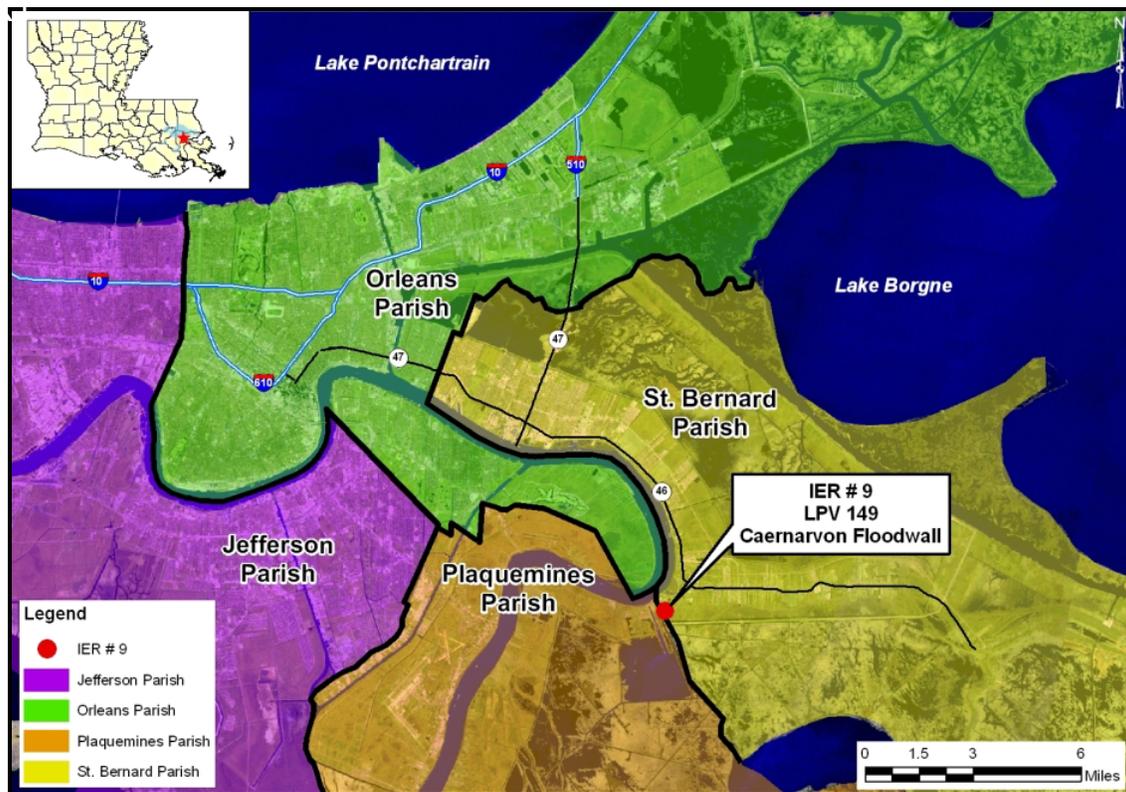


DRAFT INDIVIDUAL ENVIRONMENTAL REPORT

LAKE PONTCHARTRAIN AND VICINITY, CAERNARVON FLOODWALL

ST. BERNARD PARISH, LOUISIANA

IER # 9



**US Army Corps
of Engineers®**

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report (IER) # 9 to evaluate the potential impacts associated with the replacement of two floodgates, approximately 1,500 feet (ft) of floodwall, and a levee tie-in at the southwestern corner [terminus] of the Lake Pontchartrain and Vicinity (LPV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) Chalmette Loop Levee in St. Bernard Parish, Louisiana (figure 1). The Caernarvon Floodwall and floodgates compose reach LPV 149 of the HSDRRS.



Figure 1. IER # 9 - Caernarvon Floodwall Project Area, St. Bernard Parish, Louisiana

IER # 9 has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and the USACE Engineering Regulation (ER), ER 200-2-2 Environmental Quality, Procedures for Implementing NEPA (33 CFR 230). 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, (33 CFR 230), Procedures for Implementing NEPA and pursuant to the CEQ Regulations for Implementing NEPA (40 CFR 1506.11). The Alternative Arrangements can be found at www.nolaenvironmental.gov, and are herein incorporated by reference.

The CEMVN implemented Alternative Arrangements on 13 March 2007, under the provisions of the CEQ Regulations for Implementing NEPA (40 CFR 1506.11). The Alternative Arrangements were developed and implemented in the aftermath of Hurricanes Katrina and Rita in order to evaluate environmental impacts arising from HSDRRS projects in a timely manner, utilizing the NEPA emergency procedures found at 40 CFR 1506.11. The Alternative Arrangements were published on 13 March 2007 in 72 FR 11337, and are available for public review at www.nolaenvironmental.gov.

The Alternative Arrangements were developed and 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 George W. Bush Administration.

The area described in this IER is located in southeastern Louisiana and is 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 would 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 determine 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 the form of 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

It is the intent of the CEMVN to employ an integrated, comprehensive, and systems-based approach to hurricane and storm damage risk reduction by raising the HSDRRS to the 100-year level of risk reduction. The proposed action would satisfy the CEMVN's purpose and need to provide the 100-year level of risk reduction from flood damage due to flooding from hurricanes and other tropical storms in the St. Bernard Parish area. The term "100-year level of risk reduction," as it is used throughout this document, refers to a level of risk reduction which reduces the risk of hurricane surge and wave-driven flooding that the New Orleans Metropolitan Area has a 1 percent chance of experiencing each year.

