that there are three active natural gas wells in the area, along with several dry holes and permit expired sites. None of the points are located within the existing or proposed rights of way, and therefore mineral resources are eliminated from further evaluation.

## Discussion of Impacts

### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Therefore, those soils classified as prime and unique farmland in the area would remain at a higher risk to flooding from normal tropical events than under the proposed action due in large part to the fact that current system is not built to the 100-year level of risk reduction. Therefore, utilization of the prime and unique farmland soils for agricultural purposes is limited but not to the extent experienced under existing conditions. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Approximately 13.14 acres of prime and unique farmland soils are located within the existing right-of-way and would be potentially impacted by construction activities.

### LPV 145

#### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Soils*

There are no soils classified as prime and unique located near LPV 145; therefore, the proposed action would have no impact on prime and unique farmland soils.

### *Indirect Impacts to Soils*

There are no soils classified as prime and unique located near LPV 145; therefore, adverse indirect impacts associated with the proposed action would not be anticipated.

### *Cumulative Impacts to Soils*

While no prime and unique farmland soils are within LPV 145, by providing a 100-year level of risk reduction prime and unique farmland soils located throughout the project area would be protected and available for continued agricultural use. The probability of inundation with brackish water from flood and storm surge would be greatly reduced. Prime and unique farmland soils throughout the area would also be impacted as potential borrow locations to supply material for the multiple IER projects and other HSDRRS projects in various stages of construction throughout the area.

### Alternative 2 for LPV 145 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Soils*

With the implementation of alternative 2, all impacts to prime and unique farmland soils would be similar to those described under the proposed action.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Soils*

With the implementation of alternative 3, all impacts to prime and unique farmland soils would be similar to those described under the proposed action.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Soils*

With the implementation of alternative 4, all impacts to prime and unique farmland soils would be similar to those described under the proposed action.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct Impacts to Soils*

All of the construction activities would be located within the existing ROW and no additional ROW would be required. The proposed action would impact approximately 0.04 acres of prime and unique farmland soils. A Farmland Conversion Impact Rating form has been submitted to the NRCS for the proposed action and no further action would be required.

### *Indirect Impacts to Soils*

There would be no adverse indirect impacts to prime and unique farmland soils associated with the proposed action.

### *Cumulative Impacts to Soils*

While the construction of the HSDRRS would impact prime and unique farmland soils and permanently remove additional soils from agricultural use, the proposed action, as part of IER # 10 and in combination with the other IER projects, would benefit these soils. By providing a 100-year level of risk reduction, prime and unique farmland soils in the project area would be available for potential agricultural use. The probability of inundation of agricultural land with brackish water from flood and storm surge would also be greatly reduced. However, the risk reduction provided by the HSDRRS would also have the potential to spur increased commercial and/or residential development possibly impacting additional prime and unique farmland soils. Prime and unique farmland soils throughout the area would also be impacted as potential borrow locations to supply material for the multiple IER projects and other HSDRRS projects in various stages of construction throughout the area.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Soils*

Alternative 2 would impact approximately 0.04 acres of prime and unique farmland soils.

#### *Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 2 would be the same as described for the proposed action.

### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

#### *Direct Impacts to Soils*

Alternative 3 would impact approximately 0.04 acres of prime and unique farmland soils.

#### *Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 3 would be the same as described for the proposed action.

### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Soils*

Alternative 4 would impact approximately 0.04 acres of prime and unique farmland soils.

*Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 4 would be the same as described for the proposed action.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Soils*

The proposed action would impact approximately 0.85 acres of prime and unique farmland soils. A Farmland Conversion Impact Rating form has been submitted to the NRCS for the proposed action and no further action would be required.

*Indirect Impacts to Soils*

There would be no adverse indirect impacts to prime and unique farmland soils associated with the proposed action.

*Cumulative Impacts to Soils*

While the construction of the HSDRRS would impact prime and unique farmland soils and permanently remove additional soils from agricultural use, the proposed action as part of IER # 10 and in combination with the other IER projects would benefit these soils. By providing a 100-year level of risk reduction, prime and unique farmland soils in the project area would be available for potential agricultural use. The probability of inundation of agricultural land with brackish water from flood and storm surge would also be greatly reduced. However, the hurricane and storm damage risk reduction provided by the HSDRRS would also have the potential to spur increased commercial and/or residential development possibly impacting additional prime and unique farmland soils. Prime and unique farmland soils throughout the area would also be impacted as potential borrow locations to supply material for the multiple IER projects and other HSDRRS projects in various stages of construction throughout the area.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct Impacts to Soils*

Alternative 2 would impact approximately 15.41 acres of prime and unique farmland soils.

*Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in 14.56 more acres of prime and unique farmland soils impacted as well as a larger area of construction related activities.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct Impacts to Soils*

All of the construction activities would be located within the existing ROW and no additional ROW would be required. The proposed action would impact approximately 12.25 acres of prime and unique farmland soils. A Farmland Conversion Impact Rating form has been submitted to the NRCS for the proposed action and no further action would be required.

#### *Indirect Impacts to Soils*

There would be no adverse indirect impacts to prime and unique farmland soils associated with the proposed action.

#### *Cumulative Impacts to Soils*

While the construction of the HSDRRS would impact prime and unique farmland soils and permanently remove some soils from agricultural use, the proposed action, as part of IER # 10 and in combination with the other IER projects, would benefit these soils. By providing a 100-year level of risk reduction, prime and unique farmland soils in the project area would be available for potential agricultural use. The probability of inundation of agricultural land with brackish water from flood and storm surge would also be greatly reduced. However, the hurricane and storm damage risk reduction provided by the HSDRRS would also have the potential to spur increased commercial and/or residential development possibly impacting additional prime and unique farmland soils. Prime and unique farmland soils throughout the area would also be impacted as potential borrow locations to supply material for the multiple IER projects and other HSDRRS projects in various stages of construction throughout the area.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct Impacts to Soils*

Alternative 2 would impact approximately 111.52 acres of prime and unique farmland soils.

#### *Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in 99.27 more acres of prime and unique farmland soils impacted as well as a larger area of construction related activities.

Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

*Direct Impacts to Soils*

Alternative 3 would impact approximately 3.68 acres of prime and unique farmland soils.

*Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 3 would be similar to, but less than, those described under the proposed action. Alternative 3 would have a smaller footprint than the proposed action, which would result in 8.57 fewer acres of prime and unique farmland soils impacted as well as a smaller area of construction related activities.

Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Soils*

Alternative 4 would impact approximately 49.01 acres of prime and unique farmland soils.

*Indirect and Cumulative Impacts to Soils*

Both indirect and cumulative impacts associated with alternative 4 would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in 36.76 more acres of prime and unique farmland soils impacted as well as a larger area of construction related activities.

### **3.2.9 Floodplains and Drainage**

#### Existing Conditions

The purpose of the HSDRRS is to reduce risk to property during a 100-year tropical event. The HSDRRS projects are wholly located within the 100-year floodplain as is a substantial portion of the study area. Therefore, despite the fact that the project is taking place within the 100-year floodplain, it is beneficial because it will be reducing risk to residential and commercial development already located within the 100-year floodplain.

Drainage in the project area involves several man-made canals which transport water, via gravity, from the developed areas of the parish located at higher elevations along the Mississippi River to the 40 Arpent canal which runs along the non-federal levee at a much lower elevation. There are seven pump stations located along the non-federal levee system and one, St. Mary's Pump Station, located on the Federal levee system, in LPV 148. These stations pump the water from the 40 Arpent Canal along the non-federal levee and the Jourda canal along LPV 148 into the flood side water bodies and marsh. The CWA acts as a large "reservoir" for the storm water pumped from the developed areas of St. Bernard Parish. The HSDRRS would not add any additional storm water to the CWA and would actually prevent storm surge from entering the CWA. The pump stations in the parish were damaged by Hurricanes Katrina and Rita; however, most are in the process of being repaired. Improvements to the levee system could include

fronting protection to the St. Mary's Pump Station, but the pump stations along the non-federal levee system would not be part of this project. Overall, the project would not affect and may possibly improve the areas drainage.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project and no additional floodplain area would be impacted. The amount of area within the 100-year floodplain may actually increase due to new guidelines set by FEMA and the National Flood Insurance Rate Program since Hurricanes Katrina and Rita. The developed areas that are already located within the 100-year floodplain would still be at a higher risk to flooding from normal tropical events due in large part to the fact that current system is not built to the 100-year level of risk reduction. While drainage would not change under the no action alternative, the pump houses would be at a higher risk for flooding due to the fact that all of the drainage structures would remain at there current level, which is below the 100-year level of risk reduction.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to Floodplains and Drainage*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. Therefore, no additional floodplain area would be impacted by the proposed action.

###### *Indirect Impacts to Floodplains and Drainage*

All of the developed areas already located within the floodplain would benefit from the proposed action because it would bring the HSDRRS up to the 100-year level of risk reduction. The proposed action would not impact any of the existing drainage canals or other drainage systems located within the project area. Furthermore, the proposed action would also benefit drainage in the area because all of the pump facilities located within the non-federal levee system would also be protected with a higher level of hurricane and storm damage risk reduction.

###### *Cumulative Impacts to Floodplains and Drainage*

By providing a 100-year level of risk reduction for the Chalmette Loop project area, the incremental effect of IER # 10, in combination with other projects in the vicinity (discussed in section 4.0), would significantly reduce the effect of surges from extreme events up to the 100-year storm level. Along with the HSDRRS improvements other projects including the Violet freshwater diversion project as well as other wetland restoration projects completed by community groups would positively impact the habitat within the CWA and provide a buffer for the area from potential storm surge. While recovery efforts have been

ongoing throughout the study area, redevelopment has been slowed by duration of planning and study to develop adequate hurricane and storm damage risk reduction and a lack of confidence among the general public. The completed hurricane and storm damage risk reduction project would restore public confidence and would spur expanded redevelopment of impacted areas and have the potential to induce further development of vacant parcels of land located within the 100-year floodplain. Expanded development would potentially put more property at risk from future flood and storm events.

Alternative 2 for LPV 145 Earthen Levee

*Direct Impacts to Floodplains and Drainage*

Alternative 2 would convert approximately 266 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

*Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

*Direct Impacts to Floodplains and Drainage*

Alternative 3 would convert approximately two additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

*Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 3 would be similar to, but less than, those described under the proposed action. While alternative 3 would require some new ROW, the overall footprint would be smaller than the proposed action, which would result in fewer impacts as well as a smaller area of construction related activities.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct Impacts to Floodplains and Drainage*

Alternative 4 would convert approximately 240 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 4 would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

### LPV 146

#### Proposed Action for LPV 146 T-wall on Existing Levee

##### *Direct Impacts to Floodplains and Drainage*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. Therefore, no additional floodplain area would be impacted by the proposed action.

##### *Indirect Impacts to Floodplains and Drainage*

All of the developed areas already located within the floodplain would benefit from the proposed action because it would bring the HSDRRS up to the 100-year level of risk reduction. The proposed action would not impact any of the existing drainage canals or other drainage systems located within the project area. Furthermore, the proposed action would benefit drainage in the area because all of the pump facilities located within the non-federal levee system would also be protected with a higher level of hurricane and storm damage risk reduction.

##### *Cumulative Impacts to Floodplains and Drainage*

By providing a 100-year level of risk reduction for the Chalmette Loop project area, the incremental effect of IER # 10, in combination with other projects in the vicinity (discussed in section 4.0), would significantly reduce the effect of surges from extreme events up to the 100-year storm level and beyond. This would result in further enhancement of the entire proposed 100-year HSDRRS throughout the area. Along with the HSDRRS improvements other projects including the Violet freshwater diversion project as well as other wetland restoration projects completed by community groups would positively impact the habitat within the CWA and provide a buffer for the area from potential storm surge. While recovery efforts have been ongoing throughout the study area, redevelopment has been slowed by duration of planning and study to develop adequate hurricane and storm damage risk reduction and a lack of confidence among the general public. The completed hurricane and storm damage risk reduction project would restore public confidence and would spur expanded redevelopment of impacted areas and have the potential to induce further development of vacant parcels of land located within the 100-year floodplain. Expanded development would potentially put more property at risk from future flood and storm events.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Floodplains and Drainage*

Alternative 2 would convert approximately 204 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

#### *Direct Impacts to Floodplains and Drainage*

Alternative 3 would convert approximately 0.36 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 3 would be similar to, but less than, those described under the proposed action. While alternative 3 would require some new ROW, the overall footprint would be smaller than the proposed action, which would result in fewer impacts as well as a smaller area of construction related activities.

### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Floodplains and Drainage*

Alternative 4 would convert approximately 288 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 4 would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint, which would result in increased impacts as well as a larger area of construction related activities.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct Impacts to Floodplains and Drainage*

All of the construction activities associated with the proposed action, including the T-wall, bridge, and Bayou Road Flood Gate would be anticipated to occur within the existing ROW. An access road of up 2000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. Therefore, no additional floodplain area would be impacted by the proposed action.

#### *Indirect Impacts to Floodplains and Drainage*

All of the developed areas already located within the floodplain would benefit from the proposed action because it would bring the HSDRRS up to the 100-year level of risk reduction. The proposed action would not impact any of the existing drainage canals or other drainage systems located within the project area. Furthermore, the proposed action would benefit drainage in the area because all of the pump facilities located within the non-federal levee system would also be protected with a higher level of hurricane and storm damage risk reduction.

#### *Cumulative Impacts to Floodplains and Drainage*

By providing a 100-year level of risk reduction for the Chalmette Loop project area, the incremental effect of IER # 10, in combination with other projects in the vicinity (discussed in section 4.0), would significantly reduce the effect of surges from extreme events up to the 100-year storm level and beyond. This would result in further enhancement of the entire proposed 100-year HSDRRS throughout the area. Along with the HSDRRS improvements other projects including the Violet freshwater diversion project as well as other wetland restoration projects completed by community groups would positively impact the habitat within the CWA and provide a buffer for the area from potential storm surge. While recovery efforts have been ongoing throughout the study area, redevelopment has been slowed by duration of planning and study to develop adequate hurricane and storm damage risk reduction and a lack of confidence among the general public. The completed hurricane and storm damage risk reduction project would restore public confidence, spur expanded redevelopment of impacted areas, and have the potential to induce further development of vacant parcels of land located within the 100-year floodplain. Expanded development would potentially put more property at risk from future flood and storm events.

### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct Impacts to Floodplains and Drainage*

Alternative 2 would convert approximately 26 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities.

### LPV 148

#### Proposed Action for LPV 148 T-wall on Existing Levee

##### *Direct Impacts to Floodplains and Drainage*

All of the construction activities associated with the proposed action would occur within the existing ROW and no additional ROW would be required. Therefore, no additional floodplain area would be impacted by the proposed action.

##### *Indirect Impacts to Floodplains and Drainage*

All of the developed areas already located within the floodplain would benefit from the proposed action because it would bring the HSDRRS up to the 100-year level of risk reduction. The proposed action would not impact any of the existing drainage canals or other drainage systems located within the project area. Furthermore, the proposed action would benefit drainage in the area because the St. Mary's Pump Station # 8 located within the levee system would be raised and protected with a higher level of hurricane and storm damage risk reduction.

##### *Cumulative Impacts to Floodplains and Drainage*

By providing a 100-year level of risk reduction for the Chalmette Loop project area, the incremental effect of IER # 10, in combination with other projects in the vicinity (discussed in section 4.0), would significantly reduce the effect of surges from extreme events up to the 100-year storm level and beyond. This would result in further enhancement of the entire proposed 100-year HSDRRS throughout the area. Along with the HSDRRS improvements other projects including the Caernarvon freshwater diversion project as well as other wetland restoration projects completed by community groups would positively impact the habitat within the Lake Lery marsh and provide a buffer for the area from potential storm surge. While recovery efforts have been ongoing throughout the study area, redevelopment has been slowed by duration of planning and study to develop adequate hurricane and storm damage risk reduction and a lack of confidence among the general public. The completed hurricane and storm damage risk reduction project would restore public confidence, spur expanded redevelopment of impacted areas, and have the potential to induce further development of vacant parcels of land located within the 100-year floodplain. Expanded development would potentially put more property at risk from future flood and storm events.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct Impacts to Floodplains and Drainage*

Alternative 2 would convert approximately 411 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW. While the alternative would directly impact the Jourda drainage canal that runs along the length of the protected side of the levee, the drainage canal would be relocated outside of the proposed ROW for alternative 2. Therefore any impacts to drainage would be temporary.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 2 would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 2 would impact the drainage canal along LPV 148, but it would be relocated and impacts to drainage would be temporary.

### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

#### *Direct Impacts to Floodplains and Drainage*

Alternative 3 would convert approximately 73 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 3 would be similar to, but less than, those described under the proposed action. While alternative 3 would require some new ROW, the overall footprint would be smaller than the proposed action, which would result in fewer impacts as well as a smaller area of construction related activities.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct Impacts to Floodplains and Drainage*

Alternative 4 would convert approximately 302 additional acres of floodplain into HSDRRS use. The remainder of construction related activities would occur within the existing ROW. While the alternative would directly impact the Jourda drainage canal that runs along the length of the protected side of the levee as well as the Creedmore drainage canal on the flood side, the drainage canals would be relocated outside of the proposed ROW for alternative 4. Therefore any impacts to drainage would be temporary.

#### *Indirect and Cumulative Impacts to Floodplains and Drainage*

Both indirect and cumulative impacts associated with alternative 4 would be similar to, but greater than, those described under the proposed action.

Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 4 would impact the drainage canals along LPV 148, but these two canals would be relocated and impacts to drainage would be temporary.

### **3.2.10 Air Quality**

#### Existing Conditions

The Federal Clean Air Act (CAA) requires that all states comply with the National Ambient Air Quality Standards (NAAQS). NAAQS have been developed for seven pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), and two forms of particulate matter (PM<sub>10</sub> – particulate matter with a diameter of 10 micrometers or less; and PM<sub>2.5</sub> - particulate matter with a diameter of 2.5 micrometers or less).

When ambient air pollution parameters exceed NAAQS, the Federal and state government are responsible for implementing an air quality management plan. These areas of exceedence are called “non-attainment” and “air maintenance” zones. The state is responsible for preparing a State Implementation Plan (SIP) that designs a plan to “attain” ambient NAAQS. Federal actions occurring in the non-attainment zone must conform to the SIP and avoid impeding the state’s efforts to achieve air quality goals. St. Bernard Parish is classified as in attainment for all of the NAAQS (U.S. Environmental Protection Agency [EPA] 2007).

Throughout St. Bernard Parish there are recovery efforts at work including continued debris removal, demolition of condemned homes and businesses, as well as construction activities associated with new development. There are also parish wide FEMA sponsored efforts including street, sewerage and water repairs and construction of school and government facilities. All of these recovery efforts add to the amount of dust emissions as well as construction equipment emissions within the parish.

#### Discussion of Impacts

##### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. These construction activities would cause temporary site specific construction effects including exhaust and dust emissions.

##### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Air Quality*

Temporary and minor increases in air pollution could occur from the use of construction equipment such as cranes, pile drivers, generators, excavators, bull dozers, and construction vehicle traffic. Combustible emissions from construction equipment would be expected to temporarily increase during the

construction phase of the project. 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. Operation of construction equipment and support vehicles would also generate VOCs, PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, CO, O<sub>3</sub> and SO<sub>x</sub> emissions from diesel engine combustion.

Calculations were performed to estimate the total combustible air emissions from the construction activities. Calculations were made for standard construction equipment such as pile drivers, generators, cement trucks, back hoes, cranes, and bulldozers using emission factors from the EPA approved emission model NONROAD6.2. Fugitive dust calculations were made for disturbing the soils while constructing T-walls, and were calculated using emission factors from Mid-Atlantic Regional Air Management Association.

Assumptions were made regarding the type of equipment, duration of the total number of days, each piece of equipment that would be used, and the number of hours per day each type of equipment would be used. Assuming that construction within all four reaches would occur simultaneously, a summary of the total emissions for all four reaches (LPV 145, 146, 147, and 148) is presented in table 11.

**Table 11: Total Air Emissions from Construction Activities-Pollutant Total**

Pollutant	Total Emissions (Tons Per Year)
Carbon Monoxide (CO)	46.82
Volatile Organic Compounds (VOCs)	9.57
Nitrous Oxides (NO <sub>x</sub> )	93.79
Particulate matter < 10 microns (PM <sub>10</sub> )	74.98
Particulate matter < 2.5 microns (PM <sub>2.5</sub> )	20.15
Sulfur Dioxide (SO <sub>2</sub> )	11.58

Source: 40 CFR 51.853

Construction workers would temporarily increase the combustible emissions during their commute to and from work. Supplies would be delivered to the site by large delivery trucks. The emissions from supply trucks and workers commuting to work were calculated in the air emission analysis and those emissions are included in the totals in table 14.

During the construction of the proposed action, 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. Air emissions from the proposed action would be temporary and should not significantly impair air quality in the region. Due to the short duration of the construction project, any increases or impacts on ambient air quality would be expected to be short-term and minor and would not be expected to cause or contribute to a violation of Federal or state ambient air quality standards.

### *Indirect Impacts to Air Quality*

There would be no adverse indirect impacts to air quality within the project area under the proposed action.

### *Cumulative Impacts to Air Quality*

It is assumed that construction activities associated with other HSDRRS projects would create dust emissions, but would use standard BMPs. The BMPs would include application of water to control dust and periodic wetting down of haul roads to aid in prevention of fugitive dust becoming airborne. Construction activities occurring during and within the vicinity of the IER # 10 project area, including replacement of the Bayou Dupre closure structure with IER # 8 and the Caernarvon Floodwall improvements with IER # 9, would likely occur in increments through the estimated construction period. Therefore, cumulative impacts to air quality due to the proposed action and other construction activities within the area that would occur concurrently would be temporary. Incremental contribution to cumulative air quality impacts due to the proposed action would not be expected after the construction is complete.

### Alternative 2 for LPV 145 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 2, all impacts to air quality would be similar to, but greater than, those described under the proposed action. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 2 would also require more earthwork creating the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 3, all impacts to air quality would be similar to, but greater than, those described under the proposed action. While alternative 3 would have a smaller overall footprint than the proposed action, it would require more earthwork which would create the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 4, all impacts to air quality would be similar to, but greater than, those described under the proposed action. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 4 would also require more earthwork which would create

the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

#### LPV 146

##### Proposed Action for LPV 146 T-wall on Existing Levee

###### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of the proposed action, all impacts to air quality would be similar to those described under the proposed action for LPV 145.

##### Alternative 2 for LPV 146 Earthen Levee

###### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 2, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 2 would also require more earthwork which would create the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

##### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

###### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 3, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. While alternative 3 would have a smaller overall footprint than the proposed action, it would require more earthwork, which would create the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

##### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

###### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 4, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 4 would also require more earthwork creating the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of the proposed action, the types of impacts to air quality would be similar to those described under the proposed action for LPV 145; however, the actual quantity of emissions would be less due to the shorter length of LPV 147.

### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 2, the types of impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145; however, the actual quantity of emissions would be less due to the shorter length of LPV 147.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of the proposed action, all impacts to air quality would be similar to those described under the proposed action for LPV 145.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 2, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. Alternative 2 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 2 would also require more earthwork creating the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 3, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. While alternative 3 would have a smaller overall footprint than the proposed action, it would require more earthwork which would create the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Air Quality*

With the implementation of alternative 4, all impacts to air quality would be similar to, but greater than, those described under the proposed action for LPV 145. Alternative 4 would have a larger footprint than the proposed action, which would result in increased impacts as well as a larger area of construction related activities. Alternative 4 would also require more earthwork creating the potential for additional and prolonged dust emissions as well as increased durations for earth moving equipment and associated exhaust emissions.

### **3.2.11 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, *etc.*) or subjective judgments (*e.g.*, community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 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). DNL is the community noise metric recommended by the EPA and has been adopted by most Federal agencies (EPA 1974). A DNL of 65 dBA is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by the EPA as a level below which there is no adverse impact (EPA 1974).

Noise levels occurring at night generally produce a greater annoyance than do the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA louder than the same level of noise during the day. This perception is largely because background environmental sound levels at night in most areas are also about 10 dBA lower than those during the day.

Noise levels surrounding the project corridor are variable depending on the time of day, location, and climatic conditions. Although areas within the project area as a whole are mostly residential and commercial, there are very few inhabitants due to Hurricane Katrina. The major noise sources within the area include construction related noise from ongoing recovery efforts as well as vehicular noise from the three major highways that cross the area, including Highway 46, Highway 47, and Highway 39. Other major noise sources include the Murphy and Exxon Mobile oil refineries and noise associated with shipping activity along the Mississippi River. The HSDRRS project is located well away from these developed areas and is directly surrounded by marsh and water.

## Discussion of Impacts

### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. Any noise receptors within 1,000 feet of the project corridor would experience temporary noise impacts associated with construction activities such as earth moving and vehicles

### LPV 145

#### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Noise*

Table 12 describes noise emission levels for construction equipment expected to be used during the proposed construction activities. As can be seen from this table, the anticipated noise levels would range from 76 dBA to 91 dBA based on data from the Federal Highway Administration [FHWA] (2006).

**Table 12: A-Weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances<sup>1</sup>**

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.

Assuming the worst case scenario of 91 dBA from pile driving, as would be the case during the construction of T-wall structure, all areas within 1,000 feet of the project corridor would experience noise levels exceeding 65 dBA. Construction noise levels would attenuate to 75 dBA at a distance of 350 feet from construction activities.

The distance from the project corridor to the nearest residential properties is approximately 1,230 feet. The noise model projects that these residential properties would not be expected to experience unacceptable noise levels during construction activities as they are greater than 1,000 feet away.

Therefore, no additional noise impacts associated with construction activities such as pile driving and vehicles would be anticipated with the proposed action.

### *Indirect Impacts to Noise*

Indirect impacts from noise would have the potential to result in avoidance of the project area by wildlife, residents, and recreational and commercial fisherman. The long term exposure of residents in the immediate area from continuous increased noise levels could also lead to emotional or mental stress. While these indirect impacts may be adverse, they would only be temporary and cease once construction activities are completed.

### *Cumulative Impacts to Noise*

Noise impacts associated with planned construction activities associated with IER # 10 as well as ongoing projects to improve the HSDRRS for St. Bernard Parish and other rebuilding and restoration following Hurricane Katrina would not likely cause noise levels in the project area to exceed the maximum levels of noise described under the direct impacts section. However, concurrent construction activities associated with each LPV associated with IER # 10, along with other IER projects in the area, would have the potential to extend the duration of elevated noise levels for residents living in the project area

### Alternative 2 for LPV 145 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 2, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action. Alternative 2 would have a substantially reduced amount of pile driving activity as compared to the proposed action.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 3, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action. Alternative 3 would have a substantially reduced amount of pile driving activity as compared to the proposed action.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 4, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action. Alternative 4 would have a substantially reduced amount of pile driving activity as compared to the proposed action.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of the proposed action, all noise related impacts would be similar to those described under the proposed action for LPV 145.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 2, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action for LPV 145. Alternative 2 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 3, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action for LPV 145. Alternative 3 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 4, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action for LPV 145. Alternative 4 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of the proposed action all noise related impacts would be similar to those described under the proposed action for LPV 145.

Because of the proximity of the project area to developed areas near LPV 147, there are approximately 18-20 residential properties within the general area that could be exposed to adverse impacts from construction noise. One construction activity, pile driving, would be expected to create temporary noise impacts above 65 dBA to sensitive receptors within 1,000 ft of the project corridor. Assuming the worst case scenario of 101 dBA, as would be the case during pile driving for gate structures and floodwall tie-in construction along the project

corridor, all areas within 1,000 ft of the pile driving would experience noise levels exceeding 65 dBA. The use of pile drivers and other highlevel noise sources would likely be limited to daylight hours, which would reduce the adverse impact of noise on surrounding land uses. For LPV 147 eight to twelve residential structures are within 1,000 feet of the proposed action and could experience temporary noise impacts.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of the proposed action, all noise related indirect and cumulative impacts would be similar to those described under the proposed action for LPV 145.

LPV 148

Proposed Action for LPV 148 T-wall on Existing Levee

*Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of the proposed action, all noise related impacts would be similar to those described under the proposed action for LPV 145 except at the very end, near Highway 39. Because of the proximity of the project area to a developed area near the Caernarvon flood wall, there are approximately 25-30 residential properties within the general area that could be exposed to adverse impacts from construction noise. One construction activity, pile driving, would be expected to create temporary noise impacts above 65 dBA to sensitive receptors within 1,000 ft of the project corridor. Assuming the worst case scenario of 101 dBA, as would be the case during pile driving for floodwall tie-in construction along the project corridor, all areas within 1,000 ft of the pile driving would experience noise levels exceeding 65 dBA. The use of pile drivers and other highlevel noise sources would likely be limited to daylight hours, which would reduce the adverse impact of noise on surrounding land uses. For LPV 148, 12-15 residential structures are within 1,000 feet of the proposed action and could experience temporary noise impacts.

Alternative 2 for LPV 148 Earthen Levee

*Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 2, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action for LPV 145. Alternative 2 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 3, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action

for LPV 145. Alternative 3 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Noise*

With the implementation of alternative 4, all noise related impacts would be similar to, or slightly reduced from, those described under the proposed action for LPV 145. Alternative 4 would have a substantially reduced amount of pile driving activity as compared to the proposed action for LPV 145.

### **3.2.12 Transportation**

#### Existing Conditions

The proposed project is located in the more rural areas of St. Bernard Parish, with the existing communities centered on the natural ridges of the Mississippi River and Bayou Terre aux Bouefs. St. Bernard Highway (Highway 46) and Judge Perez Drive (Highway 39) are the major roadways through the parish running parallel to the river and connecting St. Bernard Parish to Orleans Parish. The main north/south roadway is Paris Road (Highway 47) that bisects the project area and connects to Interstate 510 in New Orleans East. Near the southern end of the project, Highway 46 turns east and parallels Bayou Terre aux Bouefs and Bayou Road. These are the two roadways that would be most affected by the proposed action. Highway 46 would be elevated to cross over the new levee section and the flood gate at Bayou Road would be replaced. The urbanized areas of the parish located along the Mississippi River include Arabi, Chalmette, Meraux, and Violet. The other developed region in the project area is along Highway 46 and Bayou Road in eastern St. Bernard Parish and includes the communities of Poydras, Kenilworth, and Verret. All of the major transportation routes in the project area are shown in figure 2.

Operational conditions on a highway can be described with “level of service” (LOS). LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Heavy trucks adversely affect the LOS of a highway. “Heavy trucks” are vehicles that have more than four tires touching the pavement. Heavy vehicles adversely affect traffic in two ways: 1) they are larger than passenger cars and occupy more roadway space; 2) they have poorer operating capabilities than passenger cars, particularly in respect to acceleration, deceleration, and the ability to maintain speed on grades; and 3) they weigh more and cause more road damage. The second impact is more critical. The inability of heavy vehicles to keep pace with passenger cars in many situations creates large gaps in the traffic stream resulting in travel inefficiencies.

The most recent traffic volumes available from the Louisiana Department of Transportation and Development (LADOTD) are from 2005. Traffic levels in the project area have been well below previous numbers since Hurricane Katrina due in large part to the substantially reduced population of the area. Most roadways throughout the parish experience a fairly good LOS during a normal day with portions of Highway 46 and Highway 39 near the parish line seeing small delays and congestion during peak morning and evening travel times.

The only rail line in the project area parallels the Mississippi River and is located between the river and Highway 46. It does not cross any of the LPV reaches for IER # 10 and would not be impacted by the project.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to the current, post-Katrina design standards would occur within the existing right-of-way of the project. The no action alternative would temporarily impact traffic on highways and local roads within the vicinity of the project area from worker and truck traffic associated with construction activities.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to Transportation*

Additional traffic to the roadway network would include the mobilization of construction equipment, construction workers traveling to and from construction sites, construction materials being shipped to construction sites, and construction related debris being removed from construction sites. Construction materials being shipped to construction sites would be the bulk of the additional traffic.

Truck access to the project sites would be via Interstate 10 to Interstate 510 to Highway 47 from the east as well as Interstate 10 to Highway 46 or Highway 39 from the west. Barges could also be used during construction and would access the project area via the MRGO from the Intracoastal Waterway. Barges carrying construction materials to the site could increase traffic through the IHNC lock as well as on the GIWW and MRGO. These increases in barge traffic could further compound delays expected to result from the replacement of the IHNC lock expected to begin in the next year.

Concrete would likely be transported to the site via mixing truck and pumped on-site or, due to the large amount potentially required, a temporary concrete facility may be used on site. Steel sheet piling and H-piles would likely be shipped by truck. The bulk of the truck traffic would occur on Interstate 10, Interstate 510, Highway 47, Highway 46, Highway 39, and potentially along other local roads. Concrete and steel delivery would require approximately 12,000 truck trips. Borrow material delivery would require approximately 31,000 truck trips, assuming each truck could hold 15 cubic yards of borrow material.

Local streets would be used to access work sites from the arterials. The access roads (e.g., work site roads, staging areas) used by the trucks would have substantial changes in their LOS. It should be noted that without a detailed transportation routing plan, a more detailed impact evaluation to the LOS of minor highways and roads cannot be done, but will be addressed in more detail in the CED.

### *Indirect Impacts to Transportation*

Heavy trucks would add to existing loading sources for pavement degradation. The additional trucks associated with the proposed action would contribute to additional wear-and-tear of pavement on the areas major routes and some local streets.

### *Cumulative Impacts to Transportation*

As discussed previously, additional wear-and-tear of pavement on roads within the project vicinity would occur due to increased truck traffic under the proposed action. Ongoing construction related to other reconstruction projects in the project vicinity as well as construction related to other IER projects would also contribute to the increase of truck traffic and would therefore increase wear-and-tear on the pavement of the roads.

### Alternative 2 for LPV 145 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 2, all transportation related impacts would be similar to, or greater than, those described under the proposed action. Alternative 2 would require a greater amount of truck trips (approximately 890,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 3, all transportation related impacts would be similar to, or greater than, those described under the proposed action. Alternative 3 would require a greater amount of truck trips (approximately 265,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 4, all transportation related impacts would be similar to, or greater than, those described under the proposed action. Alternative 4 would require a greater amount of truck trips (approximately 785,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of the proposed action, all transportation related impacts would be similar to those described under the proposed action for LPV 145. Concrete and steel delivery would require approximately 12,500 truck trips. Borrow material delivery would require approximately 32,000 truck trips, assuming each truck could hold 15 cubic yards of borrow material.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 2, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 2 would require a greater amount of truck trips (approximately 810,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

### Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 3, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 3 would require a greater amount of truck trips (approximately 380,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

### Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 4, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 4 would require a greater amount of truck trips (approximately 760,000 more trips assuming the use of 15 cubic yard dump trucks) than the proposed action to supply the large amount of borrow material that would be required to construct the earthen levee.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of the proposed action, all transportation related impacts would be similar to those described under the proposed action for LPV 145. Concrete and steel delivery would require approximately 400 truck trips. Borrow material delivery would require approximately 9,000 truck trips, assuming each truck could hold 15 cubic yards of borrow material.

It should be noted that both of the alternatives would have the same typical section as the existing roadway section. Therefore, the LOS should not be different once construction is complete.

### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 2, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 2 would require a greater amount of truck trips (approximately 36,000 more trips assuming the use of 15 cubic yard dump trucks) to supply the large amount of borrow material that would be required to construct the earthen levee and given that barges via the MRGO would not be an option.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of the proposed action, all transportation related impacts would be similar to those described under the proposed action for LPV 145. Concrete and steel delivery would require approximately 16,500 truck trips. Borrow material delivery would require approximately 100,000 truck trips, assuming each truck could hold 15 cubic yards of borrow material.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 2, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 2 would require a greater amount of truck trips (approximately 1,500,000 more trips assuming the use of 15 cubic yard dump trucks) to supply the large amount of borrow material that would be required to construct the earthen levee and given that barges via the MRGO would not be an option.

Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 3, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 3 would require a greater amount of truck trips (approximately 395,000 more trips assuming the use of 15 cubic yard dump trucks) to supply the large amount of borrow material that would be required to construct the earthen levee and given that barges via the MRGO would not be an option.

Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Transportation*

With the implementation of alternative 4, all transportation related impacts would be similar to, or greater than, those described under the proposed action for LPV 145. Alternative 4 would require a greater amount of truck trips (approximately 785,000 more trips assuming the use of 15 cubic yard dump trucks) to supply the large amount of borrow material that would be required to construct the earthen levee and given that barges via the MRGO would not be an option.

### **3.2.13 Cultural Resources**

These resources are significant because of their association to past events and historically important persons; to design and/or construction values; and for their ability to yield important information about prehistory and history. Additionally, they are significant because of the National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979; as well as other statutes. Cultural resources are publicly significant because of the high value preservation groups and private individuals place on their protection, restoration, enhancement, or recovery.

#### Existing Conditions

Records on file at the Louisiana Division of Archaeology and the CEMVN indicate 12 previously recorded archaeological sites are located within 1 mile of the IER #10 project area; however, none of these sites are situated directly within the project area. Site forms and archaeological reports on file at the Louisiana Division of Archaeology and the CEMVN describe these known sites. They consist of four prehistoric sites, six historic sites, and two multiple component sites. All prehistoric sites are classified as shell middens; two of these prehistoric sites (16SB39 and 16SB154) also contain human burials. Historic period components consist of five sites dating from the 19th century, and one site dating to the late 19th century to early 20th century. Two sites are coastal defense fortifications - Site 16SB84 (Battery Bienvenue) and Site 16SB85 (Tower Dupre). Also identified are the remains of two 19th century plantations (16SB86, Kenilworth Plantation; 16SB122, Poydras Plantation), a 19th century domestic site (16SB146), and a late 19th century to early 20th century artifact scatter (16PL150). The main house of the Kenilworth Plantation is listed on the National Register of Historic Places (NRHP). Site 16SB86 is a contributing element to that listing. Sites 16SB39,

16SB84, 16SB140, and 16SB154 have been declared NRHP eligible. Twenty-two historic standing structures have been recorded within 1 mile of the project area. Two of these are NRHP listed (Sebastopol Plantation and Kenilworth Plantation). No significant historic structures, or NRHP listed or eligible properties, are located in the IER #10 project area.

Seven previously conducted cultural resource surveys fall completely within or intersect the IER #10 project area. Of these, five surveys were conducted on behalf of the USACE, and a sixth was conducted for a private sector firm under contract with the USACE. These include three surveys conducted on behalf of projects to improve shipping channels, one survey performed in conjunction with a levee improvement project, and two surveys performed for proposed borrow pits. Collectively, these surveys resulted in the identification of seven newly recorded archaeological sites, and the re-examination of eight previously recorded archaeological sites. None of these sites are situated in the IER #10 project area.

The CEMVN contracted R. Christopher Goodwin & Associates, Inc, to conduct reconnaissance and Phase 1 terrestrial surveys of the IER #10 project area (Heller et al. 2008). In this study, researchers utilized background research, previous cultural resource investigations review, aerial photographs, satellite imagery, soil and topographic analyses, field reconnaissance information, and Phase 1 survey data to identify and investigate high potential areas for archaeological resources and assess historic structures in the project area. No historic standing structures were identified in the project area. Eight parcels of land in the IER #10 project area were found to exhibit a high potential for archaeological resources. Phase 1 level field investigations conducted in these high potential areas identified two archaeological sites. Site 16SB160 (Mexican and Gulf Line Railroad Embankment) is an elevated linear earthen railroad embankment shown on the 1979 USGS 7.5' Delacroix, Louisiana quadrangle map as "Old Railroad Grade." Shovel testing along the embankment alignment were negative and no other features associated with the railroad, such as wooden cross ties or iron tracks, are present. Researchers conclude that the portion of Site 16SB160 that intersects the IER #10 project area lacks research potential and no further work is recommended.

Site 16SB161 was identified just outside of the IER #10 project area. Although the site was not investigated, a surface scatter of historic artifacts and a brick foundation was observed. The site is likely associated with the 19th century Creedmore Plantation. Shovel tests in the project area located adjacent to the site were negative and suggests the site does not extend into the project area. However, researchers recommend that any proposed ground disturbing activities in the vicinity of the site be limited to 400 feet of the levee centerline. As the project will stay within the levee right-of-way, which is 300 feet from the centerline in that area, the project would not affect Site 16SB161.

The CEMVN held meetings with State Historic Preservation Office (SHPO) staff and Tribal governments to discuss the emergency alternative arrangements approved for NEPA project review and the development of a Programmatic Agreement (PA) to tailor the Section 106 consultation process under the alternative arrangements. The CEMVN formally initiated Section 106 consultation for the Lake Pontchartrain and Vicinity Hurricane Protection Project (100-year), which includes IER #10, in a letter dated April 9, 2007. This letter emphasized that standard Section 106 consultation procedures would be implemented during PA development. A public meeting was held on July 18, 2007 to discuss the working draft PA. It is anticipated that the PA will be executed in the near future.

In letters sent to the SHPO and Indian Tribes dated October 14, 2008, the CEMVN provided project documentation, evaluated cultural resources potential in the project area, and found that the proposed actions would have no impact on cultural resources. The SHPO, Caddo Nation of Oklahoma, Seminole Nation of Oklahoma, Alabama Coushatta Tribe of Texas, Choctaw Nation of Oklahoma and Seminole Tribe of Florida concurred with our "no historic properties affected" finding in letters dated November 17, 2008, October 17, 2008, October 24, 2008, November 4, 2008, November 12, 2008, and November 24, 2008, respectively. No other Indian Tribes responded to the CEMVN's request for comments. Section 106 consultation for the proposed action is concluded. However, if any unrecorded cultural resources are determined to exist within the proposed project boundaries, then no work would proceed in the area containing these cultural resources until a CEMVN archaeologist has been notified and final coordination with the SHPO and Indian Tribes has been completed.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project and would have no impact on significant cultural resources. The existing project ROW has been subjected to severe ground disturbing activities associated with levee, floodwall, and flood gate construction. Recent investigations found no cultural resources in high probability areas and the likelihood for intact and undisturbed cultural resources in these areas is considered extremely minimal. No further cultural resources investigations are recommended.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Cultural Resources*

Based on the review of state records, previous cultural resources studies, and the results of a recent reconnaissance and Phase 1 cultural resources investigation, implementation of the proposed action would have no direct impact on cultural resources. T-wall construction is proposed for the existing project ROW where the probability for intact and undisturbed cultural resources is considered extremely minimal. In addition to the existing project ROW, a 2,300-foot wide corridor situated along both sides of the levee centerline was also evaluated for cultural resources in the LPV 145 project reach. The entire study area was found to contain mostly low-lying and frequently flooded marshland and cypress swamps and was severely impacted by MRGO navigation channel excavation, placement of massive amounts of associated dredged material, and levee construction. No previously recorded cultural resources are documented directly in the project area. Researchers concluded that no high probability areas for cultural resources exist in the LPV 145 reach and no further investigations are warranted (Heller et al. 2008).

### *Indirect Impacts to Cultural Resources*

Implementation of the proposed action would have beneficial indirect impacts by providing an added level of hurricane and storm damage risk reduction to known and unknown cultural resources in the project vicinity by reducing the damage caused by flood events. Twelve archaeological sites, 22 historic standing structures, and 2 NRHP listed properties are located within 1 mile of the project area. Erosion of ground deposits during flood events can result in severe damage and destruction of cultural resources.

### *Cumulative Impacts to Cultural Resources*

Implementation of the proposed action would have beneficial cumulative impacts on historic properties in the New Orleans metropolitan area. This proposed action is part of the ongoing Federal effort to reduce the threat to property posed by flooding. The combined effects from construction of the multiple projects underway and planned for the HSDRRS would reduce flood risk and storm damage to significant archaeological sites, individual historic properties, engineering structures, and historic districts.

### Alternative 2 for LPV 145 Earthen Levee using Stability Berms

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 2 would have the same direct, indirect, and cumulative impacts to cultural resources as those described for the proposed action.

### Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 3 would have the same direct, indirect, and cumulative impacts to cultural resources as those described for the proposed action.

### Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 4 would have the same direct, indirect, and cumulative impacts to cultural resources as those described for the proposed action.

## LPV 146

### Proposed Action for LPV 146 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

The proposed action would stay within the existing project ROW where the likelihood for intact and undisturbed cultural resources is considered extremely

minimal. Implementation of the proposed action would have the same direct, indirect and cumulative impacts as those described under the proposed action for LPV 145.

Alternative 2 for LPV 146 Earthen Levee using Stability Berms

*Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 2 would have the same direct, indirect, and cumulative impacts to cultural resources as those described under the proposed action for LPV 145.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 3 would have the same direct, indirect, and cumulative impacts to cultural resources as those described under the proposed action for LPV 145.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 4 would have the same direct, indirect, and cumulative impacts to cultural resources as those under the proposed action for LPV 145.

LPV147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Cultural Resources*

The LPV 147 project reach is bisected by Bayou Terre aux Boeufs and its associated natural levee, which extends east from the vicinity of Caernarvon through Verret. This important elevated landscape feature provided habitable dry land from prehistoric times to the present. Researchers identified two areas exhibiting a high potential for archaeological sites within a 1,500-foot wide corridor. Phase 1 investigations in these two areas (Parcels 10-01 and 10-2) failed to produce cultural material or any evidence of intact subsurface cultural deposits. Site 16SB160 (Mexican and Gulf Line Railroad Embankment) runs across both parcels and is the remnants of an earthen railroad embankment with no associated subsurface features. Researchers conclude that the site is not eligible for listing on the NRHP. The proposed action would stay within the existing project ROW, where previous levee and road construction has extremely minimized the likelihood for intact and undisturbed cultural resources. No further cultural resources investigations would be recommended for the proposed action. Implementation of the proposed action would have no direct impact on cultural resources.

*Indirect and Cumulative Impacts to Cultural Resources*

Implementation of the proposed action would have the same indirect and cumulative impacts as those described under the proposed action for LPV 145.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct Impacts to Cultural Resources*

Implementation of alternative 2 would have no direct impact on cultural resources. Recent cultural resources investigations identified two high probability areas for cultural resources located within a 1,500-foot wide corridor. The study corridor, which is substantially wider than the proposed alternative, includes the existing project ROW and the proposed new ROW expansion areas. Phase 1 investigations in these two high probability areas did not produce cultural material or any evidence of intact subsurface cultural deposits. No further cultural resources investigations would be recommended for this alternative.

*Indirect and Cumulative Impacts to Cultural Resources*

Implementation of alternative 2 would have the same indirect and cumulative impacts as those described under the proposed action for LPV 145.

LPV 148

Proposed Action for LPV 148 T-wall on Existing Levee

*Direct Impacts to Cultural Resources*

Researchers identified six land parcels within the LPV 148 reach that exhibited a high potential for cultural resources. Phase 1 investigations in these high probability areas identified one archaeological site, Site 16SB161, just outside of the project area. A surface scatter of historic artifacts and a brick foundation was observed and is likely associated with the 19th century Creedmore Plantation. Shovel tests indicate the site does not extend into the project area. However, researchers recommend that any proposed ground disturbing activities in the vicinity of the site be limited to 400 feet of the levee centerline.

No further cultural resources investigations are recommended for the proposed action. The proposed action would stay within the existing ROW, where previous levee construction has extremely minimized the likelihood for intact and undisturbed cultural resources. Implementation of the proposed action would have no direct impact on cultural resources.

*Indirect and Cumulative Impacts to Cultural Resources*

Implementation of the proposed action would have the same indirect and cumulative impacts as those described under the proposed action for LPV 145.

### Alternative 2 for LPV 148 Earthen Levee using Stability Berms

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 2 would have the same direct, indirect, and cumulative impacts to cultural resources as those described under the proposed action for LPV 145.

### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 3 would have the same direct, indirect, and cumulative impacts to cultural resources as those described under the proposed action for LPV 145.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Cultural Resources*

Implementation of alternative 4 would have the same direct, indirect, and cumulative impacts to cultural resources as those described under the proposed action for LPV 145.

## **3.2.14 Aesthetic (Visual) Resources**

### Existing Conditions

As described in section 3.2.1, numerous streams, or portions thereof, within the project area are designated under the Louisiana Scenic Rivers Act. The LDWF describes the river corridors as being largely undeveloped and providing open vistas of solid and broken marshes interspersed with natural levees and spoil banks which support woody vegetation. The relatively unobstructed panoramas contribute to the stream and river wilderness quality and high scenic value.

Visually, the project area is a contrast of natural and urban landscapes. Primary viewpoints, via the scenic streams, into the project area's natural landscape highlight coastal marsh, low lying natural levees, and small ponds and bayous. The natural landscape is contrasted by unnaturally straight channels, and spoil banks, cutting through the coastal marsh, which were most likely caused by navigation and petroleum related exploration. Flood control measures such as earthen berm levees, floodwalls, and water control structures are evident as one travels the MRGO as well as previous borrow areas for levee building material.

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade and any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way. The visual attributes of the project corridor would be temporarily impacted by

construction activities at the project site and by transport activities needed to move equipment and materials to and from the site. The long-term impacts on visual resources would be minimal. Visual access to the proposed project site is minimal and the appearance of the levees and associated structures would remain similar to the existing conditions.