The elevations of the existing floodwall, gates, and levee tie-ins within the Caernarvon Floodwall complex are below the 100-year design elevation. 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 completed HSDRRS would lower the risk of damage to property and infrastructure during a storm event. The safety of the people in the region is the highest priority of the CEMVN.

1.2 AUTHORITY FOR THE PROPOSED ACTION

The authority for the proposed action was provided as part of a number of HSDRRS projects spanning southeastern Louisiana, including the LPV project and the West Bank and Vicinity (WBV) project. Congress and the George W. Bush 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 (Public Law [PL] 89-298, Title II, Sec. 204) which amended and 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 (WRDAs) 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 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) appropriated funds to accelerate the completion of the previously authorized project and to restore and repair the project at full Federal expense. 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) appropriated funds and added authority to raise levee heights where necessary, reinforce and replace floodwalls, and otherwise enhance the project to provide the levels of risk reduction necessary to achieve the certification required for participation in the National Flood Insurance Program. Additional Supplemental Appropriations include the U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (PL 110-28) Title IV, Chapter 3, Flood Control and Coastal Emergencies, Section 4302 (5th Supplemental), and the 6th Supplemental (PL 110-252), Title III, Chapter 3, Construction.

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 summarized below:

- On 29 October 2009, the CEMVN Commander signed a Decision Record on Individual Environmental Report Supplemental (IERS) #2 entitled “Lake Pontchartrain and Vicinity, West Return Floodwall, Jefferson and St. Charles Parishes, Louisiana.” The supplemental document evaluates the potential effects associated with proposed project revisions to the original IER #2.
- On 28 September 2009, the CEMVN Commander signed a Decision Record on IER # 30 entitled, Contractor-Furnished Borrow Material # 5, St. Bernard and St. James Parishes, Louisiana, and Hancock County, Mississippi.” The document evaluates the potential impacts associated with the possible excavation of three proposed contractor-furnished borrow areas.
- On 8 September 2009, the CEMVN Commander signed a Decision Record on IER # 29 entitled, Contractor Furnished Borrow Material # 4, Orleans, St. John the Baptist, and St. Tammany Parishes, Louisiana.” The document evaluates the potential effects associated with the possible excavation of three proposed contractor-furnished borrow areas.
- On 30 June 2009, the CEMVN Commander signed a Decision Record on IER # 5 entitled “Lake Pontchartrain and Vicinity, Permanent Protection System for the Outfall Canals

Project on 17th Street, Orleans Avenue, and London Avenue Canals, Jefferson and Orleans Parishes, Louisiana.” The document evaluates the potential effects associated with the construction and maintenance of a permanent protection system for the 17th Street, Orleans Avenue, and London Avenue Canals.

- On 29 June 2009, the CEMVN Commander signed a Decision Record on Individual Environmental Report Supplemental # 1 entitled “Lake Pontchartrain and Vicinity, La Branche Wetlands Levee, St. Charles Parish, Louisiana.” The supplemental document evaluates the potential effects associated with the proposed project revisions to the original IER # 1.
- On 25 June 2009, the CEMVN Commander signed a Decision Record on IER # 6 entitled “Lake Pontchartrain and Vicinity, New Orleans East Citrus Lakefront Levee, Orleans Parish, Louisiana.” The document evaluates the potential effects associated with proposed improvements to three reaches of the East Orleans Hurricane Risk Reduction Levee that were originally constructed as part of the LPV project.
- On 23 June 2009, the CEMVN Commander signed a Decision Record on IER # 8 entitled “Lake Pontchartrain and Vicinity, Bayou Dupre Control Structure, St. Bernard Parish, Louisiana.” The document evaluates the potential effects associated with the proposed improvement or replacement of a flood control structure on Bayou Dupre.
- On 19 June 2009, the CEMVN Commander signed a Decision Record on IER # 7 entitled “Lake Pontchartrain and Vicinity, New Orleans Lakefront to Michoud Canal, Orleans Parish, Louisiana.” The document evaluates the potential effects associated with proposed improvements to three reaches of the East Orleans Hurricane Risk Reduction Levee that were originally constructed as part of the LPV project.
- On 26 May 2009, the CEMVN Commander signed a Decision Record on IER # 10 entitled “Lake Pontchartrain and Vicinity, Chalmette Loop Levee, St. Bernard Parish, Louisiana.” The document evaluates the potential impacts associated with the proposed construction of a T-wall floodwall on top of the existing Chalmette Loop levee.
- On 13 March 2009, the CEMVN Commander signed a Decision Record on IER # 4 entitled “Lake Pontchartrain and Vicinity, New Orleans Lakefront Levee, Orleans Parish, Louisiana.” The document was prepared to evaluate the potential impacts associated with improving the Orleans lakefront hurricane risk reduction features.
- On 18 February 2009, the CEMVN Commander signed a Decision Record on IER # 12 entitled “Gulf Intracoastal Waterway (GIWW), Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana.” The document was prepared to evaluate potential impacts associated with the proposed construction and upgrades of levees, floodwalls, floodgates, and pumping station(s) within a portion of the WBV HSDRRS.
- On 3 February 2009, the CEMVN Commander signed a Decision Record on IER # 25 entitled “Government Furnished Borrow Material # 3, Orleans, Jefferson, and Plaquemines Parishes, Louisiana.” The document was prepared to evaluate the potential impacts associated with the possible excavation of four Government Furnished borrow areas.
- On 21 October 2008, the CEMVN Commander signed a Decision Record on IER # 11 "Improved Protection on the Inner Harbor Navigation Canal, Orleans and St. Bernard Parishes, Louisiana (Tier 2 Borgne)." The document was prepared to evaluate the potential impacts associated with constructing a surge barrier near Lake Borgne.