#### Proposed Action for LPVs 145, 146, 147, and 148 T-wall on Existing Levee

##### *Direct and Indirect Impacts to Aesthetic (Visual) Resources*

Expansion of the levee footprints, raising the levee heights, and the addition of floodwalls, would have minimal impacts on visual resources. The visual attributes of the project corridor would be temporarily impacted by construction activities at the project site and by transport activities needed to move equipment and materials to and from the site. The long-term impacts on visual resources would be minimal. Visual access to the proposed project site is minimal and the appearance of the levees and associated structures would remain similar to the existing conditions.

##### *Cumulative Impacts to Aesthetic (Visual) Resources*

Cumulatively, the visual impacts caused by hurricane and storm damage 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 elements lost.

#### Alternative 2 for LPVs 145, 146, 147, and 148 Earthen Levee

##### *Direct, Indirect, and Cumulative Impacts to Aesthetic (Visual) Resources*

With the implementation of alternative 2, all impacts to visual resources would be similar to those described under the proposed action.

#### Alternative 3 for LPVs 145, 146, 147, and 148 Earthen Levee using deep soil mixing and landside shift

##### *Direct, Indirect, and Cumulative Impacts to Aesthetic (Visual) Resources*

With the implementation of alternative 3, all impacts to visual resources would be similar to those described under the proposed action.

#### Alternative 4 for LPVs 145, 146, 147, and 148 Earthen Levee using stability berms with staged construction and wick drains

##### *Direct, Indirect, and Cumulative Impacts to Aesthetic (Visual) Resources*

With the implementation of alternative 4, all impacts to visual resources would be similar to those described under the proposed action.

### 3.2.15 Recreation

#### Existing Conditions

St. Bernard Parish has several popular recreational features including Wildlife Management Areas (WMAs), national and state parks, and local parks and playgrounds. The three state and Federal recreation areas identified in the parish included the following:

1. Biloxi WMA – Managed by the LDWF, the total area of the facility is estimated to be 39,583 acres. The WMA is accessible only by boat via commercial launches at Hopedale and Shell Beach. Activities permitted on site include boat, bank fishing, crabbing, shrimping and shellfishing.
2. Chalmette Battlefield NHPP – The park is the site of the 1815 Battle of New Orleans and the location of a National Cemetery. A ¼ - mile walking trail and picnic tables are some of the facilities on-site.
3. St. Bernard State Park – Located along the Mississippi River, the park provides opportunities for recreation among wetlands and woodlands. The park includes several campsites along with play areas, swimming pools and picnic tables.

Other smaller parks identified in the parish include Sidney Torres Park, Vista Park, and Val Reiss Park. With the exception of St. Bernard State Park, none of the facilities identified previously are located in the vicinity of the proposed alternatives, as shown on figure 26. St. Bernard State Park is located just north of the western end of LPV 148. Some recreational fishing and bird watching along the MRGO are other activities reported in the vicinity of the existing levee.



**Figure 26: Recreation Resources located within the Project Area**

## Discussion of Impacts

### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way of the project. The no action alternative would not have direct impacts on recreational resources with the exception of some construction related activities along the existing right-of-way that would lead to temporary restrictions on bird-watching, fishing, and wildlife viewing.

### LPV 145

#### Proposed Action for LPV 145 T-wall on Existing Levee

##### *Direct Impacts to Recreation*

The proposed action would increase the height and width of the existing levee ROW, providing 100-year level of risk reduction. The proposed action would not have direct impacts on recreational resources with the exception of some construction related activities along the proposed ROW that could lead to temporary restrictions on bird-watching, fishing, and wildlife viewing. The impacts of any material delivery and construction would occur primarily during the construction period. The proposed ROW would not acquire any portion of St. Bernard State Park or affect any recreational facilities located on-site.

##### *Indirect Impacts to Recreation*

Potential indirect impacts from the proposed action would primarily consist of effects on recreational fishing from increased turbidity to the water bodies surrounding the proposed ROW. These impacts could include fish species temporarily leaving the area or reduced feeding activity due to poor sight conditions. Impacts would be reduced to the maximum extent practicable because construction-related runoff would be managed through BMPs.

##### *Cumulative Impacts to Recreation*

Potential cumulative impacts to recreation from the proposed action would involve the combined effects to recreational resources from the multiple LPV flood control projects in the New Orleans area, which could temporarily affect recreational fishing. However, local, state, and Federal areas, within the protected areas, would benefit from additional hurricane and storm damage risk reduction provided by the HSDRRS, as well as from flooding from the Mississippi River. Several proposed or recently approved wetland restoration projects, including CWPPRA projects PO-01 and PO-08 for wetland restoration and PO-30 for shoreline protection, would positively impact the aquatic habitat within the area. These projects would provide additional recreational and fishing opportunities as well as additional habitat for fish species temporarily displaced from turbidity or other construction related impacts.

Alternative 2 for LPV 145 Earthen Levee

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 2, all recreation related impacts would be similar to those described under the proposed action.

Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 3, all recreation related impacts would be similar to those described under the proposed action.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 4, all recreation related impacts would be similar to those described under the proposed action.

LPV 146

Proposed Action for LPV 146 T-wall on Existing Levee

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of the proposed action, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

Alternative 2 for LPV 146 Earthen Levee

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 2, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 3, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 4, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of the proposed action, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

### Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 2, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of the proposed action, all recreation related impacts would be similar to those described under the proposed action for LPV 145. There would be no impacts to the St. Bernard State Park if this or any of the other alternatives were implemented.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 2, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

### Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 3, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

### Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

#### *Direct, Indirect, and Cumulative Impacts to Recreation*

With the implementation of alternative 4, all recreation related impacts would be similar to those described under the proposed action for LPV 145.

### **3.3 SOCIOECONOMIC RESOURCES**

#### Introduction

This section provides an overview of social and economic characteristics and development activity within the project area and assesses the potential impacts of the no action alternative and action alternatives on social patterns and neighborhoods located within the project area of the proposed action and St. Bernard Parish. The analysis addresses the project's potential to affect demographic patterns and the built environment in the area.

The boundary line for the project area follows sections of the existing Chalmette Loop, with modifications as needed for construction activities for the authorized system and proposed improvements. The proposed levee alignment of this section of the programmatic plan extends south southeastward along the MRGO from its intersection with Bayou Bienvenue, then turning further southward then westward similar to the Chalmette Loop to connect with the LPV 149 modification discussed in the IER # 9 analysis.

#### Geographic Area of Analysis

The broadest geographic area of analysis is defined as all of St. Bernard Parish. In the land use and environmental justice subsections 3.3.2 and 3.4 respectively, areas within the parish more closely approximating the area protected by the levees are used as the basis for analysis. Figure 1 presents the location of the parish within the New Orleans metropolitan area. The social and economic considerations discussed in this section are primarily those immediately within the project area and alternative ROW, although social effects associated with the proposed plan can reach into parish areas beyond the ROW. The baseline profile includes a summary of demographic, economic and social characteristics including population, race and ethnicity; median household income and per-capita income, poverty; housing; labor characteristics, and environmental justice.

#### **3.3.1 Demographics and Economics**

##### Population and Ethnic Characteristics of Project Area

The project area for socioeconomic impact analysis of the proposed action is St. Bernard Parish. According to the 2000 U.S. Census, the total population of the parish was reported as 67,229 persons. Whites were the largest race or ethnic group, accounting for 88.3 percent of the total population. Blacks or African-Americans comprised 7.6 percent of the population and are the second largest ethnic group within the area. "Other" race groups accounted for 2.3 percent of the population; this category includes persons who identify themselves as two or more races. Minorities accounted for 15.6 percent of the project area's population. Persons of Hispanic Origin comprised nearly 5 percent of the total population (see table 13).

Following Hurricane Katrina on August 29, 2005, and the subsequent flooding of St. Bernard Parish, several areas within the parish suffered extensive damage leading to large-scale displacement of the resident population. Shortly after Hurricane Katrina, more damage was inflicted on the area by Hurricane Rita. After Orleans Parish, St. Bernard Parish was hardest hit by these two hurricane events within the state. Previous studies have reported that nearly all residents within St. Bernard Parish were affected by the flooding (Congressional Research Service, November 2005). Assessments conducted by FEMA have reported nearly 97 percent of the total population of the parish were affected either by flooding or structural damages to their houses (ibid).

**Table 13: Population and Economic Characteristics for the Project Area Comparison of Project Area with Surrounding Region**

	St. Bernard Parish		Orleans Parish		Louisiana	
	Number	Percentage	Number	Percentage	Number	Percentage
<b>Race</b>						
White Alone	59,356	88.3%	135,956	28.1%	2,856,161	63.9%
Non-Hispanic White	56,723	84.4%	128,871	26.6%	2,794,391	62.5%
Hispanic-White	2,633	3.9%	7,085	1.5%	61,770	1.4%
Non-White Alone	7,873	11.7%	348,718	71.9%	1,612,815	36.1%
Black or African American Alone	5,122	7.6%	325,947	67.3%	1,451,944	32.5%
American Indian and Alaska Native Alone	329	0.5%	991	0.2%	25,477	0.6%
Asian Alone	889	1.3%	10,972	2.3%	54,758	1.2%
Native Hawaiian and other Pacific Islander	14	0.0%	109	0.0%	1,240	0.0%
Other*	1,519	2.3%	10,699	2.2%	79,396	1.8%
<b>Total</b>	<b>67,229</b>	<b>100.0%</b>	<b>484,674</b>	<b>100.0%</b>	<b>4,468,976</b>	<b>100.0%</b>
<b>Minority Population Total**</b>	<b>10,506</b>	<b>15.6%</b>	<b>355,803</b>	<b>73.4%</b>	<b>1,674,585</b>	<b>37.5%</b>
<b>Hispanic Population Total</b>	<b>3,425</b>	<b>5.1%</b>	<b>14,826</b>	<b>31.1%</b>	<b>107,738</b>	<b>2.4%</b>
<b>Age (Years)</b>						
Under 5 Years	4,242	6.3%	33,496	6.9%	317,392	7.1%
5-9 Years	4,639	6.9%	37,133	7.7%	336,780	7.5%
10-14 Years	4,996	7.4%	36,769	7.6%	347,912	7.8%
15-17 Years	3,078	4.6%	22,010	4.5%	217,715	4.9%
18-24 Years	6,200	9.2%	55,234	11.4%	473,801	10.6%
25-34 Years	8,780	13.1%	70,466	14.5%	601,162	13.5%
35-49 Years	15,796	23.5%	106,059	21.9%	1,007,734	22.5%
50-64 Years	10,236	15.2%	66,854	13.8%	649,551	14.5%
65 Years and Above	9,262	13.8%	56,653	11.7%	516,929	11.6%
<b>Total</b>	<b>67,229</b>	<b>100.0%</b>	<b>484,674</b>	<b>100.0%</b>	<b>4,468,976</b>	<b>100.0%</b>
<b>Number of Households</b>						
Female Headed Households (no husband present)	3,636	14.5%	45,740	24.3%	270,072	16.3%
Zero-Car Households	2,597	10.3%	51,435	27.3%	196,305	11.9%
<b>Poverty</b>						
Persons Answering Question on Poverty	66,269		468,453		4,334,094	
Percentage below Poverty	8,687	13.1%	130,896	27.9%	851,113	19.6%
<b>Income</b>						
Per-Capita Income (\$)	\$16,718		\$17,258		\$16,912	
Median Household Income (\$) (1999)***	\$35,939		\$27,133		\$32,566	
<b>Housing Profile</b>						
Total Housing Units	26,790	100.0%	215,091	100.0%	1,847,181	100.0%
Occupied	25,123	93.8%	188,251	87.5%	1,656,053	89.7%
Vacant	1,667	6.2%	26,840	12.5%	191,128	10.3%
<b>Occupied Housing Units</b>	<b>25,123</b>	<b>100.0%</b>	<b>188,251</b>	<b>100.0%</b>	<b>1,656,053</b>	<b>100.0%</b>
Owner Occupied	18,758	74.7%	87,535	46.5%	1,124,995	67.9%
Renter Occupied	6,365	25.3%	100,716	53.5%	531,058	32.1%
Source: U.S. Department of Commerce, Bureau of Census, SF1 and SF3 Data Tables, U.S. Census of Population and Housing, 2000.						
<b>Notes:</b> The Project Area includes St. Bernard Parish, LA.						
* The Other Category includes census categories "some other race alone" and "two or more races".						
** The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), American Indian and Alaskan Native Alone, Asian Alone, Native Hawaiian and Other Pacific Islander and Other categories.						
*** The median household income was calculated by taking the weighted average of the median incomes of all the census tracts in a given study area.						
A linguistically isolated household is one in which no member 14 years old and over (1) speaks only English or (2) speaks a non-English language and speaks English very well.						

Extensive damage to the housing stock, disruption of basic services and infrastructure damage, loss of employment and closure of damaged schools and businesses are just some of the reasons that led to the displacement of the resident population. The displacement of persons after the hurricane events, compounded by lack of credible information regarding the likelihood of evacuees' returning to the area, has resulted in great uncertainty about current population estimates and the overall demographic characteristics of the area (Rand Gulf States Policy Institute, 2006).

Following the disaster local, state, and Federal agencies along with private research organizations such as the Brookings Institution and the Urban Land Institute have published estimates of the current population in the area. The Greater New Orleans Community Data Center (GNOCDC) utilizing mail delivery statistics by the U.S Postal Service has also reported population estimates after the hurricane events (GNOCDC, 2007).

GNOCDC estimates were presented before the Senate Committee on Banking, Housing and Urban Affairs and are viewed as the most credible estimates at this time. As of July 1, 2005, the population within the parish was estimated to be 64,576 persons (U.S Census Bureau). In July 2006, nearly a year after the hurricane events, the population was estimated to be 15,514 persons (U.S Census Bureau). Based on August 2007 estimates by GNOCDC, the total population in the parish is estimated to be 10,098 persons. This accounts for nearly 16 percent of the population reported in July 2005. At this time, no official estimates of the racial composition of the population in the parish are available.

#### Age Characteristics

In 2000, nearly 37 percent of the population within the project area was reported to be in the 25-49 year age groups (see table 13). Persons in the 35-49 year age cohort formed the single largest group and represented nearly a quarter of the estimated population within the project area. Persons in the 45-54 age groups now account for nearly 20 percent of the population, based on estimates prepared after the hurricane events. Persons in the 35 to 44 age group are now estimated to form the second largest age cohort (*2006 Louisiana Health and Population Survey*).

#### Income and Poverty

According to 2000 U.S. Census, per-capita incomes in St. Bernard Parish were \$16,718 in 1999, while the median household income was reported to be \$35,939. Persons living below poverty accounted for 13.1 percent of the population within the parish. As presented in table 13, per-capita incomes of residents within Orleans Parish (\$17,258) and Louisiana (\$16,912) were observed to be higher than the per-capita incomes within St. Bernard Parish. However, poverty levels exhibited by residents in St. Bernard Parish were lower than those exhibited by residents of Orleans Parish and Louisiana.

Although current income and poverty estimates are unavailable at the parish level, nearly one-fifth of the population directly impacted by the storm exhibited poverty levels higher than the national average (Congressional Research Service, November 2005).

#### Housing Profile

In 2000, a total of 26,790 housing units were reported in St. Bernard Parish (U.S Census 2000). Of the 25,123 occupied units within the parish, nearly three-quarters were owner occupied. Nearly six percent of the units were reported as vacant in 2000. Vacancy rates in the parish were reported to be lower than the vacancy rates in neighboring Orleans

Parish (12.5 percent) and the state (10.3 percent). Orleans Parish exhibits nearly equal proportions of owner vs. renter units. In the state of Louisiana, two-thirds of the units are owner occupied. In 2000, median contract rents in the parish were reported to be \$374 and the median housing value was \$82,900. Contract rents and housing values in neighboring Orleans Parish were marginally higher at \$378 and \$88,100 respectively.

The events of Hurricanes Katrina and Rita led to the damage of an estimated 20,247 housing units in St. Bernard Parish. Nearly 78 percent or 19,686 units suffered major or severe damage. An additional 561 units accounting for nearly 2 percent of the units suffered from minor damages (Louisiana Speaks, 2007).

Labor Force Characteristics

The parish economy includes a mix of heavy industrial sectors along with agriculture and fisheries. Wholesale and retail trade, government services and construction are some of the other major economic contributors and employment generators in the parish. Some of the major retail establishments located in the parish prior to the hurricanes included nationwide big-box chains such as Sears, Home Depot, Wal-Mart, and K-Mart. The parish’s port area is home to several businesses including large refining operations operated by American Sugar Refinery and Chalmette Refining, LLC (Exxon-Mobil). Other major employers included the Domino Sugar Corporation, Murphy Oil USA Inc., and Boasso America.

As reported by the 2000 U.S. Census, nearly 3.4 percent of the residents within the parish were unemployed. St. Bernard Parish exhibited the lowest unemployment rates when compared to neighboring Orleans Parish and the state (see table 14). In terms of employment by individual industry sector, the three largest sectors were retail trade, manufacturing and health care and social assistance sectors. Nearly 13 percent of the workforce was employed in the retail trade, followed by 10 percent each in the manufacturing and health care and social assistance sectors respectively. The construction and accommodation and food services sectors were two other major sectors employing nearly nine percent and seven percent of the workforce.

As of March 2008, the total civilian labor force in the parish was estimated to be 7,682 persons of whom 7,278 were employed and 404 were unemployed. The unemployment rate in the parish is estimated to be 5.3 percent. The average weekly wage in the 3<sup>rd</sup> quarter of 2007 was reported as \$850, which would be equivalent to \$21.25 per hour or \$44,200 per year, assuming a 40-hour work week.

**Table 14: Labor Force Characteristics, 2000**

	<b>St. Bernard Parish</b>	<b>Orleans Parish</b>	<b>Louisiana</b>
Total Population - 16 Years and over	52,363	370,38	3,394,546
Not in Labor Force	40.3%	42.2%	40.6%
In Armed Forces	0.3%	0.5%	0.5%
Employed	56.0%	51.8%	54.6%
Unemployed	3.4%	5.5%	4.3%

Source: U.S Census Bureau, SF3 Tables and GNOCDC, <www.gnodc.org>

**3.3.2 Land Use**

The following section summarizes generalized land use patterns along the proposed alternatives developed for the Federal levee system A description of land use patterns is provided by project alternative describing localized land use patterns. Land uses were

identified based on a review of maps and other planning documents such as the *St. Bernard Parish Land Use Study* obtained from the Regional Planning Commission (RPC).

#### LPV 145 Chalmette Loop Levee – Bayou Bienvenue to Bayou Dupre

Based on land use classification obtained from the RPC, the predominant land uses on the protected side of the existing levee are open space parcels interspersed with wetlands. No public parks or recreational areas were identified along this portion of the project area. The MRGO borders the existing levee footprint on the flood side of the structure. No residential or commercial activity was identified between 1 mile and 2 miles of the protected side of the levee. The neighborhoods of Chalmette and Meraux located approximately 2 miles west of the levee footprint are the closest areas of residential and commercial activity within this portion of the project area.

#### LPV 146 Chalmette Loop Levee – Bayou Dupre to Highway 46

Land uses within this portion of project area are similar to those presented in the previous section. Land uses along the protected side of the levee are dominated by wetlands and marshes. The waters of the MRGO border the flood side of the proposed alternative. Two fairly large communities are located west and south-west of the proposed alternative. These include the communities of Violet and Poydras. Both communities are characterized by a mix of residential and commercial uses.

#### LPV 146 (MRGO to Highway 46)

Land uses abutting the MRGO on the flood side of the levee are predominantly open space and marshlands. Wetlands dominate the land uses along the southern end of the alignment. No residential or commercial activity was identified near the existing or proposed footprint of the alternative.

#### LPV 147 – Chalmette Loop Levee – Highway 46 and Bayou Road Flood Gate

The residential neighborhood of Verret was identified less than a quarter-mile from the protected side of the existing footprint along this section. The neighborhood was heavily damaged during the hurricane resulting in the displacement of the resident population. Prior to Hurricane Katrina, the neighborhood was primarily composed of small to medium single-family homes and retail businesses. Other major land uses identified in the area include a fire station owned and operated by the St. Bernard Fire Department (SBFD). The fire station located at 3901 Bayou Road has since been repaired and is currently the station for Engine Company No. 11.

#### LPV 148 – Chalmette Loop Levee – Verret to Caernarvon

Located along the southern boundary of the parish, marshlands were the predominant land uses identified along both sides of the existing levee. Residential and commercial uses with some open spaces characterize the land uses within the neighborhood of Poydras, located nearly a quarter mile north on the protected side of the existing structure. The southern portion of the neighborhood is undeveloped. Some medium single family residential units along with commercial and business uses and open space uses dominate the land uses patterns along Highway 46, a major transportation corridor in the area. The St. Bernard State Park, a major recreational area in the parish is located within the neighborhood of Poydras. The park offers facilities for active recreational uses including camping, hiking, and swimming on a 358-acre site. Campsites with water and

electrical hookup are some of the attractions at the park. The park suffered damages during the hurricane, but has been repaired and re-opened to the public since December 2006.

### Discussion of Impacts

The following section discusses the extent of the project impacts by the alternatives.

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Therefore, the potential for loss of life due to flooding and associated damages to residents, businesses, and public agencies would remain at its current level. Additionally, loss of wages and large scale displacement of residents would result in adverse impacts to persons currently living within the parish. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way. No direct impacts to neighborhood or community cohesion would be anticipated under the no action.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to Land Use and Socioeconomics*

The proposed action would not alter the existing land use along the proposed ROW. No residential or business displacements are expected from the construction of this alternative. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated.

Construction of the proposed action would be expected to result in beneficial long-term and short-term impacts. The long-term benefits would include improvements to the existing HSDRRS to reduce flood risk. Short-term beneficial impacts would include employment generation along with purchases of material within the local economy and the larger region. The proposed construction activities along the ROW could help generate employment and increase income levels, and contribute to a more rapid restoration of the previous local tax base needed for public facilities and services. The proposed additional hurricane and storm damage risk reduction may further encourage the growth of businesses and industries in the study area.

###### *Indirect Impacts to Land Use and Socioeconomics*

Construction of the proposed action would not be expected to change existing land use patterns along the East Bank of St. Bernard Parish. The action would not encourage one type of land use over another. However, the potential exists for an increase in the rate of development within the developable areas of the parish, given the increased hurricane and storm damage risk reduction provided by the raised levees. Additionally, the proposed action would allow for FEMA certification of the 100-year level of risk reduction.

A reduction in insurance rates and the potential costs resulting from flood damage could be expected after the proposed action is complete. Population and long-term employment and income levels in the parish would be expected to increase if the raised levees stimulated growth in the urban area. Although the proposed action would reduce, but not eliminate the risk of flooding, it would still have a beneficial impact on population and long-term employment and income levels in the parish.

During the construction of the proposed action, movement of construction materials and removal of debris to and from the construction site would be required. In order to reduce costs and the construction time period, construction material would be stored in close proximity to the site. Staging areas for construction material have been proposed so as to ensure that construction activities would not result in any adverse impacts to wetlands and other natural resources. In order to minimize any construction related impacts, the following mitigation measures would be followed:

- Preparation of a Maintenance of Traffic Plan (MTP) in consultation with police, fire, and emergency service providers to minimize hardship to communities in the larger area while maintaining traffic flow of emergency service routes.
- Use of low sulfur diesel fuel in construction equipment.
- Limit unnecessary idling times on diesel powered engines to 5-10 minutes.
- Direct diesel powered exhaust away from local residential or building fresh air intakes.
- Use low operating speeds with on-site equipment in order to reduce dust and PM pollutants from tires and brakes.
- Use water or appropriate liquids for dust control during demolition, land clearing, grading; and on materials stockpile or surface; and other activities.
- Cover open-body trucks for transporting materials.

#### *Cumulative Impacts to Land Use and Socioeconomics*

The proposed action would have beneficial cumulative impacts on socioeconomic resources in the New Orleans metropolitan area. The action, in combination with other IER projects, is part of the ongoing Federal effort to reduce the threat to life, health, and property posed by flooding. The combined effects from construction of the multiple projects underway and planned to rebuild the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven events, and thereby, encourage recovery. All segments of the St. Bernard Parish East Bank HSDRRS need to be brought to 100-year level of risk reduction in order to obtain FEMA certification of the system. The increased hurricane and storm damage risk reduction would provide a positive economic impact for St. Bernard Parish. Potential cumulative beneficial impacts of the proposed action would occur particularly when considered in conjunction with potential effects from other flood control projects in the region.

Construction of the proposed action would require steel as one of the key raw materials. IER # 10 alone would be expected to require nearly 230,000 tons of H-pile and 21,000 tons of sheet pile. Popular publications profiling the steel industry have reported supply and demand projections for the U.S steel industry indicate that the “HSDRRS demand for steel will account for a small percentage of U.S. steel production capacity”. It is estimated that the U.S. steel production in 2007 would be approximately 121.4 million tons, including approximately 500,000 tons of H-pile and 175,000 tons of sheet pile. The estimated demand for H-pile and sheet pile due to the HSDRRS program is reported as approximately 300,000 tons and 128,000 tons respectively. The existing supply in the U.S. is expected to adequately meet the demand and based on industry sources, the required quantities can be met without paying a price premium. Based on available information, the HSDRRS program is not expected to place any excessive strain on the local steel industry in any form.

#### Alternative 2 for LPV 145 Earthen Levee

##### *Direct Impacts to Land Use and Socioeconomics*

Under this alternative, nearly 76.83 acres of additional ROW would have to be acquired for the 2011 and 2057 design elevations. In order to permit construction, a construction easement measuring 0.28 acres would be required. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from alternative 2 would be essentially the same as those described for the proposed action.

##### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 2 would be essentially the same as those described for the proposed action.

#### Alternative 3 for LPV 145 Earthen Levees using deep soil mixing and landside shift

##### *Direct Impacts to Land Use and Socioeconomics*

The construction of the proposed alternative would require the acquisition of 9.17 acres of additional ROW. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from alternative 3 would be essentially the same as those described for the proposed action.

##### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 3 would be essentially the same as those described for the proposed action.

Alternative 4 for LPV 145 Earthen Levees using stability berms with staged construction and wick drains

*Direct Impacts to Land Use and Socioeconomics*

The construction of the proposed alternative would require the acquisition of 106.25 acres of additional ROW. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from alternative 4 would be essentially the same as those described for the proposed action.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 4 would be essentially the same as those described for the proposed action.

LPV 146

Proposed Action for LPV 146 T-wall on Existing Levee

*Direct Impacts to Land Use and Socioeconomics*

The design plans recommend the construction of the proposed action on an existing footprint, and no additional ROW or temporary easement would be necessary. No residential or business displacements would be expected from the construction of this alternative. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated.

Construction of the preferred alternative would be expected to result in beneficial long-term and short-term impacts. The long-term benefits would include restoration and, in some cases improvements to the existing HSDRRS to withstand potential storms in the future. Short-term beneficial impacts would include employment generation along with purchases of material within the local economy and the larger region. The proposed construction activities along the ROW could help generate employment and increase income levels, and contribute to a more rapid restoration of the previous local tax base needed for public facilities and services. The proposed additional hurricane and storm damage risk reduction may further encourage the growth of businesses and industries in the study area.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from the proposed action would be essentially the same as those described for the proposed action under LPV 145.

### Alternative 2 for LPV 146 Earthen Levee

#### *Direct Impacts to Land Use and Socioeconomics*

Under this alternative, nearly 1.03 acres of additional ROW would have to be acquired for the 2010 design elevation and an additional 6.53 acres would be required under the 2057 design elevation. In addition to the acquisition of land, an existing fence (ownership currently unknown) within the proposed ROW would have to be relocated 50 feet from its current location. The fence is located along the east side of Highway 46 in the vicinity of the fire station along Bayou Road. Based on a review of aerials of the area, land around the existing fence appears to be vacant and could accommodate the proposed relocation. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from alternative 2 would be essentially the same as those described for the proposed action.

#### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 2 would be essentially the same as those described for the proposed action.

### Alternative 3 for LPV 146 Earthen Levees using deep soil mixing and landside shift

#### *Direct Impacts to Land Use and Socioeconomics*

The design plans recommend the construction of the proposed action on an existing footprint, and no additional ROW would be necessary. However, an existing fence (ownership currently unknown) within the proposed ROW would have to be relocated 50 feet from its current location. The fence is located along the east side of Highway 46 in the vicinity of the fire station along Bayou Road. Based on a review of aerials of the area, land around the existing fence appears to be vacant and could accommodate the proposed relocation. No residential or business displacements would be expected from the construction of this alternative. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated.

#### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 3 would be essentially the same as those described for the proposed action.

### Alternative 4 for LPV 146 Earthen Levees using stability berms with staged construction and wick drains

#### *Direct Impacts to Land Use and Socioeconomics*

The construction of the proposed alternative would require the acquisition of 2.14 acres of additional ROW. In addition to the acquisition of land, an existing

fence (ownership currently unknown) within the proposed ROW would have to be relocated 50 feet from its current location. The fence is located along the east side of Highway 46 in the vicinity of the fire station along Bayou Road. Based on a review of aerials of the area, land around the existing fence appears to be vacant and could accommodate the proposed relocation. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from alternative 4 would be essentially the same as those described for the proposed action.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 4 would be essentially the same as those described for the proposed action.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Land Use and Socioeconomics*

The design plans recommend the construction of the proposed action on an existing footprint, and no additional ROW would be necessary. No relocation of facilities would be required. Due to the absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. Other beneficial long-term and short-term impacts from the proposed action would be essentially the same as those described for the proposed action under previous reaches.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from the proposed action would be essentially the same as those described for LPV 145.

Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

*Direct Impacts to Land Use and Socioeconomics*

The design plans for the alternative recommend the acquisition of 25 acres of additional ROW on either side of the existing levees between Bayou Road and Highway 46. Additionally, nearly 12 acres of borrow pit area would be required to satisfy fill requirements. Four other facilities would have to be relocated to permit construction of the action. These would include a fence (ownership currently unknown), Verret Fire Station located on Bayou Road, an antenna, and a single-family residential home located on Bayou Road. Based on the U.S Census household size estimates for the block group, two to three persons would be displaced by the acquisition of the structure. If the residential unit is occupied, the residents would need to be provided compensation and relocation assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (URA) 49 CFR Part 24.

The fence is located along the east side of Highway 46 in the vicinity of the fire station along Bayou Road. Based on a review of aerials of the area, land around the existing fence appears to be vacant and could accommodate the proposed relocation.

The antenna appears to be used for communication purposes by the St. Bernard Fire Station # 10 located at 3901 Bayou Road. The antenna would need to be relocated prior to the start of construction activities to prevent any permanent impacts to fire protection and emergency services.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 2 would be essentially the same as those described for the proposed action.

LPV 148

Proposed Action for LPV 148 T-wall on Existing Levee

*Direct Impacts to Land Use and Socioeconomics*

The design plans for the proposed action would require the acquisition of 0.54 acres of land. An existing fence surrounding a pump station would need to be relocated 328 feet from this current location. The removal of the Creedmore Drainage Structure would be required under this alternative. Further discussion on the relocation of utilities is provided under section 3.2.8. Due to absence of any communities along the proposed footprint or the construction of any permanent physical barrier between neighborhoods, no impacts to neighborhood or community cohesion would be anticipated. No residential or business displacements would be expected from the construction of this alternative.

Construction of the proposed action would be expected to result in beneficial long-term and short-term impacts. The long-term benefits would include restoration and, in some cases improvements to the existing HSDRRS to withstand potential storms in the future. Short-term beneficial impacts would include employment generation along with purchases of material within the local economy and the larger region. The proposed construction activities could help generate employment and increase income levels, and contribute to a more rapid restoration of the previous local tax base needed for public facilities and services. The proposed additional hurricane and storm damage risk reduction may further encourage the growth of businesses and industries in the study area.

*Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from the proposed action would be essentially the same as those described for LPV 145.

### Alternative 2 for LPV 148 Earthen Levee

#### *Direct Impacts to Land Use and Socioeconomics*

Under this alternative, nearly 276.23 acres and 304.07 acres of additional ROW would have to be acquired for the 2011 and 2057 design elevations, respectively. The proposed alternative would require the relocation of six to eight housing units along Pilate Lane, located within the proposed ROW, as shown on figure 27. The relocation of the housing units and the associated displacement of 12 to 24 persons would have the potential to cause adverse impacts on the existing levels of neighborhood cohesion and community cohesion in the area. Other long-term and short-term impacts from alternative 2 would be essentially the same as those described for the proposed action.

#### *Indirect and Cumulative Impacts to Land Use*

The construction of the alternative would result in adverse effects to displaced persons. The other potential indirect and cumulative impacts on socioeconomic resources from alternative 2 would be essentially the same as those described for the proposed action.

### Alternative 3 for LPV 148 Earthen Levees using deep soil mixing and landside shift

#### *Direct Impacts to Land Use and Socioeconomics*

The construction of the proposed alternative would require the acquisition of 71.85 acres of additional ROW. Similar to the direct impacts presented under alternative 2, the following alternative would also require the relocation of the fence surrounding a pump station and the removal of the Creedmore Drainage Structure. Further discussion on the relocation of utilities is provided under section 3.2.8. No residential or business displacements would be expected from the construction of this alternative.

Other beneficial long-term and short-term impacts from alternative 3 would be essentially the same as those described for the proposed action.

#### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 3 would be essentially the same as those described for the proposed action.

### Alternative 4 for LPV 148 Earthen Levees using stability berms with staged construction and wick drains

#### *Direct Impacts to Land Use and Socioeconomics*

The construction of the proposed alternative would require the acquisition of 303.42 acres of additional ROW. The proposed alternative would require the relocation of six to eight housing units within the proposed ROW, as shown on figure 27. The relocation of the housing units and the associated displacement of 12 to 24 persons would have the potential to cause adverse impacts on the existing levels of neighborhood cohesion and community cohesion in the area.

Other long-term and short-term impacts from alternative 4 would be essentially the same as those described for the proposed action.

#### *Indirect and Cumulative Impacts to Land Use and Socioeconomics*

Potential indirect and cumulative impacts on socioeconomic resources from alternative 4 would be essentially the same as those described for the proposed action.

### **3.4 ENVIRONMENTAL JUSTICE**

The Environmental Justice (EJ) analysis for the proposed project follows the guidance and methodologies recommended in the Federal CEQ's Environmental Justice Guidance under the National Environmental Policy Act (December 1997). Executive Order 12898 Federal Actions To Address Environmental Justice in Minority Populations and Low Income Populations, issued in 1994, directs Federal and state agencies to incorporate EJ as part of their mission by identifying and addressing the effects of all programs, policies, and activities on minority and low-income populations. The fundamental principles of environmental justice are as follows:

- Ensure the full and fair participation by all potentially affected communities in the decision-making process;
- Prevent the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations; and
- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

In addition to Executive Order 12898, the EJ analysis is being developed per requirements of "Department of Defense's Strategy on Environmental Justice" (March 24, 1995).

Per the above directives, EJ analysis will identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of the project on minority and low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the study area, as well as community outreach activities such as stakeholder meetings with the affected population.

Census Block Group statistics from the 2000 Census and Environmental Systems Research Institute (ESRI) estimates for year 2007 were utilized for EJ 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, EJ 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 EJ impacts.

#### Existing Conditions

All Census Block Groups within a 1-mile radius of the IER # 10 footprint are defined as the IER # 10 project area. As presented in table 15, the percentage of minority persons in

2000 within the IER # 10 project area (18.5 percent) was slightly higher than the percentage of minority persons within St. Bernard Parish (15.6 percent), but lower than the percentage of minorities within the state (37.5 percent). Levels of poverty for residents within the project area also exhibited similar trends.

Due to large scale displacement of the resident population after the hurricane events of 2005, U.S Census estimates on the racial mix of the population are unavailable. However, based on estimates reported by ESRI, the low income and minority population greatly increased from 2000 to 2007. This is likely due to the temporary change in demographics caused by the displacement of households after Hurricane Katrina. St. Bernard Parish had several FEMA trailer sites, which altered the demographic profile of the parish. Because of the continuous shift in demographics and household income, data analysis cannot determine if the project area is currently a low income or minority community, but the area will likely stabilize over time to its pre-Katrina profile as a non-low income, non-minority community. However, there are communities within the project area that are low income and/or minority communities, notably in the unincorporated areas of Violet and Poydras.

Areas bordering the Federal levee system are mostly uninhabited and the proposed action would not be anticipated to result in any adverse impacts to EJ communities. The design plans for the proposed alternatives indicate that the action would not result in any residential displacements or permanent construction impacts. In spite of the lack of reliable population estimates along this corridor, construction of the proposed action would abide by the principles of Executive Order 12898 on Environmental Justice. The section on Public Involvement (section 6.1) presents details on the various on-going activities undertaken by the USACE to involve the public in the overall development of the project and comply with the guidelines contained in Executive Order 12898.

**Table 15: Race and Income Characteristics, 2000 and 2007**

	<b>IER # 10 Project Area</b>		<b>St. Bernard Parish</b>		<b>Louisiana</b>	
	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>	<b>Number</b>	<b>%</b>
Minority Population, 2000	1,347	18.5%	10,506	15.6%	1,689,422	37.5%
Estimated Minority Population, 2007	2,027	47.8%	8,851	37.7%	1,741,453	39.8%
Low Income Population, 2000	1,301	18.6%	8,687	13.1%	851,113	19.6%
* Estimated Low Income Population, 2007	458	30.1%	2,134	23.8%	351,703	21.4%

Source: 2000 Data from U.S Census. 2007 estimates developed by ESRI

### Discussion of Impacts

#### No Action

Under the no action alternative, the current HSDRRS would remain at the originally authorized grade rather than the 100-year level of risk reduction. Therefore, areas in minority and low-income communities subject to flooding would remain at the current level of flood risk under the no action alternative. Any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way. No disproportionate impacts to low-income or minority residents would be anticipated.

## LPVs 145, 146, and 148

### Proposed Action for LPVs 145, 146, and 148 T-wall on Existing Levees

#### *Direct Impacts to Environmental Justice*

The routing of LPVs 145, 146, and 148 are mostly away from inhabited areas with the exception of the eastern end of LPV148 near Bayou Road and Pilate Lane. Based on 2000 U.S Census data, the census block bordering Bayou Road and Pilate Lane reported a higher concentration of minority persons than the parish (89.7 percent versus 15.6 percent). However, the proposed action would not require any additional ROW or result in the acquisition of any residential structures or result in displacement of persons along the proposed ROW.

#### *Indirect Impacts to Environmental Justice*

As the proposed action would not be expected to result in the displacement of minority or low-income persons under any of the three reaches identified above, there would not be any indirect impacts on such persons. However, movement of construction related material and debris along roadways in the vicinity of LPV 148 would have the potential to cause some temporary noise and traffic impacts to everyone living in the area. As these impacts would be expected to last only until the completion of construction related activities they would be temporary. Mitigation to address these temporary impacts is presented in section 7.

#### *Cumulative Impacts to Environmental Justice*

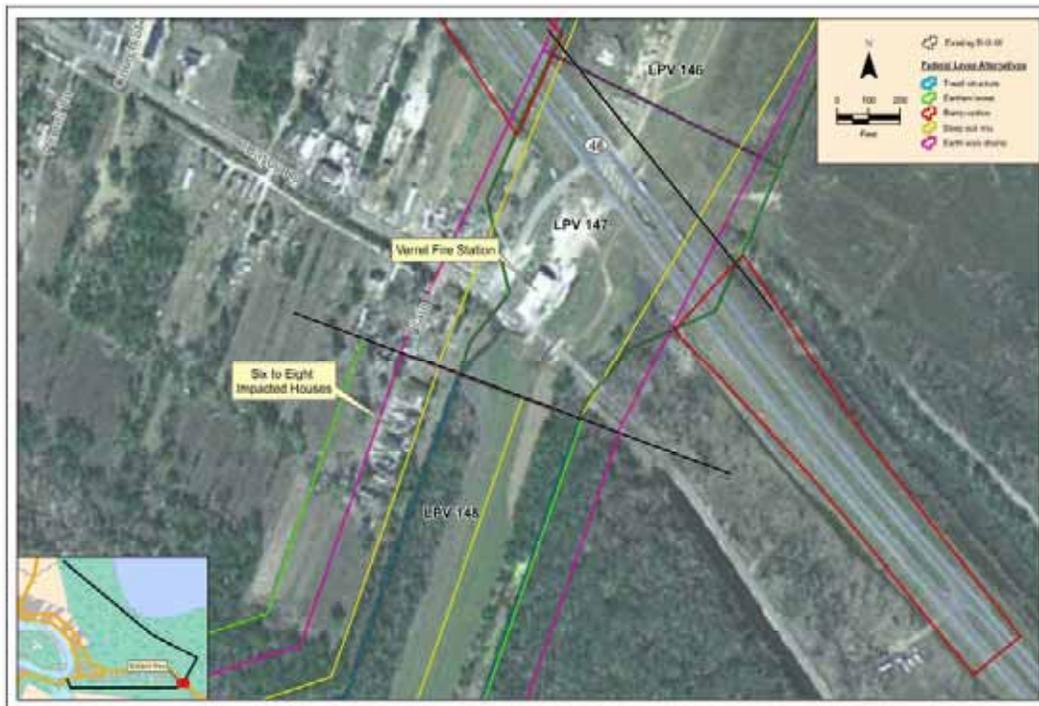
Cumulative EJ impacts will be discussed in the CED at the conclusion of small neighborhood focus meetings. The CED will document the environmental justice impacts that may impact minority and low-income population due to the proposed action and all other activities in the area.

### Alternative 2 for LPVs 145, 146, and 148 Earthen Levee

#### *Direct Impacts to Environmental Justice*

Alternative 2 under LPVs 145 and 146 would require additional ROW. The extent of additional ROW required under the individual reaches is presented in the Socioeconomics Resources Section. However, the additional ROW required is currently vacant land and would not result in the acquisition of any housing units.

The design plans for alternative 2 under LPV 148 would require additional ROW. Additionally, the proposed design plans indicate the acquisition of housing units located along Pilate Lane. Based on aerial photography, six to eight housing units were identified along the proposed ROW (see figure 27). Assuming a household size of 2 persons, 12 to 24 persons could be displaced under this alternative. Based on 2000 U.S Census data, the affected census block in this area reports a greater concentration of minority and low-income persons than the parish. Field surveys conducted prior to land acquisition would determine the exact number of occupied housing units and the racial composition of the affected population.



**Figure 27: Potential Residential Impacts along Pilate Lane**

*Indirect Impacts to Environmental Justice*

Alternative 2 under LPVs 145 and 146 would be located in and around uninhabited land and would not be expected to result in any indirect impacts. However, movement of construction related material and debris along roadways in the vicinity of LPV 148 would have the potential to cause some temporary noise and traffic impacts to everyone living in the area. As these impacts would be expected to last only till the completion of construction related activities they would be temporary. Mitigation to address these temporary impacts are presented in section 7.

Under alternative 2 under LPV 148, displacement of 12 to 16 persons would be anticipated. In addition to displacement related impacts, movement of construction related material and debris along roadways in the vicinity of LPV 148 would have the potential to cause some temporary traffic and noise related impacts to minority and low-income persons living in the area. The construction related impacts would also be borne by non-minority and non low-income persons, and would not disproportionately impact only minority and low-income persons. However, as these impacts would be expected to last only until the completion of construction related activities, they would be temporary. Mitigation to address these temporary impacts are presented in section 7.

*Cumulative Impacts to Environmental Justice*

Cumulative EJ impacts will be discussed in the CED at the conclusion of small neighborhood focus meetings. The CED will document the environmental justice impacts that may disproportionately impact minority and low-income population due to the proposed action and all other activities in the area.

Alternative 3 for LPVs 145, 146, and 148 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to Environmental Justice*

There would be no direct EJ related impacts under alternative 3. As the proposed action would not be expected to result in the displacement of minority or low-income persons, there would not be any indirect disproportionate impacts on such persons.

Alternative 4 for LPVs 145, 146, and 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to Environmental Justice*

With the implementation of alternative 4, all EJ related impacts would be similar to those described under alternative 2.

LPV 147

Proposed Action for LPV 147 Highway 46 over T-wall with overpass

*Direct Impacts to Environmental Justice*

Design plans for the proposed action indicate that it could be constructed mostly within the existing ROW. There would not be relocations of any facility under this alternative. The proposed action would therefore not be anticipated to result in any direct EJ impacts.

*Indirect Impacts to Environmental Justice*

As the proposed action would not be expected to result in the displacement of minority or low-income persons, there would not be any indirect disproportionate impacts on such persons. However, movement of construction related material and debris along roadways in the vicinity of LPV 147 would have the potential to cause some temporary noise and traffic impacts to minority and low-income persons living in the area. As these impacts would be expected to last only till the completion of construction related activities they would be temporary. Mitigation to address these temporary impacts is presented in section 7.

*Cumulative Impacts to Environmental Justice*

Cumulative EJ impacts will be discussed in the CED at the conclusion of small neighborhood focus meetings. The CED will document the environmental justice impacts that may disproportionately impact minority and low-income population due to the proposed action and all other activities in the area.

## Alternative 2 for LPV 147 Earthen Levee, Highway 46 over levee with overbuild

### *Direct Impacts to Environmental Justice*

The design plans for alternative 2 recommend the acquisition of one residential unit located at 3840-A Bayou Road. Based on 2000 U.S Census data, the census block bordering Bayou Road and Pilate Lane reported a higher concentration of minority persons than the parish (89.7 percent versus 15.6 percent). Field surveys conducted prior to land acquisition would determine the exact number of occupied housing units and the racial composition of the affected population. Based on current population estimates of the affected census block this particular alternative would have the potential to exert direct EJ impacts.

### *Indirect Impacts to Environmental Justice*

In addition to displacement related impacts, movement of construction related material and debris along roadways in the vicinity of LPV 147 would have the potential to cause some temporary impacts to minority and low-income persons living in the area. As these impacts would be temporary in nature, they would be expected to last only till the completion of construction related activities.

### *Cumulative Impacts to Environmental Justice*

Cumulative EJ impacts will be discussed in the CED at the conclusion of small neighborhood focus meetings. The CED will document the environmental justice impacts that may disproportionately impact minority and low-income population due to the proposed action and all other activities in the area.

## **3.5 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE**

Under Engineer Regulation (ER) 1165-2-132 the reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within a proposed area of construction is required. ER 1165-2-132 identifies the CEMVN HTRW policy to avoid the use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (e.g., Resource Conservation and Recovery Act [RCRA] regulated), pollutants and other contaminants, which are not regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), will be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

An ASTM E 1527-05 Phase I Environmental Site Assessment (ESA) was completed for the project area: **HTRW-07-53, Chalmette Loop Levees and Bayou Bienvenue and Bayou Dupré Control Structures, St. Bernard Parish, Louisiana**, submitted by URS Group, Inc. on 1 September 2007. A copy of the Phase I ESA will be maintained on file at the CEMVN. The Phase I ESA documented the Recognized Environmental Conditions (RECs) for the project area. If a REC cannot be avoided, due to the necessity of construction requirements, the CEMVN may further investigate the REC; to confirm presence or absence of contaminants, and to plan actions to avoid possible contaminants. Federal, state, or local coordination may be required. Because the CEMVN plans to avoid RECs, the probability of encountering HTRW in the project area is low.

### Existing Conditions

Conditions within 1,000 feet of the centerline of the existing HSDRRS were assessed through a Phase I ESA performed for the entire length of each HSDRRS segment. No Recognized Environmental Conditions (RECs) were found within the project right-of-way, although several possible RECs were identified on adjacent properties.

### Discussion of Impacts

#### No Action

Under the no action alternative, any construction necessary to bring the HSDRRS up to current, post-Katrina design standards, would occur within the existing right-of-way. No RECs were identified in the September 2007 Phase I ESA within the existing ROW. Based on the most recent information available, the probability of encountering HTRW in the course of construction activities would be low.

#### LPV 145

##### Proposed Action for LPV 145 T-wall on Existing Levee

###### *Direct Impacts to HTRW*

No RECs were identified in the September 2007 Phase I ESA within the potential ROW for the proposed action. Based on the most recent information available, the probability of encountering HTRW in the course of this project would be low.

###### *Indirect Impacts to HTRW*

No RECs were identified in the September 2007 Phase I ESA within the potential ROW of the proposed action nor on adjoining properties that have the potential to create indirect impacts. The probability of encountering HTRW in the course of this project would be low, and no indirect impacts from HTRW would be anticipated.

###### *Cumulative Impacts to HTRW*

No RECs were identified in the September 2007 Phase I ESA within the potential ROW of the proposed action, nor on adjoining properties that have the potential to create direct or indirect impacts. The probability of encountering HTRW in the course of this project would be low; therefore, no cumulative impacts from HTRW would be anticipated.

##### Alternative 2 for LPV 145 Earthen Levee

###### *Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 2, the probability of encountering HTRW in the course of this project would be low.

Alternative 3 for LPV 145 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 3, the probability of encountering HTRW in the course of this project would be low.

Alternative 4 for LPV 145 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 4, the probability of encountering HTRW in the course of this project would be low.

LPV 146

Proposed Action for LPV 146 T-wall on Existing Levee

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of the proposed action, the probability of encountering HTRW in the course of this project would be low.