- On 20 October 2008, the CEMVN Commander 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 26 August 2008, the CEMVN Commander signed a Decision Record on IER # 14, entitled "Westwego to Harvey Levee, Jefferson Parish, Louisiana." The proposed action includes enlarging earthen levees, rebuilding floodwalls, constructing fronting protection for three pump stations, replacing a floodgate with a swing gate, and raising an existing ramp to ensure a continuous line of risk reduction in the levee and floodwall system.
- On 25 July 2008, the CEMVN Commander signed a Decision Record on IER # 3, entitled "Lake Pontchartrain and Vicinity, Lakefront Levee, Jefferson Parish, Louisiana." The proposed action includes the rebuilding of 9.5 miles of earthen levees, upgrading of foreshore protection, replacement of two floodgates, and construction of fronting protection and construction or modification of breakwaters at four pumping stations along the lakefront in Jefferson Parish, Louisiana.
- On 18 July 2008, the CEMVN Commander signed a Decision Record on IER # 2, entitled "Lake Pontchartrain and Vicinity, West Return Floodwall, Jefferson and St. Charles Parishes, Louisiana." The proposed action includes replacing 3.4 miles of floodwall in Jefferson and St. Charles Parishes, Louisiana.
- On 12 June 2008, the CEMVN Commander signed a Decision Record on IER # 15, entitled "Lake Cataouatche Levee, Jefferson Parish, Louisiana." The proposed action includes constructing and maintaining a 100-year level of risk reduction along the project area in Jefferson Parish, Louisiana.
- On 9 June 2008, the CEMVN Commander signed a Decision Record on IER # 1, entitled "Lake Pontchartrain and Vicinity, La Branche Wetlands Levee, St. Charles Parish, Louisiana." The proposed action includes raising approximately 9 miles of earthen levees, replacing over 3,000 ft of floodwalls, rebuilding or modifying four drainage structures, closing one drainage structure, and modifying one railroad gate in St. Charles Parish, Louisiana.
- On 30 May 2008, the CEMVN Commander signed a Decision Record on IER # 22 entitled "Government Furnished Borrow Material # 2, Jefferson and Plaquemines Parishes, Louisiana and Hancock County, Mississippi." The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE while excavating borrow areas for use in construction of the HSDRRS.
- On 5 May 2008, the CEMVN Commander 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 excavating borrow areas for use in construction of the HSDRRS.
- On 14 March 2008, the CEMVN Commander 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 (IHNC) from Lake Pontchartrain and/or the GIWW-Mississippi

River Gulf Outlet (MRGO¹) -Lake Borgne complex. The IER # 11 project also includes two Tier 2 documents, which discuss alignment alternatives, designs of the navigable and structural barriers, and the impacts associated with exact footprints. The Tier 2 Borgne document has been completed and a Decision Record was signed on 21 October 2008. The Tier 2 Pontchartrain document is currently being completed.

- On 21 February 2008, the CEMVN Commander 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 Commander 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.
- In July 2006, the CEMVN Commander signed a Finding of No Significant Impact (FONSI) on EA # 433 entitled, “USACE Response to Hurricanes Katrina & Rita in Louisiana.” The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of Hurricanes Katrina and Rita.
- On 30 October 1998, the CEMVN Commander signed a FONSI on EA # 279 entitled “Lake Pontchartrain Lakefront, Breakwaters, Pump Stations 2 and 3.” The report evaluates the impacts associated with providing fronting protection for outfall canals and pump stations. It was determined that the action would not significantly impact resources in the immediate area.
- On 2 October 1998, the CEMVN Commander signed a FONSI on EA # 282 entitled “LPV, Jefferson Parish Lakefront Levee, Landside Runoff Control: Alternate Borrow.” The report investigates the impacts of obtaining borrow material from an urban area in Jefferson Parish. No significant impacts to resources in the immediate area were expected.
- On 30 August 1990, the CEMVN Commander signed a FONSI on EA # 163 entitled “LPV Hurricane Protection – Alternate Borrow Area for Jefferson Parish Lakefront Levee, Reach III.” The report addresses the impacts associated with the use of a borrow area in Jefferson Parish for LPV construction.
- On 12 March 1990, the CEMVN Commander signed a FONSI on EA # 102 entitled “LPV Hurricane Protection – 17th Street Canal Hurricane Protection.” The report addresses the use of alternative methods of providing flood risk reduction for the 17th Street Outfall Canal in association with LPV activity. Impacts to resources were found to be minimal.
- On 21 July 1988, the CEMVN Commander signed a FONSI on EA # 76 entitled “LPV Hurricane Protection – Orleans Avenue Outfall Canal.” The report investigates the impacts of strengthening hurricane risk reduction at the Orleans Avenue Outfall Canal.

¹ The MRGO navigation project was officially de-authorized on 5 June 2008 upon submission of the USACE’s de-authorization report to Congress.