Alternative 2 for LPV 146 Earthen Levee

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 2, the probability of encountering HTRW in the course of this project would be low.

Alternative 3 for LPV 146 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 3, the probability of encountering HTRW in the course of this project would be low.

Alternative 4 for LPV 146 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 4, the probability of encountering HTRW in the course of this project would be low.

## LPV 147

### Proposed Action for LPV 147 Highway 46 over T-wall with overpass

#### *Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of the proposed action, the probability of encountering HTRW in the course of this project would be low.

### Alternative 2 for LPV 147 Earthen levee, Highway 46 over levee with overbuild

#### *Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 2, the probability of encountering HTRW in the course of this project would be low.

## LPV 148

### Proposed Action for LPV 148 T-wall on Existing Levee

#### *Direct Impacts to HTRW*

Several RECs (or potential RECs) were observed within 300 feet to 1,000 feet of the designated end of LPV 148. While none of the potential RECs are within the potential ROW for the proposed action, the potential for impacts is present from possible migration of contamination into the project area.

The possible REC is Elevating Boats Inc., located at 900 St. Bernard Parkway. This site is listed in the EDR database and is located within 1000 feet of the current levee. The site visit confirmed the location of the shipyard and the presence of several areas with visible soil staining and leaking drums. If contamination is found to exist, contaminated soil would be removed, if the project could not be designed to avoid these areas.

Two areas are of potential environmental concern:

- 1) The area adjacent to the levee on the western boundary of the levee study area. This area is just south of St. Bernard Parkway. There appears to be a clearing that has several construction debris areas, an abandoned storage warehouse, several scrapped buses, and a tanker truck with unknown contents.
- 2) An area adjacent to the levee on the eastern boundary of the levee study area. This area is southwest of the intersection of the levee and Bayou Road, at the end of a residential road. There is an area where several drums, abandoned trucks, cars, and tractors, as well as other miscellaneous materials, have been dumped.

#### *Indirect Impacts to HTRW*

The Phase I ESA for LPV 148 identified several RECs (or potential RECs) on the adjoining property occupied by Elevated Boats Inc. None of the RECs were

close to the terminal segment of LPV148, and the probability for indirect impacts from possible migration of contamination into the project area is low. The RECs on the adjoining property are within the project area of LPV 149, which will be addressed in IER # 9. The extent and significance of the contamination, if any, with regard to potential indirect impacts can be better assessed when combined with the HTRW findings of IER # 9.

*Cumulative Impacts to HTRW*

None of the RECs identified on the adjoining properties would have the potential to create cumulative impacts on the project area for LPV 148.

Alternative 2 for LPV 148 Earthen Levee

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 2, the probability of encountering HTRW in the course of this project would be similar to that for the proposed action.

Alternative 3 for LPV 148 Earthen Levee using deep soil mixing and landside shift

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 3, the probability of encountering HTRW in the course of this project would be similar to that for the proposed action.

Alternative 4 for LPV 148 Earthen Levee using stability berms with staged construction and wick drains

*Direct, Indirect, and Cumulative Impacts to HTRW*

With the implementation of alternative 4, the probability of encountering HTRW in the course of this project would be similar to that for the proposed action.

**Phase I Environmental Assessment-ADDENDUM-3-24-2009**

A report in September 2007, *Phase I Environmental Site Assessment Chalmette Loop Levees and Bayou Bienvenue and Bayou Dupre Control Structures*, presented no recognized environmental concerns (RECs) within the vicinity of LPV 145, LPV 146, and LPV 147 as stated in IER #10. On March 20<sup>th</sup> and 23<sup>rd</sup>, 2009, the Engineering Division's Environmental Team conducted a HTRW site investigation of the levees addressed in the Phase I ESA. Site reconnaissance found no existing RECs or areas of environmental concern as reported by the addendum submitted to USACE New Orleans District Hurricane Protection Office on March 24, 2009.

A report in November 2006, *Phase I Environmental Site Assessment Chalmette Loop Levee Verret to Caernarvon (LPV 148)*, presented one REC, Elevated Boat Inc., and two areas of auto and miscellaneous debris as stated in IER #10. *Phase II Environmental Site Assessment. LPV 149 Floodwall and Gate Locations*, in August 2008, analyzed soils for Chemicals of Concern (COCs) in the vicinity of LPV 149, which is closer in proximity to the REC than LPV 148. Contamination levels were below state industrial RECAP standards and the probability of encountering contamination levels of significance at LPV 149 was considered low. Contamination concern at LPV 148 due to the REC; therefore, is considered low due to the results of the Phase II ESA.

On March 20<sup>th</sup> and 23<sup>rd</sup>, 2009, the Engineering Division's Environmental Team conducted a HTRW site investigation of LPV 148. The debris sites are still present but are considered to be of little concern to the project area. Site reconnaissance found no existing RECs or new areas of environmental concern as reported by the addendum submitted to USACE New Orleans District Hurricane Protection Office on March 24, 2009.

#### **4. CUMULATIVE IMPACTS**

NEPA requires a Federal agency to consider not only the direct and indirect impacts of a proposed action, but also the cumulative impacts of the action. Direct, indirect, and cumulative impacts of the proposed action are evaluated specifically for each IER, but will also be addressed within the draft CED that is being prepared by the USACE CEMVN. A cumulative impact is defined as the "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR §1508.7)." Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

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 USACE 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. The discussion provided below describes an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed.

Cumulative impacts on significant resources were addressed as part of section 3 for each of the individual components (e.g., LPV 145, 146, 147, 148) of IER # 10. The purpose of this section is to provide an analysis of the cumulative impacts of the overall Chalmette Loop Levee when added to other past, present, and reasonably foreseeable future projects. The analysis focuses on the St. Bernard Parish area. The first step in the analysis is a description of the projects considered in the analysis.

## 4.1 METHODOLOGY

To assess cumulative impacts, a broad range of activities and patterns of environmental changes that are occurring in the vicinity of the project were considered. The guidelines were followed for the cumulative impact analyses in this document:

- The proximity of the projects to each other either geographically or temporally.
- The probability of actions affecting the same environmental resource, especially systems that are susceptible to development pressures.
- The likelihood that the project will lead to a wide range of effects or lead to a number of associated projects.
- Whether the effects of other projects are similar to those of the project under review
- The likelihood that the project will occur.
- Temporal aspects, such as the project being imminent.

## 4.2 DESCRIPTIONS OF OTHER PROJECTS CONSIDERED

The project area has experienced a myriad of past projects and programs that have altered the natural and human environment. In addition, current reconstruction efforts as a result of Hurricanes Katrina and Rita are taking place throughout southeast Louisiana. Although the full extent of construction in St. Bernard Parish and throughout the Gulf Coast in the future is unknown, several ongoing and reasonably foreseeable future projects are considered for this cumulative impact assessment. It is within this context and landscape that the IER # 10 project is proposed.

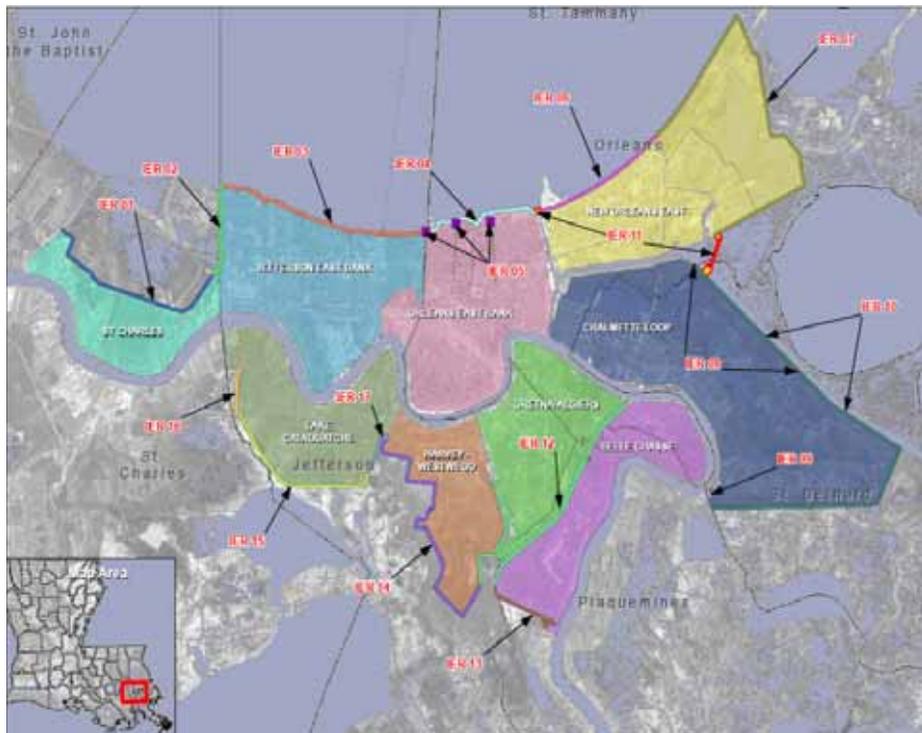
The Water Resources Development Act of 2007 (WRDA 07) became law in November 2007. This bill authorized several additional projects and studies in the general vicinity of the IER # 10 project area and could contribute to cumulative impacts. WRDA 07 included authorization of the LPV and WBV HSDRRS projects to raise hurricane and storm damage risk reduction levels to 100-year levels. WRDA 07 also authorized coastal restoration projects, Morganza-to-the-Gulf hurricane protection, hurricane protection in Jean Lafitte and lower Jefferson Parish, a study of coastal area damage that could be attributable to the Army Corps of Engineers, the MRGO deep-draft deauthorization, an EIS for the IHNC lock, and the formation of a Coastal Louisiana Ecosystem Protection and Restoration Task Force (Alpert 2007). The majority of these projects or studies still require specific appropriations. These additional projects could contribute to resource impacts, either adversely, or with long-term beneficial impacts such as is the case with the coastal restoration projects.

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 USACE on a system-wide scale. The draft CED will describe the integration of individual IERs into a systematic planning effort. Overall cumulative impacts, a finalized mitigation plan, and future operations and maintenance requirements will also be included. The following discussion describes an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed. Table 16 gives an overview of these other HSDRRS projects.

#### 4.2.1 CEMVN HSDRRS IERs

The HSDRRS is divided into three USACE authorized projects: 1) LPV; 2) WBV; and 3) New Orleans to Venice (NOV). The NOV and WBV projects have no or limited discussion in this IER because their alignments are not located within the project region and, with the exception of some positive cumulative socioeconomic impacts, these projects would not greatly increase cumulative impacts. The various projects that make up the LPV projects include the construction of 125 miles of levees, concrete floodwalls and other structures. Many of these projects are broken out by area and referred to by their IER document number. Figure 28 shows LPV and WBV IER projects within the Greater New Orleans area. A summary of the LPV IER projects that fall within proximity to IER # 10 is provided below.

- **IER # 6, LPV, New Orleans East, New Orleans Lakefront Levee to Citrus Lakefront Levee, N.O. Airport Floodwall to Paris Road, Orleans Parish** – investigates improvement of approximately six miles of levees, floodwalls, and flood gates that extend from the IHNC and the New Orleans Lakefront Airport east to Paris Road – locally known as the Citrus Lakefront. Foreshore protection enhancements along this reach could include the dredging of access channels in Lake Pontchartrain.



**Figure 28: HSDRRS Lake Pontchartrain and Vicinity and West Bank and Vicinity IER Projects**

- **IER # 7, LPV, New Orleans East, New Orleans East Lakefront Levee to New Orleans East Back Levee, Paris Road to East bank of Michoud Canal, Orleans Parish** – investigates improvement of approximately 19.3 miles of levee and three flood gates stretching from the New Orleans East Lakefront Levee to New Orleans East Back Levee – CSX Railroad to Michoud Canal. This portion of the LPV HSDRRS encompasses a large portion of the Bayou Sauvage NWR.

Alternative alignments under consideration include realignment along the Maxent Canal east of Bayou Sauvage NWR. The northern portion of this reach could include foreshore protection enhancements requiring dredged access channels in Lake Pontchartrain.

- **IER # 8, LPV, Bayou Dupre Control Structure, St. Bernard Parish** – involves improvement or replacement of the Bayou Dupre Flood Gate. Alternatives under consideration include the construction of new structures on either the flood side or protected side of the existing flood gate.
- **IER # 9, LPV, Caernarvon Floodwall, St. Bernard Parish** – evaluates a range of alignments as part of improvements to the Caernarvon floodwall. Depending on the chosen alignment there could be major impacts to infrastructure, residences, and wetlands.
- **IER # 11 Tier 2 Borgne** – evaluates the potential impacts associated with constructing a surge barrier on Lake Borgne. A Decision Record was signed for IER # 11, Tier 2 Borgne on 27 October 2008.
- **IER # 11 Tier 2 Lake Pontchartrain, LPV, IHNC, Orleans Parish** – evaluates a new structure proposed within the Pontchartrain 2 location range which extends from the Seabrook Bridge to 2,500 feet south of the bridge on the IHNC. This is the Tier 2 review for alternatives to protect against storm surge from the IHNC originating from Lake Pontchartrain. This project was initially evaluated in IER # 11, Tier 1 (USACE 2008b). A Decision Record was signed for IER # 11, Tier 1 on 14 March 2008.
- **IER # 18 - Government Furnished Borrow Material (GFBM), Jefferson, Orleans, Plaquemines, St. Charles and St. Bernard Parishes, Louisiana and IER # 19 - Contractor Furnished Borrow Material (CFBM), Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, and Hancock County, MS** - The purpose of these two IERs is to identify borrow areas that contain suitable material that can be excavated to supply clay material to Federal HSDRRS levee and floodwall projects. A Decision Record was signed for IER # 18 on 21 February 2008. A Decision Record was signed for IER # 19 on 14 February 2008.
- **IER # 20, LPV Hurricane Protection Project – Mitigation: Manchac Wildlife Management Area Shoreline Protection Modification, St. John the Baptist Parish.** This mitigation IER will describe mitigation planned for impacts caused by the originally authorized LPV Hurricane Protection Project.
- **IER # 23, Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes and Hancock County, MS** – evaluates the potential impacts associated with the actions proposed by landowners as a result of excavating borrow areas for use in construction of the HSDRRS. A Decision Record was signed for this project on 5 June 2008.

**Table 16. HSDRRS Impacts and Compensatory Mitigation to be Completed**

IER	Parish		Non-wet		Swamp		Marsh		EFH
			acres	AAHUs	acres	AAHUs	acres	AAHUs	
1 LPV, La Branch Wetlands Levee	St. Charles	Protected Side	-	-	137.05	73.99	-	-	-
		Flood Side	-	11.33	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	-	-	-	-	-	-	-
10 LPV, Chalmette Loop Levee	St. Bernard	Protected Side	-	38.32	-	-	106.55	57.31	-
		Flood Side	-	35.31	-	-	323.04	209.94	-
11 Tier 2 Borgne IHNC Protection	Orleans, St. Bernard	Protected Side	-	-	-	-	-	-	-
		Flood Side	-	15.00	-	-	186.00	24.33	-
12 GIWW, Harvey, Algiers	Jefferson, Orleans, Plaquemines	Protected Side	-	251.70	-	-	-	-	-
		Flood Side	-	2.30	74.90	38.50	-	-	-
14 WBV, Westwego to Harvey Levee	Jefferson	Protected Side	-	45.00	-	-	-	-	-
		Flood Side	-	45.50	29.75	17.02	-	-	-
15 WBV, Lake Cataouatche Levee	Jefferson	Protected Side	-	23.50	-	-	-	-	-
		Flood Side	-	3.60	-	-	-	-	-
17 Company Canal Floodwall	Jefferson	Protected Side	-	5.50	-	-	-	-	-
		Flood Side	-	-	19.00	17.09	-	-	-
18 GFBM	Jefferson, Plaquemines, St. Charles	Protected Side	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-
18 GFBM	Orleans	Protected Side	226.00	-	-	-	-	-	-
		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	-	-	-	-	-	-	-

IER	Parish		Non-wet		BLH		Swamp		Marsh		EFH <i>acres</i>
			<i>acres</i>	<i>AAHUs</i>	<i>acres</i>	<i>AAHUs</i>	<i>acres</i>	<i>AAHUs</i>	<i>acres</i>	<i>AAHUs</i>	
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	-	-	-	-	-	-	-	-	-
Totals		Protected Side	1473.09	514.92	364.02	232.56	137.05	73.99	106.55	57.31	00.00
		Flood Side	-	-	113.04	46.73	300.62	192.58	509.04	234.27	26.00
		Both	1473.09	514.92	477.06	279.29	437.67	266.57	615.59	291.58	26.00

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

- **IER # 24, Stockpile Sites for Borrow Material, Orleans and St. Bernard Parishes** – evaluates the potential impacts associated with the actions proposed by the government as a result of stockpiling borrow material for use in construction of the HSDRRS.
- **IER # 25, Government Furnished Borrow Material, Orleans, Jefferson and St. Bernard Parishes, Louisiana** – evaluates the potential impacts associated with the actions proposed by the USACE while excavating borrow areas for use in construction of the HSDRRS.
- **IER # 26, Pre-Approved Contractor Furnished Borrow Material # 3, Jefferson, Plaquemines, and St. John the Baptist Parishes, Louisiana and Hancock County, Mississippi** – proposes to approve five potential borrow sites to be used under the Pre-Approved Contractor Furnished borrow areas program to supply levee building material. A Decision Record was signed for this project on 21 October 2008.

Habitat restoration, stabilization, and creation projects that could contribute to cumulative impacts on resources in the IER # 10 study area are discussed in the following sections.

#### **4.2.2 Habitat Restoration, Creation, and Shoreline Stabilization Projects**

##### 4.2.2.1 Louisiana Coastal Protection and Restoration Study

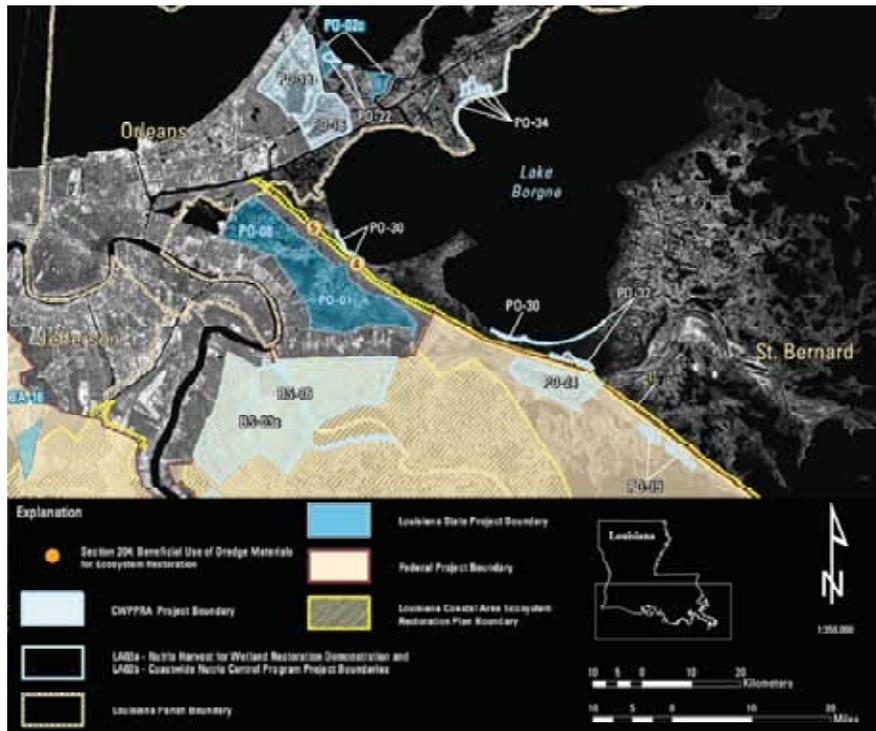
The Louisiana Coastal Protection and Restoration (LACPR) study was established to identify risk reduction measures that can be integrated to form a comprehensive system that will provide enhanced protection of coastal communities and infrastructure, as well as for restoration of coastal ecosystems. The LACPR study addresses the full range of structural and non-structural hurricane and storm damage risk reduction measures and coastal restoration alternatives available, including those needed to provide comprehensive Category 5-Hurricane protection. A Final Technical Report will be produced, with recommendations related to enhanced hurricane protection and restoration of coastal ecosystems. The baseline hydrologic conditions established for the plan alternatives analysis in the LACPR Technical Report assume that the HSDRRS is in place (estimated for completion 2011).

##### 4.2.2.2 Coastal Wetlands Planning, Protection and Restoration Act Program Projects

The CEMVN and other Federal and state agencies participate in coastal restoration projects under the provisions of the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA; also known as the Breaux Act). These are specific prioritized restoration projects implemented coast-wide by the USACE in cooperation with the Louisiana Department of Natural Resources (LDNR), Coastal Restoration Division and other Federal agencies.

Within the Lake Pontchartrain Basin, there are 14 projects proposed or constructed under CWPPRA that are designed to restore, enhance, or build marsh habitat and prevent erosion of marsh habitat. The projects involve numerous protection and restoration methods, including rock armored shoreline protection breakwaters, dredged material marsh construction, marsh terracing and planting, freshwater and sediment diversion projects, and modification or management of existing structures. Figure 29 indicates

the locations of (table 17 lists and provides additional detail) CWPPRA projects near the study area.



**Figure 29: CWPPRA Restoration, Stabilization, and Creation Projects Near the IER # 10 Project Area**

Three federally sponsored shoreline restoration projects on Lake Borgne and the MRGO (project numbers PO 30, 31, and 32) are a few of the larger CWPPRA projects within the IER # 10 project area. The Lake Borgne and MRGO shoreline restoration projects would maintain the integrity of existing marsh that would also help preserve the existing shorelines in this area. Two projects are currently under construction, and an EIS is being developed for the remainder of the proposed work.

Project PO-30, which is under construction, involves foreshore protection along the north bank of the MRGO between river miles 39.9 and 44.4. Project PO-31, which is in design, will provide continuous nearshore rock breakwaters 1.2 miles to the east and 1.6 miles to the west of Bayou Dupre. Project PO-32, which is under construction, provides a breakwater along the southern Lake Borgne shoreline from Doullut’s Canal to Jahnke’s Ditch. In addition, future projects could involve wetland creation through the placement of material dredged from the water bottoms of Lake Borgne and the construction of retention dikes, where needed, to contain the hydraulically dredged material and facilitate stacking to an elevation supportive of wetland vegetation while minimizing adverse impacts to water quality.

**Table 17: Selected CWPRA Projects Near the IER # 10 Project Area**

State Number	PPL	Agency	Project Name	Project Area	AAHU	Acres		Total Net Acres	Construction Date	Status
						Created/Restored	Protected			
BS-03a	2	NRCS	Caernarvon Diversion Outfall Management	15,556	504	802	0	802	6/1/2001	Complete
BS-10	10	USACE	Delta Building Diversion North of Fort St. Phillip	2,254	157	501	0	501		Engineering and Design
BS-11	10	USFWS	Delta Management at Fort St. Phillip	1,305	77	267	0	267	6/19/2006	Construction
BS-12	14	NRCS	White Ditch Resurrection and Outfall Management	8,224	107	42	147	189		Engineering and Design
BS-13	15	USACE	Bayou Lamoque Freshwater Diversion	9,435	560	620	0	620		Engineering and Design
BS-15	17	EPA	Bohemia Mississippi River Reintroduction	5,210	989	637	0	637		
BS-16	17	USFWS	Caernarvon Outfall Management/Lake Lery SR	16,260	302	268	384	652		
PO-06	2	NRCS	Fritchie Marsh Restoration	5,924	201	0	1,040	1,040	11/1/2000	Completed Feb. 2001
PO-16	1	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1	3,800	520	1,050	500	1,550	6/1/1995	Completed May 1996
PO-17	1	USACE	Bayou LaBranche Wetland Creation	487	191	203	0	203	1/6/1994	Completed April 1994
PO-18	2	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 2	5,475	584	750	530	1,280	4/15/1996	Completed May 1997
PO-19	3	USACE	Mississippi River Gulf Outlet (MRGO) Disposal Area Marsh Protection	855	435	0	755	755	1/25/1999	Completed Jan. 1999
PO-22	5	USACE	Bayou Chevee Shoreline Protection	212	42	0	75	75	8/25/2001	Construction
PO-24	8	NMFS	Hopedale Hydrologic Restoration	3,805	269	0	134	134	1/10/2004	Construction
PO-26	9	USACE	Opportunistic Use of the Bonnet Carre Spillway	13,583	121	0	177	177		Engineering and Design
PO-27	9	NMFS	Chandeleur Islands Marsh Restoration	504	194	220	0	220	6/1/2001	Completed July 2001
PO-28	9	NMFS	LaBranche Wetlands Terracing, Planting, and Shoreline Protection	4,505	198	374	115	489		
PO-29	11	EPA	River Reintroduction into Maurepas Swamp	36,121	8,486	0	5,438	5,438		Engineering and Design
PO-30	10	EPA	Lake Borgne Shoreline Protection	192	61	0	165	165	8/1/2007	Construction
PO-31	11	EPA	Lake Borgne Shoreline Protection at Bayou Dupre	98	29	27	56	83		Engineering and Design
PO-32	12	USACE	Lake Borgne and MRGO Shoreline Protection	465	70	17	249	266		Engineering and Design
PO-33	13	USFWS	Goose Point/Pointe Platte Marsh Creation	1,384	297	424	12	436		Engineering and Design
PO-34	16	USACE	Alligator Bend Marsh Restoration and Shoreline Protection	584	166	285	45	330		Engineering and Design

**Summary Acres for All Approved Projects (including those not shown): 1,488,841 51,829 69,890 121,719**

**Notes:**

**Agency/Sponsor:** EPA=Environmental Protection Agency; NMFS=National Marine Fisheries Service; NRCS=Natural Resources Conservation Service; NWRC=National Wetlands Research Center; USFWS=U.S. Fish and Wildlife Service; USACE=U.S. Army Corps of Engineers; PCWRP = Parish Coastal Wetlands Restoration Program.