- Supplemental Information Report (SIR) # 30 entitled “LPV Hurricane Protection Project, Jefferson Lakefront Levee” was signed by the CEMVN on 7 October 1987. The report investigates impacts associated with changes in Jefferson Parish LPV levee design.
- SIR # 22 entitled “LPV Hurricane Protection – Use of the 17th Street Pumping Station Material for Lake Pontchartrain Hurricane Protection (LPHP) Levee” was signed by the CEMVN on 5 August 1986. The report investigates the impacts of moving suitable borrow material from a levee at the 17th Street Canal in the construction of a stretch of levee from the IHNC to the London Avenue Canal.
- 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 was published in 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 Decision Record, signed by the CEMVN on 7 February 1985. Final Supplement II to the EIS, dated August 1994, was followed by a Decision Record signed by the CEMVN on 3 November 1994.
- A report entitled “Flood Control, Mississippi River and Tributaries,” published as House Document Number (No.) 90, 70th Congress, 1st Session, submitted 18 December 1927, resulted in authorization of a project by the Flood Control Act of 1928. The project provided comprehensive flood control for the lower Mississippi Valley below Cairo, Illinois. The Flood Control Act of 1944 authorized the USACE to construct, operate, and maintain water resources development projects. The Flood Control Acts have had an important impact on water and land resources in the proposed project area.

1.4 INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS

In addition to this IER, the CEMVN is preparing a draft Comprehensive Environmental Document (CED) that will describe work completed and work remaining to be constructed. The purpose of the draft CED will be to document 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, 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. 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 on the proposed work. These mitigation IERs will, as described in section 1.0 of this IER, be available for a 30-day public review and comment period.

1.5 PUBLIC CONCERNS

Throughout southern Louisiana, one of the issues of greatest 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 and temporarily or permanently closed businesses and, due to extensive flooding, made returning to communities in a timely manner unsafe.

In public meetings held at Nunez Community College in Chalmette, Louisiana on 21 August 2007, the Lynn Oaks School in Braithwaite, Louisiana on 24 October 2007, 17 April 2008, and 11 March 2009, at NP Trist Middle School in Meraux, Louisiana on 17 January 2008, at C.W. Rowley Alternative School in Chalmette, Louisiana on 17 July 2008, and at the St. Bernard Parish Council Chambers on 11 May 2009 several public concerns were raised regarding improved risk reduction along the Caernarvon Floodwall.

During each public meeting, USACE staff presented alternatives for IER # 9 to the public and discussed the overall project status. Since the alternatives include the potential taking of homes or businesses, numerous members of the public expressed their concerns as well as their preferences for specific alternatives. The public expressed concerns with the taking of family homes as well as established businesses. They also expressed concerns regarding the method and time frame for potential “buy outs.” In addition, a number of individuals expressed a preference for an alternative that would avoid all residential homes and businesses while providing a safe harbor for local boats in a storm event.

Members of the public expressed concerns regarding flooding and tidal surge impacts on St. Bernard Parish from the MRGO, the IHNC, Lake Borgne, and Lake Pontchartrain near Seabrook, particularly the “funneling” effect that storm surge from lakes, surrounding canals, and waterways, and HSDRRS projects could have on the parish. Additionally, the residents were concerned about the time required to complete the levee repairs and upgrades, the presence of barges in the canals and damage they may cause to levees and floodwalls, and the untimely construction of coastal and wetland restoration projects in St. Bernard Parish. Members of the public have also expressed concerns regarding the large volume of borrow material that would be required for the overall HSDRRS 100-year project. Members of the local community expressed concerns regarding the perceived low priority being given to St. Bernard Parish, as well as preferential communications with selected stakeholders within the parish, and have requested additional information on how HSDRRS projects are authorized and funded. The residents fear that St. Bernard Parish could become the “barrier island protection” for New Orleans, if wetland restoration projects are not constructed in a timely manner.

1.6 DATA GAPS AND UNCERTAINTY

At the time of submission of this report, engineering evaluations had not been completed for the proposed action and alternatives. The analysis provided in this IER is based on preliminary designs and best professional judgment by technical experts. Details of the final engineering design could differ from the estimates. The description of project features does not represent a formal commitment to final design, equipment to be used, vendors for supply of materials, or methods of construction; instead, it gives an approximation of how the features could be constructed and the associated impacts.

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 action and not to prescribe detailed materials, quantities, or design specifications.

Uncertainty associated with final engineering design and construction, as well as slight changes to existing conditions in the future, could affect the assessment of impacts as presented in this document. For example, access routes to the construction areas are dependent on many variables that frequently change (weather, traffic and road conditions, construction materials, fuel prices, etc.). Large quantities of construction materials would be delivered to the project area, as well as to other 100-year level of risk reduction projects in the New Orleans metropolitan area. The sources for these materials and the transportation routes for delivering them have not been fully determined. The CEMVN is currently completing a system-wide transportation analysis to better quantify these impacts.

The exact design of the transition between the HSDRRS at LPV 149 and the Mississippi River Levee (MRL) has not yet been determined. Further engineering analysis is required to determine what is necessary to certify levees that are part of the HSDRRS system. Appropriate environmental compliance analysis will be undertaken as necessary and when alternatives have been identified.

As a result of these data gaps, many of the estimates of environmental impacts described in this document utilize assumptions that would account for possible design or alignment changes, allowing the project to proceed without compromising the integrity of the assessment. Any design or alignment change that would substantially alter the assessment would be evaluated in a supplement to this IER. New data relevant to design, transportation, environmental justice (EJ), or other aspects of the project will be reviewed as they become available. These data and any resulting changes to the assessment will be incorporated into future documents, including the draft CED.

2.0 ALTERNATIVES

2.1 ALTERNATIVES DEVELOPMENT AND PRELIMINARY SCREENING CRITERIA

NEPA requires that in analyzing alternatives to a proposed action, a Federal agency 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 as well as non-structural measures for this IER, which are discussed in sections 2.4 and 2.5, respectively.

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

The following standard set of alternative scales was initially considered for each alignment alternative:

- Earthen Levee
- T-wall Floodwall
- Earthen Levee with T-wall Floodwall cap
- Earthen Levee using Deep Soil Mixing

Once a full range of alternatives was established, 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 environmental and social acceptability. Those alternatives that did not adequately meet these criteria were considered infeasible and, therefore, were eliminated from further study in this IER. This alternatives analysis process is discussed in section 5.0.