**PPL -** Priority Project List

**Project Area -** the benefitted area as determined by the Environmental Work Group for purposes of conducting Wetland Value Assessments.

**AAHU -** Average Annual Habitat Units as determined by the Environmental Work Group.

Habitat Units represent a numerical combination of habitat quality (Habitat Suitability Index) and habitat quantity (acres) within a given area at a given point in time. Average Annual Habitat Units represent the average number of Habitat Units within any given area.

**Acres Created/Restored -** The acres of emergent marsh created or restored as a result of project implementation.

**Acres Protected -** The acres of emergent marsh protected from loss as a result of project implementation.

**Total Net Acres -** The net gain in emergent marsh as a result of project implementation as determined by the Environmental Work Group. This figure includes acres of emergent marsh protected, created, and restored as a result of project implementation.

#### 4.2.2.3 Mississippi River Gulf Outlet Deep-Draft Deauthorization

The WRDA 07 provided for the deauthorization of the MRGO upon the submission of the USACE Chief's Report, Legislative EIS and signed Record of Decision (ROD) to Congress. On 5 June 2008, the Assistant Secretary of the Army for Civil Works forwarded said report, LEIS, and ROD to Congress. The report recommends deauthorization of the MRGO and construction of a closure structure across the MRGO just south of Bayou La Loutre. Therefore, the MRGO Federal navigation channel between Mile 60 at the southern bank of the GIWW to the Gulf of Mexico at Mile - 9.4 is deauthorized.

The deauthorization and plug to be constructed in the MRGO and the impacts of such an action were disclosed in a final Legislative EIS (January 2008). Because of its closer proximity to the Gulf of Mexico and that it is scheduled to be constructed before the IER # 10, the MRGO closure structure at La Loutre would be primarily responsible for the impacts associated with salinity change and any resultant species shift or alteration of habitats within the study area. The cumulative impact of a second closure on the MRGO as part of the storm surge barrier proposed as part of IER # 11 would be comparatively small.

#### 4.2.2.4 Coastal Impact Assistance Program

The Energy Policy Act of 2005 (Public Law 109-58) was signed into law by President Bush on 8 August 2005. Section 384 of the Act establishes the Coastal Impact Assistance Program (CIAP) which authorizes funds to be distributed to Outer Continental Shelf (OCS) oil and gas producing states to mitigate the impacts of OCS oil and gas activities. Pursuant to the Act, a producing state or coastal political subdivision can use all amounts received for projects and activities for the conservation, protection, or restoration of coastal areas, including wetlands and for mitigation of damage to fish, wildlife, or natural resources. Amounts awarded under the provisions of the Act can also be used to develop a comprehensive conservation management plan.

The state worked with the coastal parishes to prepare a draft Louisiana Coastal Impact Assistance Plan that identifies restoration, conservation, and infrastructure projects to be supported by the State and each coastal parish for the four years of CIAP funding. This plan included projects for the enhanced management of Mississippi River water and sediment, protection and restoration of critical land bridges, barrier shoreline restoration and protection, interior shoreline protection, marsh creation with dredged material and a coastal forest conservation initiative.

#### 4.2.2.5 State Coastal Planning and Restoration

The State of Louisiana has initiated a series of programs to offset the catastrophic loss of coastal wetlands. The Louisiana State and Local Coastal Resources Management Act was passed in 1978 to regulate the developmental activities that affect wetland loss. The resulting Louisiana Coastal Resources Program became a federally approved coastal zone management program in 1980. The Louisiana Legislature passed Act 6 in 1989 (R.S.49:213-214), and a subsequent constitutional amendment which created the Coastal Restoration Division within the LDNR, as well as the Wetlands Conservation and Restoration Authority (Wetlands Authority).

In the First Extraordinary Session, 2005 of the Louisiana Legislature, which ended on 22 November 2005, Senate Bill No. 71 (Act No. 8), which provided for the new 16-member panel, called the Coastal Protection and Restoration Authority, which is a broader version of the previous board that was named the Wetlands Conservation and Restoration Authority. In addition, Senate Bill No. 71 also provided for the establishment of the Coastal Protection and Restoration Fund, previously named the Wetlands Conservation and Restoration Fund. The Fund is used for coastal wetlands conservation, coastal restoration, hurricane and storm damage risk reduction, and infrastructure impacted by coastal wetland losses.

The LDNR Office of Coastal Restoration and Management is responsible for the maintenance and protection of the state's coastal wetlands. The Coastal Restoration and Engineering Divisions are responsible for the construction of projects aimed at creating, protecting and restoring the state's wetlands. These divisions are divided further and provide ongoing management and restoration of resources in the Louisiana coastal zone. The LDNR is involved in several major programs that are working to save Louisiana's coastal wetlands. These programs include the Breaux Act, Coast 2050, the Louisiana Coastal Area (LCA) Ecosystem Restoration Plan, and the Coastal Impact Assistance Plan of 2005. Other programs include state restoration projects, Parish Coastal Wetlands Restoration Program, Vegetation Plantings, Section 204/1135, and WRDA.

The LCA Ecosystem Restoration Study (2004) was a comprehensive report that identified the most critical human and natural ecological needs of the coastal area. The study presented and evaluated conceptual alternatives for meeting the most critical needs; identified the kinds of restoration features that could be implemented in the near-term (within 5 to 10 years) that address the most critical needs, and proposed to address these needs through features that would provide the highest return in net benefits per dollar of cost. The study also established priorities among the identified near-term restoration features, described a process by which the identified priority near-term restoration features could be developed, approved, and implemented, identified the key scientific uncertainties and engineering challenges facing the effort to protect and restore the ecosystem, and proposed a strategy for resolving them and identified, assessed and recommended feasibility studies that should be undertaken within the next 5 years to 10 years to fully explore other potentially promising large-scale and long-term restoration concepts. The study concluded by presenting a strategy for addressing the long-term needs of coastal Louisiana restoration beyond the near-term focus of the LCA Plan.

#### 4.2.2.6 Violet Freshwater Diversion Project

One of the larger restoration projects that could influence the IER # 10 project area is the recently authorized, Violet Diversion. Authorized under the provisions of the WRDA, the Violet Diversion would divert freshwater from the Mississippi River east across the wetland areas from the Mississippi River to Lake Borgne. The purpose of this diversion is to reduce the salinity in the western Mississippi Sound by diverting freshwater from the Mississippi River to the Biloxi Marshes and Lake Borgne.

As reported in the CWPPRA Project Status Report dated 22 August 2008, the Violet Diversion project complements the existing siphons diverting Mississippi River water into 17,980 acres of brackish and saline marsh in St. Bernard Parish known as the Central Wetlands Management Unit. This diversion project could greatly increase fine sediment transport and deposition into the marshes located between the Mississippi River and the MRGO. It is unlikely that sediments would be transported across the MRGO into Lake Borgne and the Biloxi Marshes because the deep water MRGO would trap most of these

sediments. The project is currently authorized and the study, which will look into both benefits and impacts of the project, is not currently funded.

Construction of the Mississippi River levee and the MRGO has resulted in dramatic and detrimental ecosystem change to the project area. The levees effectively stopped annual flooding that served to nourish the surrounding marshes with sediments, nutrients, and freshwater. Construction of the MRGO allowed saline waters from the Gulf to inundate this area, resulting in a habitat change from a healthy swamp to a deteriorating brackish marsh.

The Violet Siphons were constructed with the objective of restoring the project area to a fresher state through mimicking the former behavior of the Mississippi River by siphoning freshwater into the marsh. The siphons were closed after operating for only 4 years, primarily due to public opposition to large amounts of sediment deposited in Violet Canal interfering with navigation. The siphons are currently operational. The objective of the outfall management plan is to optimize the use of freshwater and sediment supplied by the existing siphons by managing water flow through the area. This will be accomplished by reducing channelized flow and routing the diverted flow across marshes or through shallow water areas instead of through larger channels so that suspended sediments are deposited and marshes are nourished and created.

#### 4.2.2.7 Miscellaneous Wetland Restoration Projects

A feasibility study is being conducted by the Sewerage and Water Board of New Orleans and St. Bernard Parish to evaluate the potential discharge of treated effluent from the East Bank Sewer Treatment Plant (EBSTP), located off Florida Avenue and Dubreuil Street in the Ninth Ward Basin, into wetlands to provide water quality improvement, solids handling, hazard mitigation, and coastal wetland restoration.

### **4.2.3 Other Projects**

#### 4.2.3.1 Florida Avenue Bridge Project

This proposed project by the Louisiana Department of Transportation and Development is the construction of a new bridge over the IHNC in the Florida Avenue Corridor in Orleans Parish, including the roadway improvements and/or new roadway construction necessary to tie the bridge to the existing street and highway system. This project has been designated by the Louisiana Legislature for the Transportation Infrastructure Model for Economic Development (TIMED) Program funding.

The bridge will be a 156-foot vertical clearance fixed span bridge. Within Orleans Parish west of Tupelo Street, the bridge and mainline roadways will consist of four lanes of traffic. In Orleans Parish east of Tupelo Street and in St. Bernard Parish, the mainline roadway will consist of two lanes of traffic. Elevated sections will be a divided highway with 12-foot travel lanes, 8-foot outside shoulders and 2-foot paved inside shoulders. Ground-level roadways will be divided either with a median or barrier.

There is no schedule available for the construction of the Florida Avenue Bridge. The schedule is pending final design of the project which will resume following local agency and public coordination meetings.

#### 4.2.3.2 Inner Harbor Navigation Canal Lock Replacement Project

This proposed CEMVN project is to replace the current lock, built in 1921, which is too small to accommodate modern day vessels. The planned replacement lock will provide a nearly three-fold increase in the lock chamber capacity easing transport through this high-traffic waterway. The current lock is 75 feet wide by 640 feet long and 31.5 feet deep. The replacement lock, which will be located north of the current lock and the Claiborne Avenue Bridge, will be 110 feet wide by 1,200 feet long and 36 feet deep.

A U.S. District Judge has ordered that the U.S. Army Corps of Engineers cease all work on the Industrial Canal Lock Replacement Project, including mitigation planning, until the Corps completes a supplemental environmental impact assessment for the project. On 9 October 2008, the U.S. Army Corps of Engineers, New Orleans District, released the draft Supplemental Environmental Impact Statement discussing the Inner Harbor Navigation Canal Lock Replacement Project for a 45-day public review.

#### 4.2.3.3 Other Agency Projects

Local sponsors are initiating or considering initiating other actions related to the proposed action. Although these projects could contribute to adverse impacts for some of the resources, several of them would have long-term positive impacts, including improved hurricane, storm, and flood damage risk reduction.

The East Jefferson Levee District is placing more than 1,000 3-ton highway traffic barriers along the Lake Pontchartrain shoreline to help slow the rate of erosion in East Jefferson Parish. The Southeast Louisiana Flood Protection Authority-East Bank is planning to construct a new breakwater along portions of the IER # 3 project area. Over 100,000 tons of rock will be used, primarily along Reach 1 (the Recurve I-wall in Northwest Kenner to the Duncan Pumping Station) and Reach 4 (Suburban Canal to Bonabel Canal), with another 8,000 tons of rock used along the remaining reaches in the IER # 3 project area.

The Greater New Orleans Expressway Commission (GNOEC) is also considering additional Causeway improvements associated with the USACE HSDRRS project at the Causeway. These improvements could include roadway modification to maintain the new ramp height of 16.5 feet from the HSDRRS levee outward onto the Causeway itself as well as additional roadway modifications.

### **4.3 SUMMARY OF CUMULATIVE IMPACTS**

The magnitude and significance of cumulative impacts were evaluated by comparing the existing environment with the expected incremental effects, both adverse and beneficial, of the proposed action when combined with the impacts of other proximate actions. Projects that occur within St. Bernard Parish, the greater New Orleans area, the Lake Pontchartrain Basin, and the designated coastal zone for southeastern Louisiana were considered collectively (as appropriate) for the evaluation of cumulative impacts.

All of the HSDRRS projects are currently in the planning, design, and construction stages, and impacts from these component projects are being addressed or will be addressed in separate IERs. Construction of levees, gates, and onshore breakwaters throughout the region could cause direct marsh, upland, and terrestrial habitat loss. Adverse impacts to these habitats are minimized with proposed construction on existing earthen levees. The beneficial use of dredged material for nearby marshes, such as IER # 11, Tier 2 Borgne, could eventually offset some of the damages to marsh from

construction. However, direct permanent impacts as part of the 100-year HSDRRS projects to other quality habitats would be fully mitigated through formal mitigation planning.

The introduction of freshwater into the CWA as part of the Violet Canal Freshwater Diversion along with the closure structure on the MRGO could potentially lower salinity and increase biological productivity within the CWA. Depending on the velocity of the water discharged and where the available sediment load deposits, these projects could produce a shift in habitat type for the study area from saline and brackish marsh to brackish and freshwater marsh. The overall change to salinity in CWA would have both positive and negative effects on aquatic resources. Existing conditions would be restored to a state similar to historical conditions (e.g., pre-MRGO), including a more freshwater/brackish system. These conditions would be more conducive for production of oysters and other aquatic resources, but could impact the existing aquatic resources by replacing brackish emergent marsh with less saline open water habitats. Changes in salinity with the proposed action in addition to the changes expected with the MRGO closure at Bayou La Loutre could cause community shifts in localized areas such as adjacent to the closure of the MRGO near Bayou Bienvenue and Bayou La Loutre.

The Violet Canal Freshwater Diversion may have a significant effect on the large-scale water quality conditions in the study area through increased fine sediment transport and deposition into the marshes located between the Mississippi River and the MRGO. The closing of the MRGO, with a plug at Bayou La Loutre, prevents deep draft vessels from navigating on this canal. This action will decrease waves and wakes generated by vessels which has contributed to the erosion of marsh in the project area. The construction of shoreline stabilization features will also reduce marsh erosion in the area. The cessation of dredging and maintaining the MRGO to allow for deep draft navigation will also have an impact to the water quality and availability of dredged material for beneficial use in the project area with the eventual result of the channel silting in over time.

The primary hydrologic impact of the HSDRRS projects would be reduced risk of storm surge inundation impacts for low-lying areas on the protected side of the HSDRRS. In addition to the CWPPRA projects being designed and constructed, another future project currently being developed in an EIS by CEMNV is the MRGO and Lake Borgne Wetland Creation and Shoreline Stabilization. These projects could alter sheet flows from Lake Borgne into adjacent emergent wetlands with minimal impact to existing natural channels. Additionally, existing CWPPRA and other foreshore protection projects on Lake Borgne and the MRGO are expected to reduce erosion in those vicinities and could encourage some sediment deposition in those areas.

Shoreline stabilization measures could alter existing shoreline habitat and block access to interior wetlands. Impacts to EFH could occur as a result of construction activities and access dredging but should return to pre-construction levels once those activities have ceased. Marsh areas with greater heterogeneity and interspersed and lower salinity levels could be a byproduct of implementing the Violet Canal Freshwater Diversion, MRGO-Lake Borgne Wetland Creation and Shoreline Protection projects, and the MRGO closure structure. These changes could greatly benefit some wildlife, fishery, and aquatic resources in the long-term; however, with a habitat shift to a fresher aquatic environment there are impacts to existing resources such as oysters in Lake Borgne and the fish and plant species that inhabit the study area.

The likelihood of encountering HTRW under the proposed actions is considered low. The cumulative effect of these projects could provide long-term and sustainable beneficial impacts to the communities within the study area by reducing the risk of

damage within flood-prone areas and by generating economic growth. Economic growth could attract displaced residents and new workers, and encourage repopulation within the New Orleans metropolitan area.

Collectively, the proposed actions for LPV 145, LPV 146, LPV 147, and LPV 148 will require in excess of 250,000 cubic yards of fill. The HSDRRS projects cumulatively will require on the order of 69 million cubic yards of fill. The IER # 10 project represents a relatively small (< 1 percent) portion of the total borrow requirements of the HSDRRS. The impacts from obtaining fill material for these projects have been addressed in other IERs such as IER # 23 and IER # 25 which were described earlier.

Cumulative adverse impacts to human populations within the study area are not expected to be permanent; however, there would be temporary adverse impacts from the increased traffic, detours, road closures, and noise associated with construction activities that could occur 24 hours a day, 7 days a week for several years. It is expected that the temporary cumulative impacts to social and community facilities would result in permanent benefits because the threat to flood-prone areas would be reduced by the increased flood risk reduction provided by area projects. Construction of these projects could cause temporary and localized decreases in air quality that would mainly result from the emissions of construction equipment during dredging and construction and fugitive dust from construction activities. However, these changes in air quality should return to pre-construction conditions shortly after construction completion and these changes in air quality would not be expected to change the area's air quality attainment status.

The proposed action would have beneficial cumulative impacts on socioeconomic resources in the Chalmette Loop area and Greater New Orleans region. The action is part of the ongoing Federal effort to reduce the threat to life, health, and property posed by flooding. The combined effects from construction of the multiple projects underway and planned to rebuild the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven events, and thereby, encourage recovery. All segments of the St. Bernard Parish East Bank HSDRRS need to be brought to 100-year level of risk reduction in order to obtain FEMA certification of the system. Potential cumulative beneficial impacts of the proposed action would occur particularly when considered in conjunction with potential effects from other flood control projects in the region.

The construction of the proposed action would result in short-term cumulative economic benefits for the entire region in the form of material purchases from suppliers based in the region, construction payrolls, and related indirect and induced spending, or "multiplier effects." These construction-related economic benefits would occur during the anticipated construction period. Due to the catastrophic effects of the hurricanes, the structure of the local economy has significantly altered. However, it can be assumed that the proposed action will result in the employment generation and local spending that would boost the local economy.

In conclusion, although there are many ongoing and planned projects that would similarly impact resources in the Lake Pontchartrain Basin portion of Louisiana, most of the resulting impacts would be temporary. Those adverse impacts that would not be temporary in nature would be directly mitigated or would be indirectly mitigated by other projects in the region that would provide positive long-term impacts to the same resource (e.g., wetlands or EFH). Cumulative impacts to social and economic resources would not only be beneficial, but are considered essential.

## 5. SELECTION RATIONALE

The proposed action consists of constructing a T-wall on the existing Chalmette Loop earthen levee system including improvements of the Highway 46 crossing, protecting the St. Mary's Pump Station, and removal of the Creedmore Drainage Structure. The proposed action was selected because it provides adequate structural measures to meet the 100-year level of hurricane and storm damage risk reduction for St. Bernard Parish; does not disturb existing commercial, industrial, or public complexes; minimizes encroachment on existing infrastructure; and could be implemented within the time constraints and technology available; while minimizing impacts to natural resources like wetlands, fisheries, and threatened or endangered species.

Numerous alternatives were developed for the Chalmette Loop HSDRRS; however, only four of these alternatives were carried through to the impacts analysis. The four alternatives were evaluated for LPV 145, 146, and 148 together because the reaches are similar and the alternatives are the same for each reach.

The proposed action (T-wall on Existing Levee) was selected after thorough comparison with other alternatives. The comparison involved consideration of numerous criteria including schedule, cost, risk and reliability, constructability, natural environment, human environment, and operation and maintenance. The criteria were weighted from most to least important. Items including risk and reliability and human environment were considered most important, while criteria including constructability and operation and maintenance were weighted least important.

The cost criterion has a substantial difference between alternatives, almost \$250 million dollars between the most and least expensive. The proposed action is the least expensive alternative.

Constructability was noted as being of lower importance and the alternatives were roughly equal in terms of this criterion.

Impacts to the natural environment were identified as one of the more important criteria. Both the proposed action and the earthen levee alternative using deep soil mixing could be implemented within the existing ROW and would therefore have significantly less impacts than the other two earthen levee alternatives. The other two earthen levee alternatives would require additional ROW with significant impacts to wetland areas. The proposed action was only considered slightly less favorable in regards to natural environment, mainly due to the fact that the T-wall structure could prohibit terrestrial wildlife movement. Several options are under consideration that would mitigate these impacts, such as wildlife ramps or gates.

There are potential human impacts for persons wanting to use the levee to pass the MRGO, but the levee is not officially open for public access. Human impacts are an issue near Highway 46 in LPV 148. The earthen levee options would impact several residences, making the proposed action a much more attractive option.

For LPV 147, the bridge over T-wall option would take almost 300 more days for construction than a ramp on the earthen levee; however, in terms of cost, the bridge is almost half the cost, approximately \$19 million dollars less than the ramp. Both constructability and natural environment impacts share some advantages and disadvantages for both alternatives; therefore, the two alternatives are basically considered equal for the purpose of this selection rationale in terms of these two criteria. Impacts to the human environment would be minimal, if any, for the proposed action.

The ramp option would directly impact and require the relocation of the Verret Fire Station. The fire station could be relocated, and there may be a change to insurance rates for homes that would be farther from the new station. For operation and maintenance, the alternatives are about equal as the bridge may involve a lot of maintenance while the earthen levee would settle causing the ramp to settle. In total, the bridge over T-wall option is rated higher based on the evaluation criteria discussed above.

## **6. COORDINATION AND CONSULTATION**

### **6.1 PUBLIC INVOLVEMENT**

Extensive public involvement has been sought in preparing this IER. The projects analyzed in this IER were publicly disclosed and described in the Federal Register on 13 March 2007 and on the website [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov). Scoping for this project was initiated on 12 March 2007 through placing advertisements and public notices in USA Today and the New Orleans Times-Picayune. Nine public scoping meetings were held throughout the New Orleans metropolitan area to explain scope and process of the Alternative Arrangements for implementing NEPA between 27 March 2007 and 12 April 2007, after which a 30-day scoping period was open for public comment submission. Additionally, the CEMVN is hosting monthly public meetings to keep the stakeholders advised of project status. The public is able to provide verbal comments during the meetings and written comments after each meeting in person, by mail, and via [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov).

### **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 the project planning and alternative analysis phases of the project (members of this team are listed in appendix C). This interagency environmental team was integrated with the CEMVN PDT to assist in the planning of this project and to complete a mitigation determination of the potential direct and indirect impacts of the proposed action. 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 action alternative will utilize the authorized level of hurricane and storm damage risk reduction footprint and minimize impacts to wetlands.
- 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: The proposed action does not enclose any additional wetlands and its alignment remains along the same route as the existing alignment.
- 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: Concur. Bald eagle nests have been recorded and will be avoided within the vicinity of LPV 148.
- 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: No forest clearing will occur with implementation of the proposed action.
- 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 (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the 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, NMFS, 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 Bohannon (985) 822-2000, Refuge Manager for the Bayou Sauvage National Wildlife Refuge (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: Concur.

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 FWCA 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 the Corps 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: This recommendation will be considered in the design of the project to the greatest extent practicable. However, the project primarily addresses modification in the height to the levee system, not the construction of new levees.

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: Concur, however this is not applicable to the proposed action as there are no control structures within watercourses.

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, NMFS, LDWF, and LDNR.

CEMVN Response 13: Acknowledged.

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: This recommendation will be considered in the design of the project to the greatest extent practicable.

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: This recommendation will be considered in the design of the project to the greatest extent practicable. However, the project primarily addresses modification in the height to the levee system, not the construction of new levees.

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: Not applicable.

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: Not applicable.

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: Concur.

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: Concur.

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: Acknowledged.

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: Not applicable.

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: Not applicable.

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: Concur.