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. The alternatives description below is for a single reach within the larger LPV Chalmette Loop system.

2.3 PROPOSED ACTION

Realignment of Caernarvon Floodwall to the West of the Shallow Draft Elevating Boats, Incorporated (SDEB) Property

The proposed action consists of constructing a new floodwall alignment mainly to the west of the Caernarvon Canal to replace the existing Caernarvon Floodwall (LPV 149) complex on the east side of the canal. As shown in figure 2, the new alignment would include, beginning at its northern end, the following components: a tie-in to the MRL system; new floodgates across Louisiana (LA) Highway 39 and the Norfolk Southern railroad; a floodwall (T-wall) to an elevation of approximately +26 ft North American Vertical Datum of 1988 (NAVD88) along the east bank of the Caernarvon Freshwater Diversion Canal (CFDC) (to the west of the Shallow Draft Elevating Boats Incorporated [SDEB] property and the Delacroix Corporation's Caernarvon Boat Launch), turning southeast and then east to the Caernarvon Canal; a 56-ft wide navigable structure to an elevation of approximately +26 ft (NAVD88) across the Caernarvon Canal south of the Elevating Boats, LLC (EBI) sea plane hangar; a continuation of the floodwall from the Caernarvon Canal east to the existing LPV Chalmette Loop levee (LPV 148); and a tie-in to the levee system. The existing floodgates across LA Highway 39 and the railroad would be demolished. The existing levee and floodwalls would be left in place in order to provide a buffer between the EBI facility and the adjacent residences. The proposed action was evaluated based on a 300-ft wide corridor (including both the temporary construction easement and permanent easement).

Figure 2 indicates the location of the proposed permanent right-of-way (ROW) and staging areas/temporary construction areas that would be required to complete the proposed action for LPV 149.

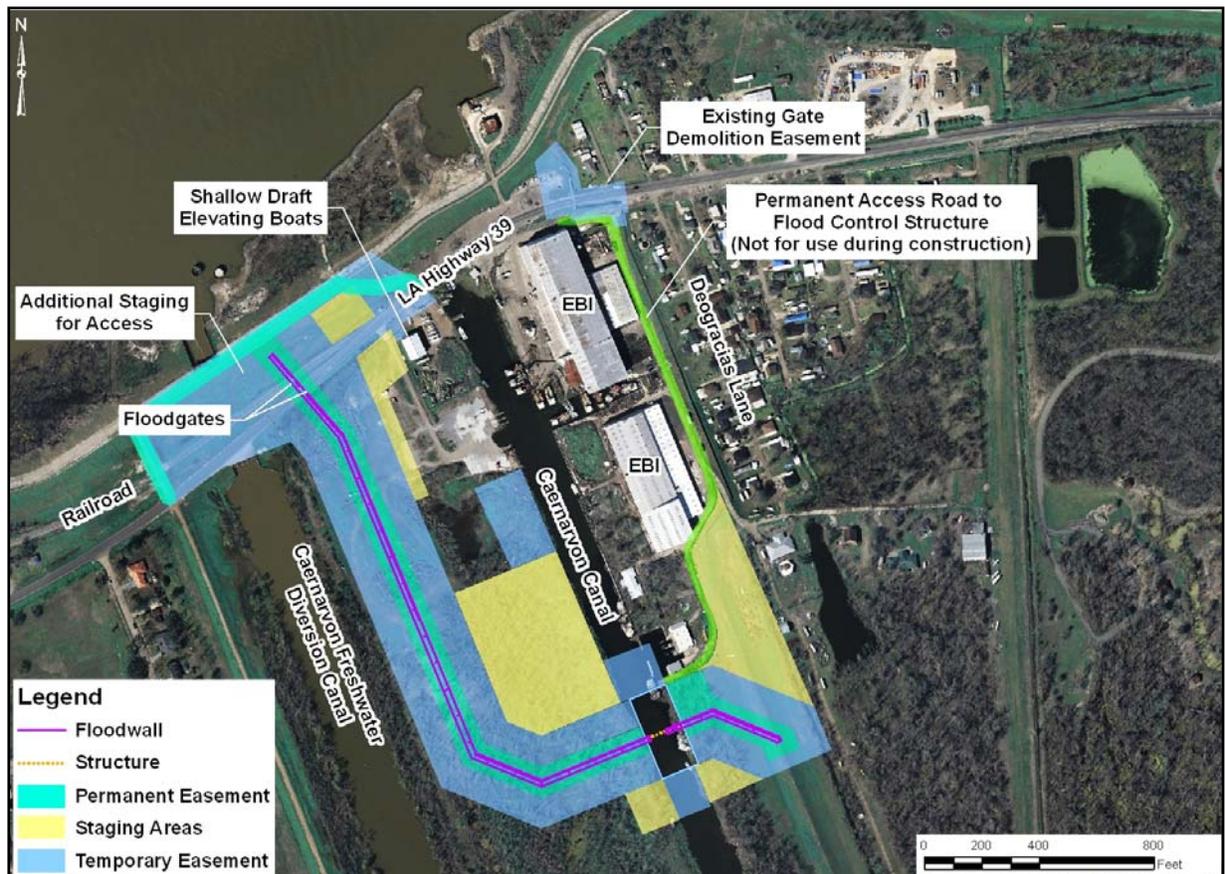


Figure 2. Proposed Action - Realignment of Caernarvon Floodwall to West of SDEB Property (with Proposed Staging Areas, Permanent Easement, and Temporary Construction Easement)