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: Construction of the project features are cost-shared between the Government and the non-Federal Sponsor. However, the non-Federal sponsor is responsible costs related to OMRR&.

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

CEMVN Response 25: Mitigation for the impacts caused by the project will be coordinated through a mitigation IER. Any changes to the mitigation plan in this IER will be coordinated in advance.

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, NMFS, 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 U.S. Fish and Wildlife Service (USFWS) reviewed the proposed action to see if it would affect any threatened and endangered (T&E) species under its jurisdiction, or their critical habitat. The USFWS concurred with the CEMVN in a letter dated December 6, 2007, that the proposed action would not have adverse impacts on T&E species under its jurisdiction (appendix D).

The Louisiana Department of Natural Resources (LDNR) reviewed the proposed action for consistency with the Louisiana Coastal Resource Program (LCRP). The proposed action was found to be consistent with the LCRP, as per a letter dated December 24, 2008 (reference number C20080556) (appendix D).

The Louisiana Department of Environmental Quality reviewed the proposed action. The CEMVN received Water Quality Certification for the proposed action on February 8, 2009 (reference number WQC 081222-01/AI 162387/CER 20080001) (appendix D).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the Louisiana State Historic Preservation Officer (LASHPO) and Native American tribes. LASHPO 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 (appendix D).

Recommendations of the USFWS, in accordance with the Fish and Wildlife Coordination Act (appendix D), include:

- Recommendation 1: To the greatest extent possible, situate flood protection features so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized.
- CEMVN Response 1: Acknowledged.
- Recommendation 2: Avoid adverse impacts to bald eagle nesting locations through the careful design of project features and timing of construction by limiting construction activities within 660 feet of a nest to the non-nesting season (June through mid-August).
- CEMVN Response 2: Acknowledged.
- Recommendation 3: 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 3: Acknowledged.
- Recommendation 4: In order to minimize the impact of T-walls on wildlife movement one earthen ramp should be constructed within the LPV 145 reach and two earthen ramps should be constructed each in LPV reaches 146 and 148. All crossings should be spaced, if feasible, at an approximated equal distance from other ramps or potential crossing sites.
- CEMVN Response 4: Concur.
- Recommendation 5: The project's first Project Cooperation Agreement (or similar document) should include language that specifies the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation feature.
- CEMVN Response 5: USACE Project Partnering Agreements (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the 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 Service, NMFS, LDWF, Environmental Protection Agency (EPA) and Louisiana Department of Natural Resources (LDNR). The Service shall

be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

CEMVN Response 6: Acknowledged.

Recommendation 7: If a proposed project feature is changed significantly or is not implemented within one year of the date of our January 30, 2009, (incorrectly dated 2007), Endangered Species Act consultation letter, we recommend that the Corps reinstate 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 7: Acknowledged.

Recommendation 8: The Corps shall fully compensate for any unavoidable losses of 31.66 AAHUs of bottomland hardwoods, and 30.93, 64.76, and 178.73 AAHUs of fresh, intermediate and brackish marshes, respectively, caused by project features. Development and implementation of those plans should be done in concert with the Service and other resource agencies.

CEMVN Response 8: Acknowledged.

## 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. The 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 resource planning has identified the acreages and habitat type for the direct or indirect impacts of implementing the proposed action.

The proposed action would have the smallest footprint in terms of construction limits; however, in order to ensure no unforeseen impacts, the entire existing ROW is being considered under impacts discussion for the proposed action. Although the proposed action is not the alternative that would have the least amount of direct impact on the existing natural environment, it was selected because it would minimize impacts to the surrounding environment while meeting the social objectives and other engineering constraints. It is anticipated that approximately 503.22 acres of various wetland habitat (mostly brackish marsh) and 50 acres of open water habitat would be required for the construction of the proposed action.

BMPs to reduce sediment loading to the surface water of the project area would be used and could reduce effects on water quality and aquatic life, specifically EFH. Permanent removal of EFH would be mitigated.

A complementary comprehensive mitigation IER or IERs will be prepared documenting and compiling these unavoidable impacts and those for all other proposed actions within the HSDRRS that are being analyzed through other IERs. Mitigation planning is being carried out for groups of IERs, rather than within each IER, so that large mitigation efforts could be taken rather than several smaller efforts, increasing the relative economic and ecological benefits of the mitigation effort.

This forthcoming mitigation IER will implement compensatory mitigation as early as possible. All mitigation activities will be consistent with standards and policies established in the appropriate Federal and state laws, and USACE policies and regulations.

## **8. COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS**

Construction of the proposed action would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described below.

Environmental compliance for the proposed action will be achieved upon coordination of this IER with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NMFS confirmation that the proposed action would not be likely to adversely affect any T&E species, or completion of Endangered Species Act Section 7 consultation (appendix D); LDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LCRP, as per a letter dated December 24, 2008 (appendix D); coordination with the LASHPO (appendix D); receipt and acceptance or resolution of all Fish and Wildlife Coordination Act recommendations (appendix D); and February 8, 2009 (reference number WQC 081222-01/AI 162387/CER 20080001) receipt and acceptance or resolution of all LDEQ comments on the water quality and air quality impact analysis documented in the IER.

## **9. CONCLUSIONS**

### **9.1 INTERIM DECISION**

The proposed action for reaches LPV 145, 146, and 148 consists of the construction of a T-wall on top of the existing levee. The 100-year level of risk reduction for the Chalmette Loop area would be achieved. To construct the T-wall, the existing levee would be slightly raised in some reaches within each LPV reach to meet the hydraulic design elevations. The existing levee would remain at its current elevation in other reaches. Some excavation would be necessary to place the T-wall foundations, which are typically embedded approximately 3 feet into the crown for erosion protection. The T-wall design would require minimal ROW and all construction is anticipated to be within the footprint of the existing levee, and well within the existing ROW for the levee. The proposed top of T-wall elevation would be constructed to EL +29.0.

The proposed action for reach LPV 147 consists of construction of the T-wall floodwall that would be similar in design technique with LPV 148. A continuous T-wall is proposed across Highway 46 and the flood gate at Bayou Road would be replaced. This would necessitate a bridge over the T-wall along Highway 46. An access road of up to 2000 feet in length parallel to Highway 46 would be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station. Both the T-wall design and

bridge option would require minimal ROW and all construction would be anticipated to be within the footprint of the existing levee, and well within the existing ROW for the levee.

The CEMVN has assessed the environmental impacts of the proposed action and has determined that the proposed action would have the following impacts:

### **Wetlands**

LPV 145, LPV 146, LPV 147, and LPV 148 construction activities would occur within the existing ROW and no additional ROW would be required. The T-wall structure would be constructed on the existing earthen levee and 503.22 acres of various wetland habitats would potentially be impacted.

### **Upland Communities**

LPV 145, LPV 146, LPV 147, and LPV 148 construction activities would occur within the existing ROW and no additional ROW would be required. Upland habitat within the footprint of the proposed levees, approximately 1,081 acres, would be temporarily lost to wildlife mainly during construction.

### **Wildlife**

LPV 145, LPV 146, LPV 147, and LPV 148 would stay within the existing ROW resulting in approximately 1,536 acres of terrestrial wildlife habitat potentially impacted. Several options are under consideration to facilitate the movement of terrestrial wildlife across the T-wall structure including earthen ramps.

### **Essential Fish Habitat**

LPV 145, LPV 146, LPV 147, and LPV 148 would stay within the existing ROW, which would result in approximately 195 acres of open water and emergent marsh habitat potentially impacted. Indirect impacts on EFH and EFH species would result from increased turbidity and sediment from runoff, but would be very limited, and temporary.

### **Aquatic Communities**

LPV 145, LPV 146, LPV 147, and LPV 148 would stay within the existing ROW, which would result in approximately 195 acres of aquatic habitat, including SAV, potentially being impacted. Increased turbidity and sediment from runoff would be very limited, and temporary with BMPs in place to minimize potential impacts.

### **Threatened and Endangered Species**

LPV 145, LPV 146, LPV 147, and LPV 148 would not be likely to adversely affect federally or state listed threatened and endangered species, marine mammals, or migratory birds. Construction activities may have a temporary impact on foraging habitat and increases in noise.

### **Water Quality**

LPV 145, LPV 146, LPV 147, and LPV 148 would disturb soils, which in turn, would increase the probability of sediment migration. Some temporary water quality impairments may occur if there is a major rain event during the construction efforts.

## **Soils**

LPV 145 would have no impact on prime and unique farmland soils. LPV 146, LPV 147, and LPV 148 would impact approximately 13.14 acres of prime and unique farmland soils.

## **Floodplains and Drainage**

LPV 145, LPV 146, LPV 147, and LPV 148 would occur within the existing ROW and no additional ROW would be required; therefore, no additional floodplain area would be impacted.

## **Utilities**

LPV 145, LPV 146, and LPV 148 would impact 19 pipelines, which would have to be relocated or repositioned at the interface of the levee alignment to accommodate a T-wall structure. Three overhead power lines would need to be raised an additional specified height to ensure adequate vertical clearance.

LPV 147 would affect one overhead power line and three local utilities, including water, gas, and drainage, which would need to be relocated outside of the construction limits.

## **Air Quality**

LPV 145, LPV 146, LPV 147, and LPV 148 would cause temporary site specific construction effects including exhaust and dust emissions.

## **Noise**

LPV 145, LPV 146, LPV 147, and LPV 148 would have temporary impacts to receptors within 1,000 feet of the project area during construction.

## **Transportation**

LPV 145, LPV 146, LPV 147, and LPV 148 would temporarily impact traffic on highways and local roads within the vicinity of the project area from worker and truck traffic associated with construction activities.

## **Cultural Resources**

Based on the review of state records, previous cultural resources studies, and the results of a recent reconnaissance and Phase 1 cultural resources investigation, implementation of LPV 145, LPV 146, LPV 147, and LPV 148 would have no direct impact on cultural resources.

## **Aesthetic (Visual) Resources**

LPV 145, LPV 146, LPV 147, and LPV 148 would have minimal impacts on visual resources. The visual attributes of the project corridor would be temporarily impacted by construction activities. After construction, long-term impacts to visual resources would remain similar to existing conditions.

**Recreation**

LPV 145, LPV 146, LPV 147, and LPV 148 would not have direct impacts on recreational resources with the exception of some construction related activities along the proposed ROW that would lead to temporary restrictions on bird-watching, fishing, and wildlife viewing.

**Socioeconomic Resources**

LPV 145, LPV 146, LPV 147, and LPV 148 would have beneficial impacts on population, land use, and employment due to heightened hurricane and storm damage risk reduction and construction-generated expenditures.

**Environmental Justice**

LPV 145, LPV 146, LPV 147, and LPV 148 no disproportionate impacts to low-income or minority residents would be anticipated.

**Hazardous, Toxic, and Radioactive Waste**

LPV 145, LPV 146, LPV 147, and LPV 148 no impacts would be anticipated.

**9.2 PREPARED BY**

The point of contact for this IER is Laura Lee Wilkinson, Environmental Coordinator. Table 20 lists the preparers of relevant sections of this report. Ms. Wilkinson can be reached at 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 ACRONYMS AND DEFINITIONS OF COMMON TERMS

<b>AAHU</b>	average annual habitat unit
<b>ASTM</b>	American Society for Testing and Materials
<b>CAA</b>	Clean Air Act of 1963
<b>CED</b>	Comprehensive Environmental Document
<b>CEMVN</b>	Corps of Engineers, Mississippi Valley Division, New Orleans District
<b>CEQ</b>	Council on Environmental Quality
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act
<b>CFBM</b>	contractor-furnished borrow material
<b>CFR</b>	Code of Federal Regulations
<b>CO</b>	carbon monoxide
<b>CWPPRA</b>	Coastal Wetlands Planning, Protection, and Restoration Act
<b>dB</b>	decibel
<b>dBA</b>	A-weighted decibel
<b>DNL</b>	day-night average sound level
<b>EA</b>	Environmental Assessment
<b>EJ</b>	Environmental Justice
<b>EFH</b>	Essential Fish Habitat
<b>EIS</b>	Environmental Impact Statement
<b>ER</b>	Engineering Regulation
<b>ESA</b>	Endangered Species Act
<b>ESRI</b>	Environmental Systems Research Institute, Inc.
<b>FEMA</b>	Federal Emergency Management Agency
<b>FHWA</b>	Federal Highway Administration
<b>FMP</b>	Fishery Management Plan
<b>FONSI</b>	Finding of No Significant Impact
<b>FWCA</b>	Fish and Wildlife Coordination Act
<b>GFBM</b>	government-furnished borrow material
<b>GIWW</b>	Gulf Intracoastal Waterway
<b>GNOEC</b>	Greater New Orleans Expressway Commission
<b>GSMFC</b>	Gulf States Marine Fisheries Commission
<b>HAM</b>	Habitat Assessment Methodology
<b>HSDRRS</b>	Hurricane and Storm Damage Risk Reduction System
<b>HTRW</b>	hazardous, toxic, and radioactive waste
<b>IER</b>	Individual Environmental Report
<b>IHNC</b>	Inner Harbor Navigation Canal
<b>LADOTD</b>	Louisiana Department of Transportation and Development
<b>LASHPO</b>	Louisiana State Historic Preservation Officer
<b>LCA</b>	Louisiana Coastal Area
<b>LCRP</b>	Louisiana Coastal Resources Program
<b>LDEQ</b>	Louisiana Department of Environmental Quality
<b>LDNR</b>	Louisiana Department of Natural Resources
<b>LDWF</b>	Louisiana Department of Wildlife and Fisheries
<b>LNHP</b>	Louisiana Natural Heritage Program
<b>LOS</b>	level of service
<b>LPV</b>	Lake Pontchartrain and Vicinity

<b>mph</b>	miles per hour
<b>MRGO</b>	Mississippi River Gulf Outlet
<b>NAAQS</b>	National Ambient Air Quality Standards
<b>NAVD88</b>	North American Vertical Datum 1988
<b>NEPA</b>	National Environmental Policy Act
<b>NMFS</b>	National Marine Fisheries Service
<b>NO<sub>2</sub></b>	nitrogen dioxide
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NOV</b>	New Orleans to Venice
<b>NPS</b>	National Park Service
<b>NRCS</b>	National Research Conservation Service
<b>NWR</b>	National Wildlife Refuge
<b>O<sub>3</sub></b>	ozone
<b>OMRR&amp;R</b>	Operation, Maintenance, Repair, Replacement and Rehabilitation
<b>Pb</b>	lead
<b>PDT</b>	Project Delivery Team
<b>PL</b>	Public Law
<b>PM</b>	particulate matter
<b>PPA</b>	Project Partnering Agreements
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>REC</b>	recognized environmental condition
<b>ROD</b>	Record of Decision
<b>ROW</b>	right of way
<b>SAV</b>	submerged aquatic vegetation
<b>SIR</b>	Supplemental Information Report
<b>SO<sub>2</sub></b>	sulfur dioxide
<b>U.S.</b>	United States
<b>USACE</b>	U.S. Army Corps of Engineers
<b>USC</b>	United States Code
<b>USEPA</b>	U.S. Environmental Protection Agency
<b>USFWS</b>	U.S. Fish and Wildlife Service
<b>USGS</b>	U.S. Geological Survey
<b>WBV</b>	West Bank and Vicinity
<b>WRDA</b>	Water Resources Development Act
<b>WVA</b>	Wetland Value Assessment

**APPENDIX B:**  
**PUBLIC COMMENT AND RESPONSES SUMMARY**

## APPENDIX C:

### MEMBERS OF INTERAGENCY ENVIRONMENTAL TEAM

Kyle Balkum	Louisiana Dept. of Wildlife and Fisheries
Elizabeth Behrens	U.S. Army Corps of Engineers
Catherine Breaux	U.S. Fish and Wildlife Service
David Castellanos	U.S. Fish and Wildlife Service
Frank Cole	Louisiana Department of Natural Resources
Getrisc Coulson	U.S. Army Corps of Engineers
John Ettinger	U.S. Environmental Protection Agency
Jeff Harris	Louisiana Department of Natural Resources
Richard Hartman	NOAA National Marine Fisheries Service
Michelle Fischer	U.S. Geologic Survey
Christina Hunnicutt	U.S. Geologic Survey
Barbara Keeler	U.S. Environmental Protection Agency
Kirk Kilgen	Louisiana Department of Natural Resources
Tim Killeen	Louisiana Department of Natural Resources
Brian Marcks	Louisiana Department of Natural Resources
Brian Lezina	Louisiana Dept. of Wildlife and Fisheries
David Muth	U.S. National Park Service
Beth Nord	U.S. Army Corps of Engineers
Gib Owen	U.S. Army Corps of Engineers
Jamie Phillippe	Louisiana Dept. of Environmental Quality
Manuel Ruiz	Louisiana Dept. of Wildlife and Fisheries
Reneé Sanders	Louisiana Department of Natural Resources
Danielle Tommaso	U.S. Army Corps of Engineers
Angela Trahan	U.S. Fish and Wildlife Service
David Walther	U.S. Fish and Wildlife Service
Laura Lee Wilkinson	U.S. Army Corps of Engineers
Patrick Williams	NOAA National Marine Fisheries Service

**APPENDIX D:  
INTERAGENCY CORRESPONDENCE**

**BOBBY JINDAL**  
GOVERNOR



**SCOTT A. ANGELLE**  
SECRETARY

**State of Louisiana**  
DEPARTMENT OF NATURAL RESOURCES  
OFFICE OF COASTAL RESTORATION AND MANAGEMENT

December 24, 2008

Elizabeth Wiggins  
Chief, Environmental Planning and Compliance Branch  
U. S. Army Corps of Engineers, New Orleans District  
P. O. Box 60267  
New Orleans, Louisiana 70160-0267

RE: **C20080556**, Coastal Zone Consistency  
**U. S. Army Corps of Engineers, New Orleans District**  
Direct Federal Action  
IER #10 Chalmette Loop Levee, Lake Pontchartrain and Vicinity, **St. Bernard 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 modification, as proposed in the application, is consistent with the LCRP, provided that the Corps of Engineers provides adequate and appropriate mitigation for all impacts to wetland function as requested by LDWF in their comment letter of December 3, 2008. If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7939.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Jim Rives".

Jim Rives  
Administrator

JR/JDH/bgm

cc: Dave Butler, LDWF  
Laura Lee Wilkinson, COE-NOD  
William McCartney, St. Bernard Parish  
Frank Cole, CMD FC  
Ismail Mehri, LACPRA

Coastal Management Division • Post Office Box 44487 • Baton Rouge, Louisiana 70804-4487  
(225) 342-7591 • Fax (225) 342-9439 • <http://www.dnr.state.la.us>  
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BOBBY JINDAL  
GOVERNOR

State of Louisiana  
DEPARTMENT OF WILDLIFE & FISHERIES

ROBERT J. BARHAM  
SECRETARY

December 3, 2008

Jim Rives, Administrator  
Louisiana Department of Natural Resources  
Coastal Management Division  
P.O. Box 44487  
Baton Rouge, LA 70804-4487

RE: *Consistency Number: C20080556*  
*Applicant: COE-NOD*  
*Notice Date: October 31, 2008*

RECEIVED  
2008 DEC -3 AM 9:47  
COASTAL MANAGEMENT  
DIVISION

Dear Mr. Rives:

The professional staff of the Louisiana Department of Wildlife and Fisheries (LDWF) has reviewed the public notice referenced above. The following recommendations have been provided by the appropriate biologist(s):

LDWF has no objection to the proposed activity, provided that the Corps of Engineers provides adequate and appropriate mitigation for all impacts to wetland functions.

The Louisiana Department of Wildlife and Fisheries appreciates the opportunity to review and provide recommendations to you regarding this proposed activity. Please do not hesitate to contact LDWF Permits Coordinator Dave Butler at 225-763-3595 should you need further assistance.

Sincerely,

Kyle Balkum  
Biologist Program Manager

cd/hf

c: Chris Davis: Biologist  
Heather Finley, Biologist Program Manager  
EPA Marine & Wetlands Section  
USFWS Ecological Services



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
646 Cajundome Blvd.  
Suite 400  
Lafayette, Louisiana 70506  
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, Tchefoncté, 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 oxyrinchus 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 Agency 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](mailto: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 Bohannon, 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  
646 CAJUNDOME BOULEVARD  
SUITE 400  
LAFAYETTE, LOUISIANA 70506

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**BOBBY JINDAL**  
GOVERNOR



**HAROLD LEGGETT, Ph.D.**  
SECRETARY

**State of Louisiana**  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL SERVICES

**FEB 08 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 081222-01/AI 162387/CER 20080001)  
Individual Environmental Report (IER) #8 (Bayou Dupre Control Structure)  
Individual Environmental Report (IER) #10 (Chalmette Loop Levee)  
Orleans & St. Bernard Parishes

Dear Ms. Wilkinson:

The Department has reviewed your application to install a control structure on Bayou Dupre at the MRGO & to construct a hurricane protection levee, in the vicinity of the east bank of metropolitan New Orleans between the Inner Harbor Navigation Canal and Caemarvon, Louisiana.

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,

A handwritten signature in black ink, appearing to read "T. F. Harris".

Thomas F. Harris  
Administrator  
Waste Permits Division

TFH/jjp



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
646 Cajundome Blvd.  
Suite 400  
Lafayette, Louisiana 70506  
March 27, 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 (IER) Lake Pontchartrain and Vicinity (LPV) Orleans East Bank, Chalmette Loop Levee, New Orleans, Louisiana (IER10). 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 two 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 and/or mitigate 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 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 precluded 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 Fish and Wildlife Service (Service) will be providing post-authorization 2(b) reports for each IER.

This draft report incorporates and supplements our FWCA Reports that addressed impacts and mitigation features for the LPV (dated July 25, 1984 and January 17, 1992) Hurricane Protection projects and the November 26, 2007 Draft Programmatic FWCA Report that addresses the hurricane protection improvements authorized in Supplemental 4. However, this 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 Wildlife and Fisheries (LDWF) and



the National Marine Fisheries Service (NMFS); their comments will be incorporated into our final report.

#### **DESCRIPTION OF THE STUDY AREA**

The study area is located within the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. Higher elevations occur on the natural levees of the Mississippi River and its distributaries. Developed lands are primarily associated with natural levees, but extensive wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development. Federal, State, and local levees have been installed for flood protection purposes, often with negative effects on adjacent wetlands. Navigation channels such as the Gulf Intracoastal Waterway and the Mississippi River – Gulf Outlet (MRGO) are also prominent landscape features, as are extensive oil and gas industry access channels and pipeline canals. Extensive wetlands and associated shallow open waters dominate the landscape outside the flood control levees. Major water bodies include the Mississippi River which is located west of the project area and Lake Borgne which is located on the eastern edge of the project area.

The boundary of IER10 project area overlays the existing LPV east bank levee system on the east side of Orleans and St. Bernard Parishes (Figure 1) in southeast Louisiana. The eastern portion of the project area is bound by the western bank of the MRGO. The southeastern portion of IER 10 traverses the Bayou La Loutre ridge while the southern boundary parallels this ridge westward to the vicinity of the Mississippi River levee. The northern boundary of the study area is the south bank of the Gulf Intracoastal Waterway (GIWW) and the MRGO which occupy the same channel. The western project area boundary is the Mississippi River.

The most northern part of the project area is part of the Greater New Orleans metropolitan area; while the southern portion of the project is characterized by small communities, forested areas, and cleared land. Intermediate and brackish marshes are found inside of and adjacent to the project area.

The existing spoil disposal banks for the GIWW, the MRGO and the Bayou La Loutre ridge on which the LPV levees are located have created an impoundment within the project area. Tidal exchange and rainfall run-off from higher elevation areas must pass through either the Bayou Dupre or the Bayou Bienvenue floodgates and into the MRGO to leave the project area.



Figure 1. Individual Environmental Report (IER) Lake Pontchartrain and Vicinity (LPV) Orleans East Bank, Chalmette Loop Levee, Louisiana (IER10) and location of reaches.

The project primarily consists of the building of approximately 21 miles of floodwalls and 2 vehicle crossings. The proposed action is a part of the overall Chalmette Loop Levee system that includes connections to IER # 11 - Tier 2 Borgne, IER # 8 - the Bayou Dupre Flood Gate (LPV 144.02), and IER # 9 - the Caernarvon Floodwall project (LPV 149). Construction of the IER 11, Improved Protection on the Inner Harbor Navigation Canal, Tier Two Borgne, Orleans and St. Bernard Parishes has precluded the need for further improvement to hurricane protection north of Bayou Dupre (i.e., LPV reaches 141, 142, and 143).