A new gate on LA Highway 39, as opposed to a ramp or bridge over the T-wall, is the only viable option in this location. There is insufficient space in the vicinity of LA Highway 39 or the railroad to build a bridge or ramp due to the road's close proximity to the MRL, Caernarvon Canal, and the CFDC. For example, a bridge over the T-wall would be approximately 95 ft wide, which could encroach on the railroad and Caernarvon Canal or the MRL, depending on the alignment. In the vicinity of the T-wall crossing, LA Highway 39 is approximately 32 ft from the railroad and approximately 30 ft from the CFDC. A ramp would be approximately 350 ft wide at its widest point; however, there is only approximately 145 ft between the MRL and the Caernarvon Canal, and approximately 120 ft between the MRL and the railroad. The curvature of the road in this area would also complicate the layout of a bridge or ramp.

Meetings on 8 April and 27 July 2009 were held with the Louisiana Department of Transportation and Development (LaDOTD) regarding this highway crossing. The current gate is located in a curved portion of LA Highway 39. LaDOTD recognized that a bridge or ramp was not a viable option for this project, given space constructability issues. LaDOTD also recognized that there is already a gate across LA Highway 39. LaDOTD has no concerns with construction of a new floodgate at this location so long as clearance and safety issues are met. Specifically, LADOTD concerns over the concrete monoliths on either side of the proposed gate structure would be addressed by pulling back these monoliths to the edge of the highway shoulders and installing guardrails. Additionally, the LADOTD raised concerns that the proposed closure structure could reduce visibility for drivers pulling out of their driveways near the project area; however, this concern was addressed in the design. Although there is a history of accidents occurring at the current gate location, the proposed alignment re-positions the gate

so that it crosses a straight portion of the highway at 90 degrees. The new gate would be designed to meet LaDOTD roadway design procedures and details (LaDOTD 2009a).

Due to the alignment of the proposed action, a gravity drain system would be required to drain storm water from the protected side of the proposed action, into an existing ditch east of the existing line of HSDRRS southeast of EBI (figure 3). The water would then flow into the Jourda Canal to the south and down to St. Mary's pump station (SMPS; figure 4).



Figure 3. Approximate Proposed Location of Gravity Drain System South of EBI

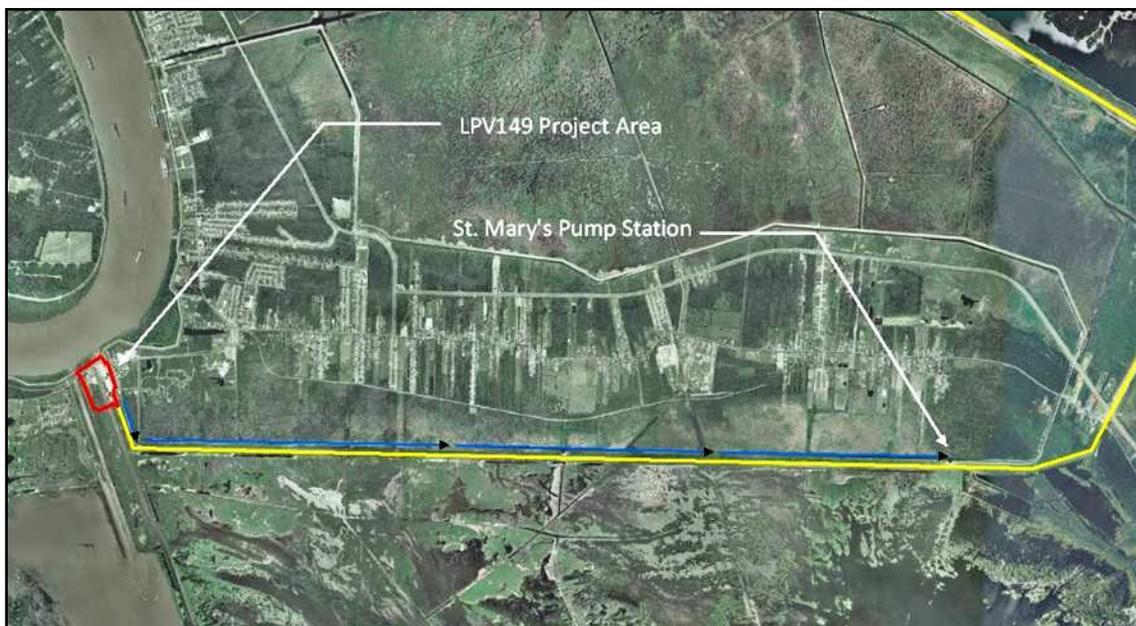


Figure 4. Flow Path from LPV 149 Project Area to St. Mary's Pump Station (Approximately 7-mile travel distance)

The proposed volume of water is minor compared to the capacity of the SMPS which has three 125,000 gallon-per-minute pumps (a total of approximately 835 cubic feet per second [cfs]). A flap gate will be installed on the outlet end of the drain to prevent back flow. The area that the outlet will drain into is sparsely populated and the flow would be metered over time, resulting in a negligible impact to the downstream area towards SMPS relative to the runoff already occurring in the area during an associated 10-year rainfall event. The layout details, optimization of the gravity drain system, and flow analysis of both the drain and downstream canals will be incorporated into the LPV 149 plans and specifications.

The permanent ROW would be approximately 10 acres (including the permanent access road to the flood control structure and the emergency access route bypassing LA Highway 39). Staging areas in LPV 149 would be approximately 10 acres and the temporary construction area would be approximately 20 acres. Two staging areas for this project would be established adjacent to LA Highway 39 (figure 2), including one adjacent to the MRL system (north of the highway) and another between the proposed new alignment and the SDEB property (south of the highway). A third staging area would be located between the floodwall alignment and the Caernarvon Canal. A fourth staging area would be established on both banks of the Caernarvon Canal south of the proposed flood control structure location. It would include a boat launch, docking facility, and off-load points for use during construction. The construction access road within the temporary easement could be used to reach the staging area on the west bank of the canal. A separate access road would be provided within the temporary easement for SDEB and Delacroix Corporation to reach the staging area. Public use of these roads would be prohibited; the roads would provide access to the canal during the time the cofferdam would be in place for contractors and employees of SDEB and Delacroix Corporation only. A fifth staging area would be located on the east bank of the canal south of the EBI facility, along the northern end of the LPV 148 right-of way.

Construction of the proposed action would be expected to begin in the winter of 2009/2010 and the construction activities would be expected to last for approximately 21 months. During construction, a cofferdam would be installed across the Caernarvon Canal in the area of the proposed flood control structure. The cofferdam would temporarily close this portion of the canal to navigation and recreational vessels for approximately 12 months to 18 months, depending on design and construction techniques. Construction activities, including pile driving, would take place a minimum of 12 hours per day, and possibly up to 18 hours per day.

A significant amount of construction equipment would be required to conduct the work, including, but not limited to, generators, barges, boats, cranes, dump trucks, flatbed trucks, bull dozers, excavators, clamshells, rollers, pile hammers, graders, tractors, front end loaders, welding machines, and water trucks.

Table 1 provides the estimated quantities of construction materials required for completion of the proposed action.

**Table 1.
Estimated Construction Material Quantities Required to Complete the Proposed Action**

Material	Units	Quantity
Borrow Material	cubic yard (CY)	5,090
Embankment Fill	CY	5,090
Clay Fill (compacted)	CY	35,500
Shell Fill	CY	4,700
Sand Fill (compacted)	CY	350
Sand Fill (wet)	CY	46,000

Table 1.
Estimated Construction Material Quantities Required to Complete the Proposed Action

Material	Units	Quantity
Deep Soil Mixing	CY	24,380
Top Soil	CY	697
Graveling Surfacing	CY	700
6" Aggregate	CY	140
Concrete Form Work	square feet (sq ft)	113,795
Structural Concrete	CY	10,160
Sheet Piling	TON	1,184
Expansion Joint	linear feet (LFT)	4,365
Rebar	TON	610
H-Piling	LFT	158,963
Pipe Piling	LFT	4,032
Silt Fencing	LFT	200
Cofferdam Compression Ring	TON	900
Treated Wood Timber Pile	LFT	64,080
Timber Rail	LFT	31,600
Timber Mat	Each	10
Steel Pipe Rail	LFT	1,540
Floodgates (railroad and highway)	TON	19
Floodgate (canal)	TON	295
Gate Operating Machinery	Each	3
Precast Control House	Each	1

Construction access for LPV 149 would be provided via LA Highway 39 at the northwestern end of the proposed alignment. Secondly, a haul road would be constructed on top of an existing private airstrip, with a ramp over the railroad adjacent to the airstrip, east of the Caernarvon community (figure 5). 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.

LA Highway 39 is a vital link between Plaquemines Parish and St. Bernard Parish; it provides the only highway access from the Plaquemines Parish east

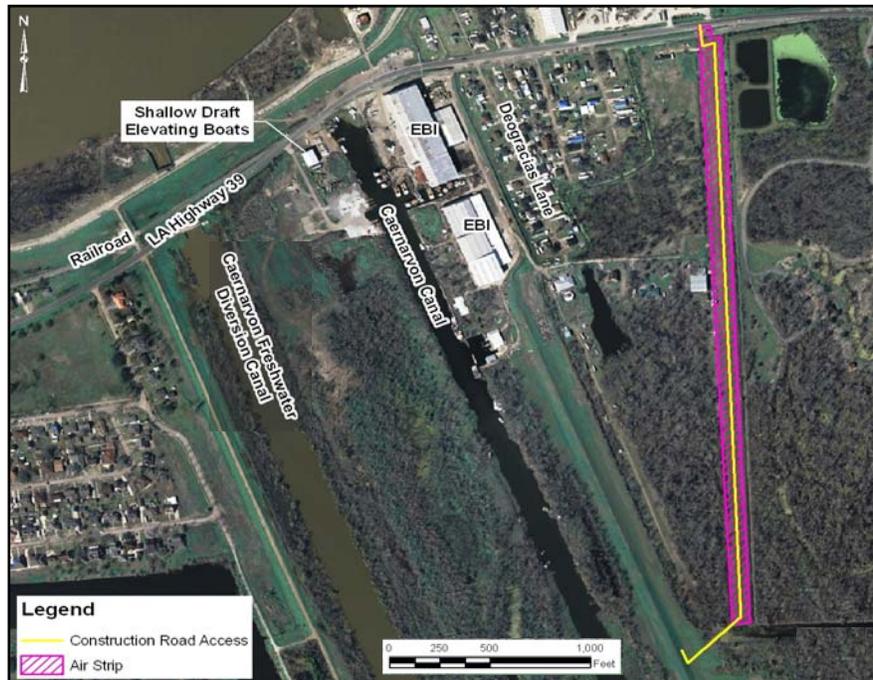


Figure 5. Limits of Work for Haul Route on Existing Airstrip

bank to areas to the north. In order to keep this highway link available, a one-lane emergency access route would be established that bypasses the floodgate across LA Highway 39 (figure 6). The emergency access route would follow existing ramps up to the MRL and would run along the levee. This road would not be built to LADOTD standards but would be able to accommodate HS-20 loads (represented by a three-axle semitrailer combination weighing 72,000 pounds). The emergency route would not be paved or have shoulders or guardrails but would provide a means of access for authorized vehicles before, during, and after storm events when the roadway gate is closed.