IER 10 has been divided into eight reaches or segments of the levee project. All of the reaches covered by IER 10 currently are earthen levees. As previously mentioned, reaches 141, 142, and 143 will not have any worked covered by this IER. Reach 144 includes the Bayou Bienvenue and Bayou Dupre floodgates both of which are addressed in IER 8. Reach 145 is located between the Bayou Dupre Flood Gate and the Bayou Bienvenue Flood Gate covers a distance of approximately 6.3 miles. Reach 146 extends from the Bayou Dupre Flood Gate to Highway 46 near Verret, a distance of approximately 7.7 miles. Reach 147 consists of a levee section of approximately 0.2 miles in length extending from the Highway 46 crossing through the Bayou Road Flood Gate. Reach 148 extends between Verret and the Caernarvon Floodwall in Braithwaite, a distance of approximately 8.1 miles.

## FISH AND WILDLIFE RESOURCES

Habitat types in the project area and vicinity include bottomland hardwoods (wet and non-wet), scrub-shrub, marsh, open water, and developed areas. Due to urban development, the MRGO and the local and Federal levee systems, the hydrology of much of the wetland habitat has been altered. Those factors have been in operation for many years and wetland loss and subsidence is evident throughout the area. Developed habitats in the study area include residential and commercial areas, as well as roads and existing levees. Those habitats do not support significant wildlife use. The Service has provided a November 26, 2007 draft programmatic FWCA Report for the LPV project. That report contains a thorough discussion of the significant fish and wildlife resources (including those habitats) that occur within the study area. For brevity, that discussion is incorporated by reference herein.

In our January 30, 2009, (incorrectly dated 2007) letter we provided information concerning the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended; 16 U.S.C. 668a-d) and the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) compliance requirements. A bald eagle nest is located within 660 feet of the levee right-of-way (ROW) of LPV reach 148. The Corps has completed an on-line evaluation (<http://www.fws.gov/southeast/es/baldeagle>) to determine potential disturbance to nesting bald eagles. A copy of that evaluation was provided to this office via a March 24, 2009, electronic mail. That evaluation indicated that the Corps proposed activities are unlikely to disturb nesting bald eagles because they would maintain a 330 feet buffer between the nest and the proposed work and would restrict all activities within 660 feet of the nest to the non-nesting season (June through mid-August). No species listed under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) are known to occur within the ROW where work would be conducted or in close enough proximity to be affected by construction activities.

### **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, including the subtidal vegetation (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).

## ALTERNATIVES UNDER CONSIDERATION

### **No-Action Alternative**

Under the no-action alternative, the current levee reaches, floodwalls, floodgates, and associated structures would remain at or be brought to the authorized height. Routine maintenance of the levee system would continue, but no additional height (i.e., greater storm protection) would be added to the system.

### **Alternatives Considered**

Other alternatives that were eliminated from further consideration because they did not adequately meet the screening criteria included, hollow core levee and raising the existing levees with earthen material. Additionally, non-structural alternatives included elevating all residential and commercial properties and public acquisition of properties in areas subject to flooding. Both of these alternatives were eliminated due to excessive cost.

## DESCRIPTION OF SELECTED PLAN

The proposed action for the IER 10 project area would provide 100-year level of protection for Orleans and St. Bernard Parishes by primarily constructing T-wall on top of the existing levee, however, rebuilding and/or modifying earthen levees and floodwalls, replacing or adding new floodgates would also be part of the proposed plan. With the proposed action, the elevations of the existing hurricane and storm damage risk reduction system would be raised to heights ranging from 26.5 feet (ft) to approximately 31 ft. No additional action is proposed nor is any additional ROW required.

### **Reach LPV 145, LPV 146 and LPV 148: Proposed Action (T-wall on Existing Levee)**

The proposed action for LPV 145, LPV 146 and LPV 148 consists of the construction of a T-wall on top of the existing levee (Figure 2). To construct the T-wall, the existing levee would be slightly raised in some areas. Some excavation will be necessary to place the T-wall foundations, which are typically embedded approximately 3.0 feet into the crown, for erosion protection. The T-wall design requires minimal right-of-way (ROW) and all construction is anticipated to be within the footprint of the existing levee, and well within the existing ROW for the levee. The proposed top of T-wall elevation would be constructed to approximately EL ±29.0, except for LPV 145 where the T-wall elevation varies from 29.0 to 31.0. Specific conditions and construction requirements of the proposed action within each of these reaches is described below.

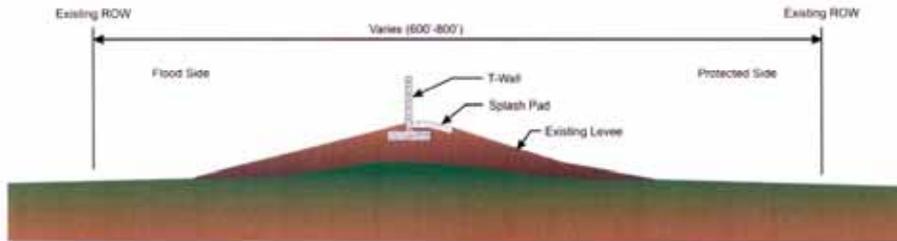


Figure 2: Typical Section of T-wall on Existing Levee

Reach LPV 145 - Bayou Bienvenue to Bayou Dupre: Proposed Action (T-wall on Existing Levee)

The existing levee ROW is approximately 875 feet wide extending 350 feet from the levee centerline on the flood side and 525 feet from the levee centerline on the protected side. The existing levee is located immediately adjacent to the MRGO, and in some areas the ROW extends into the MRGO.

In order to accommodate terrestrial wildlife movement, the construction of access areas for wildlife to traverse the T-wall will be required. This feature will consist of the construction of one earthen ramp within LPV 145. There are six pipelines within the reach that could have to be relocated or repositioned to accommodate a T-wall structure.

Construction of the proposed action is anticipated to begin fall of 2009 and the construction activities are expected to last for approximately 30 months. A significant amount of construction equipment would be required to conduct the work and the estimated volume of construction material is provided in Table 1.

**Table 1: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 145**

Material	Units	Estimated Quantity
Compacted Fill	Cubic Yard	48,976
Clearing	Acre	90.3
Rip Rap	Cubic Yard	161,136
Silt Fence	Feet	66,796
T-wall Concrete	Cubic Yard	60,237
Stabilization Slab Concrete	Cubic Yard	4,700
T-wall Sheet Pile	Square Yard	273,612
T-wall Pile	Feet	1,793,791

Construction access for LPV 145 would only be possible via a temporary bridge across Bayou Dupre and/or Bayou Bienvenue or by barge. The potential exists that the reach may be accessible via navigable sections of the MRGO. Two primary staging areas for the proposed action could be established. Approximately 18 acres, located on both the flood side and protected side adjacent to

Bayou Bienvenue, have been identified as potential staging areas for LPV 145. Within this area, four individual parcels of land suitable for staging areas are proposed. In addition, approximately 7 acres located on both the flood side and protected side adjacent to Bayou Dupre, have been identified as potential staging areas for LPV 145 and LPV 146. The staging areas occur primarily on the existing levee or on dredge spoils deposited during construction of the MRGO, therefore, minimal impacts to high quality fish and wildlife habitat would occur.

Reach LPV 146 - Bayou Dupre to Highway 46: Proposed Action (T-wall on Existing Levee)

LPV 146 extends between the Bayou Dupre Flood Gate and Highway 46 near Verret. It parallels the MRGO and then turns 90 degrees and continues in a southwesterly direction to Highway 46. There are two pipelines within the reach that may have to be relocated or repositioned to accommodate a T-wall structure.

The existing levee ROW parallel to the MRGO is approximately 925 feet wide that extends 350 feet from the levee centerline on the flood side and 575 feet from the levee centerline on the protected side. The existing levee is located immediately adjacent to the MRGO, and in some areas the ROW extends into the MRGO. From the MRGO to Highway 46, the existing levee ROW is approximately 800 feet wide that extends equally 400 feet from the levee centerline on the flood side and on the protected side. Construction of the proposed action could be implemented within the existing ROW.

In order to accommodate terrestrial wildlife movement, the construction of crossing areas for wildlife to traverse the T-wall will be required. This feature will consist of the construction of two earthen ramps within LPV 146.

Construction of the proposed action is anticipated to begin fall of 2009 and the construction activities are expected to last for approximately 23 months. The estimated volume of construction materials is provided in Table 2.

**Table 2: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 146**

Material	Units	Estimated Quantity
Compacted Fill	Cubic Yard	6,828
Clearing	Acre	109.1
Rip Rap	Cubic Yard	197,061
Silt Fence	Feet	81,270
T-wall Concrete	Cubic Yard	66,541
Stabilization Slab Concrete	Cubic Yard	5,176
T-wall Sheet Pile	Square Yard	270,790
T-wall Pile	Feet	1,326,664

Construction access for LPV 146 is a major constraint. There is one overland access point at Highway 46. Material could also be delivered by barge via the navigable portions of the MRGO. Two primary staging areas for the proposed action could be established. Approximately 7 acres,

located on both the flood side and protected side adjacent to Bayou Dupre, have been identified as potential staging areas for LPV 146. The staging area at Bayou Dupre occurs primarily on the existing levee or on dredge spoils deposited during construction of the MRGO. In addition, approximately 6 acres located on both the flood side and protected side in the vicinity of Highway 46, have been identified as potential staging areas for LPV 146. The two individual parcels of land suitable for staging areas north of Highway 46 are both located within existing levee and/or highway ROW.

Reach LPV 148 - Verret to Caernarvon: Proposed Action (T-wall on Existing Levee)

LPV 148 extends between Verret and the Caernarvon Floodwall in Braithwaite, a distance of approximately 8.1 miles. The Jourda Canal parallels the existing levee on the protected side for the majority of its length, while the Creedmore Canal parallels the levee on the flood side. Just south of LPV 149 (which will be addressed in IER 9) the levee alignment turns and continues in a northwesterly direction. The Caernarvon Canal parallels the flood side of the levee within this segment of the levee. There are 11 pipelines and three overhead power lines within the reach that could have to be relocated or repositioned to accommodate a T-wall structure.

The existing levee ROW is generally 400 feet to 410 feet wide, and widens at existing utility crossings. It extends approximately 200 feet from the levee centerline on the flood side and the protected side. Construction of the proposed action could be implemented within the existing ROW

There are two flood protection structures in this reach; they are St. Mary's Pump Station and the Creedmore Drainage Structure. The existing pump station fronting walls (T-wall monoliths and I-walls that connect them to the levee) will be replaced with new T-walls. The proposed action also includes the removal of the existing Creedmore Drainage Structure. This structure is used on extremely rare occasions, such as after the flooding associated with Hurricane Katrina; it is not regularly used to maintain or alter the existing drainage patterns of the area. Therefore, adverse impacts to the existing drainage pattern of the area are not anticipated due to the removal of this structure.

In order to accommodate terrestrial wildlife movement, the construction of crossing areas for wildlife to traverse the T-wall will be required. This feature will consist of the construction of two earthen ramps within LPV 148.

Construction of the proposed action is anticipated to begin fall of 2009 and the construction activities are expected to last for approximately 42 months. The estimated volume of construction materials for LPV 148 is provided in table 3.

**Table 3: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 148**

Material	Units	Estimated Quantity
Compacted Fill	Cubic Yard	198,643
Clearing	Acre	140
Rip Rap	Cubic Yard	255,164
Silt Fence	Feet	87,050
T-wall Concrete	Cubic Yard	68,839
Stabilization Slab Concrete	Cubic Yard	4,275
T-wall Sheet Pile	Square Yard	520,830
T-wall Pile	Feet	2,025,630

Construction access for LPV 148 will be accomplished via the existing access points at both ends of the levee section. Bayou Road provides access at the eastern end and River Road (Highway 39) provides access at the western end. In addition, a haul road will be constructed on top of an existing private airstrip, with a ramp over the railroad adjacent to the airstrip.

Approximately 3 acres have been identified as potential staging areas for LPV 148, including 2 acres on two individual parcels of land adjacent to St. Mary's Pump Station and 1 acre on the protected side at the western end near Caernarvon. The staging areas are all located within existing levee ROW.

LPV 147 would provide flood protection to Highway 46, a four-lane divided arterial and Bayou Road, a two-lane local road adjacent to Highway 46. The offset between these parallel roadways is approximately 400 feet at the protection crossing. Flood protection within LPV 147 currently consists of a levee section at Highway 46 with the roadway elevated over the levee, and a flood gate at Bayou Road. Two overhead power lines and other local utilities including water, gas, and drainage are located parallel to Bayou Road and could require relocation under the proposed action.

The proposed action for LPV 147 would be the construction of a T-wall on top of the existing levee, between LPV 146 and LPV 148 and construction of a flood gate at Bayou Road. Construction of the T-wall levee would be similar in design technique with LPV 148. It is not desirable to utilize flood gates across Highway 46 due to the excessive size of the gate that would be required to span the four-lane divided roadway and the additional danger accompanying the presence of gate storage monoliths adjacent to the road. Therefore, a bridge would be constructed over the T-wall. A side view of the proposed Highway 46 bridge spanning the proposed T-wall is shown in Figure 3. The total length of the bridge is estimated to be 1,640 feet long. The existing gate across Bayou Road would also be replaced by a taller gate. The T-wall, bridge and Bayou Road Flood Gate are anticipated to be within the existing ROW of the project. An access road of up 2,000 feet in length parallel to Highway 46 will be necessary to provide direct access to both directions of Highway 46 for the Verret Fire Station, and such a road would be built within 200 feet of the existing edge of Highway 46. The new T-wall levee would be built to a height of approximately ±31 ft (NAVD88).

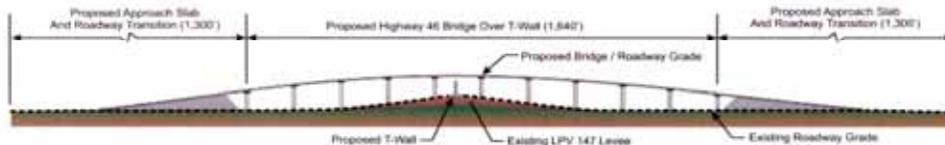


Figure 3: LPV 147 Proposed Action Highway 46 Bridge over T-wall

Terrestrial wildlife movement within LPV 147 will be provided under the proposed Highway 46 bridge, as well as through the Bayou Road Flood Gate.

Construction of the proposed action is anticipated to begin fall of 2009 and the construction activities are expected to last for approximately 13 months. The estimated volume of construction materials for the proposed T-wall / bridge is provided in Table 5.

**Table 4: Estimated Construction Material Quantities Required to Complete the Proposed Action for LPV 147**

Material	Units	Estimated Quantity
<b>T-wall Portion</b>		
Compacted Fill	Cubic Yard	3,000
Clearing	Acre	3.5
Silt Fence	Feet	2,200
T-wall Concrete	Cubic Yard	1,800
Stabilized Slab Concrete	Cubic Yard	125
T-wall Sheet Pile	Cubic Yard	12,225
T-wall Pile	Feet	48,000
<b>Bridge Portion</b>		
Precast Concrete Piles - 24"	Feet	19,380
Class A Concrete (Bents)	Cubic Yard	720
Class AA Concrete (Deck)	Cubic Yard	3,043
Concrete Girders (Type III)	Feet	16,400

Note: Bayou Road Flood Gate quantities not available.

Highway 46 provides construction access at the northern end and Bayou Road provides construction access at the southern end. Approximately 2 acres have been identified as potential staging areas for LPV 147, including 1 acre on the protected side and 1 acre on the flood side; all located within existing levee ROW.

**Armoring of Levees and Floodwalls**

Armoring could be incorporated as an additional feature to protect against erosion and scour on the protected, flood, or both sides of critical portions of levees and floodwalls. These critical areas include: transition points (where levees transition into any hardened feature such as other levees, floodwalls, pump stations, etc.), utility pipeline crossings, floodwall-protected side slopes,

and earthen levees that are exposed to wave and surge overtopping during a 500-year hurricane storm event. The proposed method of armoring could be one of the following: cast-in-place reinforced concrete slabs, articulated concrete blocks (ACB) covered with soil and grass, turf reinforcement mattress (TRM), ACB/TRM, TRM/grass, or good grass cover. The armoring would be incorporated into the existing levee or floodwall footprint, and no additional environmental impacts would be anticipated.

**Borrow**

Impacts from borrow are being addressed in separate IERs.

**PROJECT IMPACTS**

Commercial and residential development is ongoing within the hurricane protection levees; therefore, the Service has assumed that, for this specific IER, project-induced development within enclosed wetlands will be insignificant. However, impacts to wetlands (forested and marsh) due to construction activities should be mitigated.

Project impacts would result primarily from work within the levee ROW. Although most construction will occur in cleared non-wet areas on the existing levees and berms, project implementation will also directly impact bottomland hardwoods and marsh that provide high to medium habitat value for diverse fish and wildlife resources. The wetlands located within the existing ROW of the project may have reduced wetland functions and values due to their location. Impacts resulting from borrow pit creation are being addressed in separate IERs, therefore, impacts, mitigation, and Service recommendations concerning borrow pits will not be included in this report.

The Service quantified unavoidable project impacts on wildlife resources and calculated mitigation needs through the use of Habitat Assessment Methodology (HAM) and the Wetland Value Assessment (WVA). The HAM was used to determine impacts to wet bottomland hardwoods and the WVA was used to assess impacts to marsh. Those methodologies utilize an assemblage of variables considered important to the suitability of each habitat type to support a diversity of fish and wildlife species. All methodologies also operate under the assumption that optimal conditions for fish and wildlife habitat within each habitat type can be characterized, and that existing (i.e., baseline) or predicted conditions can be compared to that optimum to provide an index of habitat quality. Baseline conditions (i.e., habitat quantity and quality) are therefore measured and predicted for future without-project and future with-project conditions. The numeric comparison of each future condition provides an estimate of project-related effects on fish and wildlife habitat quality and quantity. Both habitat assessment models were developed for wetlands within the Louisiana Coastal Zone and are modified from those developed in the Service's Habitat Evaluation Procedures (HEP). The HAM and WVA, however, are community-level evaluations instead of the species-based approach used with HEP. An explanation of the assumptions affecting HSI values for each target year is available for review at the Service's Lafayette, Louisiana, Field Office. Additional information regarding the methodology and assessment are presented in Appendix A. For marshes located on the flood side of LPV 148 the NMFS analyzed the impacts using WVA and determined acreage of marsh and bottomland

hardwoods. In summary, impact assessments were conducted using the HAM and WVA methodologies as well as field inspections, wetland-loss data, knowledge of the area, and experience with other projects located within the project area.

In the future without project scenario, fish and wildlife and their habitats are expected to remain relatively stable with some decline from development, subsidence, and erosion. Implementation of the proposed project would result in the loss of 503.22 acres of wetlands (i.e., bottomland hardwoods and marsh). All impacts would result from work within the existing ROW; therefore, most impacts were linear in nature. Most impacts were determined from geographic information system (GIS) files produced by the Corps. A total of 46.45 acres of fresh marsh would be lost resulting in the loss of 30.93 Average Annual Habitat Units (AAHUs). Approximately 113.2 acres of intermediate marsh would be lost with a corresponding loss of 64.76 AAHUs. Approximately 269.92 acres of brackish marsh would be impacted with a loss of 178.73 AAHUs. Impacts to bottomland hardwoods would occur along reaches 145, 146, 147, and 148 for a total approximately 73.63 acres resulting in the loss of 31.66 AAHUs. Some areas where construction impacts would occur would also be impacted by the creation of stockpile areas which were addressed in IER 24, but impacts to wetlands within the ROW were not disclosed in that IER. Therefore, impacts to those areas from T-wall construction are included in the impact assessment of this IER and in the acreage of impacts because even without the stockpiles the impacts from construction would still occur.

**Table 5: Impacts of IER 10 (LPV Chalmette Loop) 100-year Level Protection**

Levee Reach	Habitat Type	Impacted (acres)	Flood side (FS) Protected side (PS)	AAHUs lost
LPV 145	Brackish Marsh	87.86	FS	59.01
	Intermediate Marsh	0.08	PS	0.05
LPV 146	Brackish Marsh	181.98	FS	119.67
	Intermediate Marsh	60.02	PS	33.5
	Bottomland Hardwoods	4.81	FS	1.11
	Bottomland Hardwoods	1.52	PS	0.67
LPV 147	Bottomland Hardwoods	0.5	FS	0.21
LPV 148	Intermediate Marsh	53.2	FS	31.26
	Fresh Marsh	46.45	PS	23.76
	Bottomland Hardwoods	30	FS	12.9
	Bottomland Hardwoods	36.8	PS	15.77
Sub-totals	Fresh Marsh	46.45	PS	64.76
	Intermediate Marsh	113.22	FS/PS	30.93
	Brackish Marsh	269.84	FS/PS	178.73
	Bottomland Hardwoods	73.63	FS/PS	31.66
Total	Wetlands	503.22	FS/PS-	306.08

IER 10 proposed floodwalls would separate the wetlands (which are predominantly marsh) and

waterbodies adjacent to the T-wall from each other. Semi-aquatic species such as river otter, mink, muskrat, alligators, and turtles utilize those wetland areas. Floodwalls can act as barriers to animal passage resulting in fragmented and isolated populations, which can affect the viability of animal populations. Those walls may also significantly decrease the opportunity for animals to recolonize vacant habitat after local population eliminating events (e.g., hurricanes, droughts). To minimize the impact of fragmentation and isolation the construction of earthen ramps is being incorporated as a project feature. One earthen ramp is proposed to be constructed within the LPV 145 reach and two earthen ramps are proposed each in LPV reaches 146 and 148. All crossings should be spaced, if feasible, at an approximate equal distance from other ramps or potential crossing sites.

No Federally listed threatened or endangered species presently occur within the proposed project area. There is no threatened or endangered species habitat in the project area, though West Indian manatee (*Trichechus manatus*) and the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) may occur adjacent to the project area. If project construction has not been initiated within 1 year, consultation should be accomplished prior to making expenditures for construction. If the scope or location of the proposed work is changed, both threatened and endangered species and FWCA consultation should be reinitiated as soon as such changes are made.

#### **FISH AND WILDLIFE CONSERVATION MEASURES**

Coastal wetlands are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries).

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. Based on current and expected future without-project conditions, the planning goal of the Service is to develop a balanced project, i.e., one that is responsive to demonstrated hurricane protection needs while addressing the co-equal need for fish and wildlife resource conservation.

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 bottomland hardwoods and swamp 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. Project impacts to wetlands will be minimized to a large extent by construction of the T-wall instead of a levee. Therefore, remaining direct project impacts should be mitigated via compensatory replacement of the habitat values lost. Indirect impacts associated with the T-walls potential isolation of wildlife populations should be mitigated via minimization (i.e., crossing construction).

Toward that end, the Service recommends that the following planning objectives be adopted to guide future project studies.

1. Conserve important fish and wildlife habitat (i.e., bottomland hardwoods, marsh) by minimizing the acreage of those habitats directly affected by flood control features.
2. Avoid adverse impacts to bald eagle nesting locations through careful design of levees, other project features and timing of construction.
3. Fully compensate for any unavoidable losses of wetland habitat or non-wet bottomland hardwoods caused by project features.
4. Minimize the effects of the proposed floodwalls on wildlife movement.

#### **SERVICE POSITION AND RECOMMENDATIONS**

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 incorporated into future project planning and implementation:

1. To the greatest extent possible, situate flood protection features so that destruction of wetlands and non-wet bottomland hardwoods are avoided or minimized.
2. Avoid adverse impacts to bald eagle nesting locations through the careful design of project features and timing of construction by limiting construction activities within 660 feet of a nest to the non-nesting season (June through mid-August).
3. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.
4. In order to minimize the impact of T-walls on wildlife movement one earthen ramp should be constructed within the LPV 145 reach and two earthen ramps should be constructed each in LPV reaches 146 and 148. All crossings should be spaced, if feasible, at an approximate equal distance from other ramps or potential crossing sites.

5. The project's first Project Cooperation Agreement (or similar document) should include language that specifies the responsibility of the local-cost sharer to provide operational, monitoring, and maintenance funds for mitigation features.
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 Service, NMFS, LDWF, Environmental Protection Agency (EPA) and Louisiana Department of Natural Resources (LDNR). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.
7. If a proposed project feature is changed significantly or is not implemented within one year of the date of our January 30, 2009, (incorrectly dated 2007), 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.
8. The Corps shall fully compensate for any unavoidable losses of 31.66 AAHUs of bottomland hardwoods, and 30.93, 64.76, and 178.73 AAHUs of fresh, intermediate and brackish marshes, respectively, caused by project features. Development and implementation of those plans should be done in concert with the Service and other resource agencies.

We appreciate the opportunity to provide recommendations in the planning stages of the proposed project. If you or your staff have further questions, or would like to meet and discuss our recommendations, please contact David Walther of this office at (337) 291-3122.

Sincerely,



for 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