During construction, a temporary bypass road for LA Highway 39 and a temporary railroad shoofly for the Norfolk Southern rail line would be built to allow continued operation of these transportation routes during installation of the floodgates across the highway and the rail line. A permanent access road would be constructed between LA Highway 39 and the proposed flood control structure on the Caernarvon Canal (figure 2).

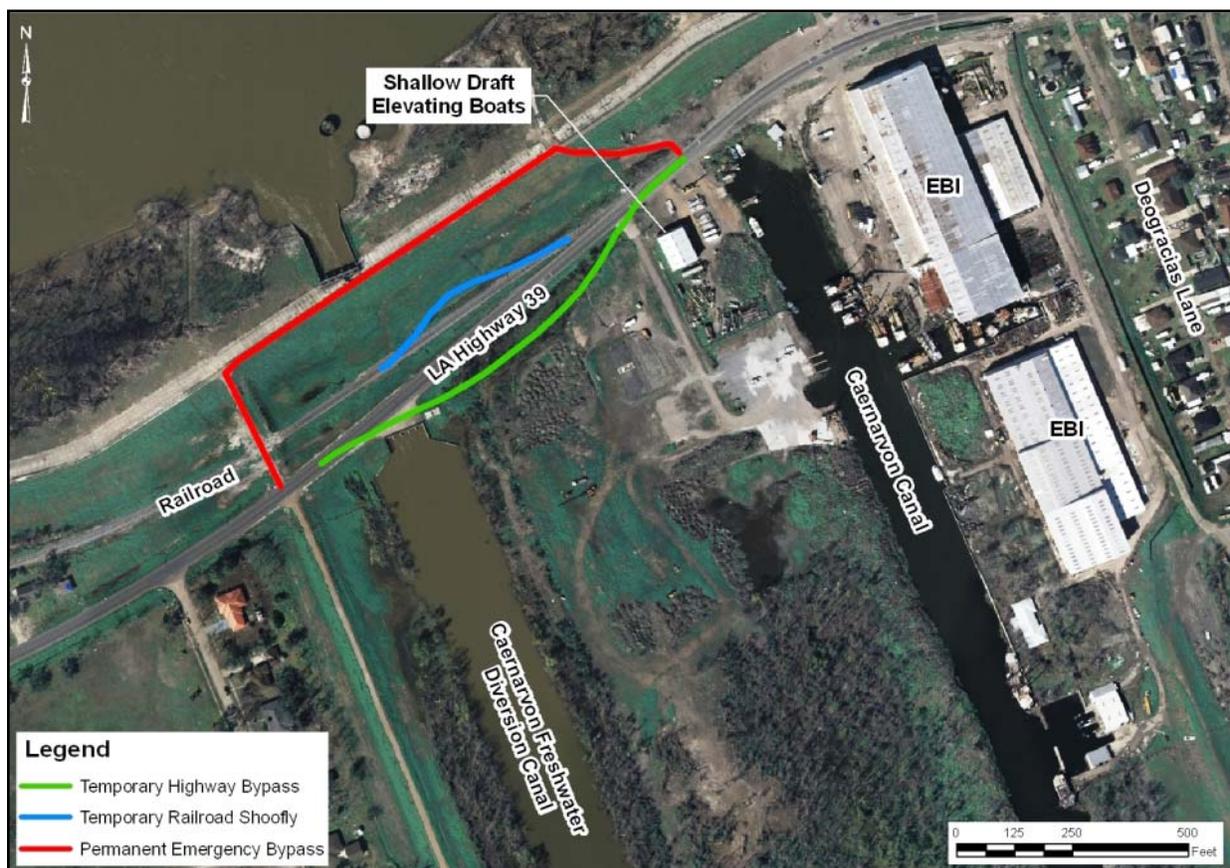


Figure 6. Proposed Emergency Access Route for the IER # 9 Project Area

Armoring of Levees and Floodwalls

Armoring would be incorporated as an additional feature to protect against erosion and scour on the protected, flood, or both sides of critical portions of floodwalls (T-walls) and levees. These critical areas include: transition points (where levees transition into any hardened feature such as gates, 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 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.

2.4 ALTERNATIVES TO THE PROPOSED ACTION

Five alternatives to the proposed action were considered in detail for the Caernarvon floodwall: alternative 1 - modification or replacement of existing floodgates and construction of a levee with a T-wall cap; alternative 2 - realignment of the Caernarvon floodwall to the immediate western side of the EBI property; alternative 3 - realignment of the Caernarvon floodwall to the western side of the Caernarvon Canal; alternative 4 - realignment of the Caernarvon floodwall to the western side of the SDEB property (zigzag configuration); and alternative 5 - realignment of the Caernarvon floodwall to the eastern side of the CFDC.

No Action Alternative

Under the no action alternative, the proposed action would not be constructed by the CEMVN; however, improvements to the Caernarvon floodwall to achieve the previously authorized level of risk reduction would be made. The current levee reach and associated structures would be brought from their current elevation of +13.0 ft to +13.5 ft (NAVD88) to the previously authorized elevation of +16.0 ft (NAVD88). Under the no action alternative, the existing floodgates across LA Highway 39 and the railroad line would be demolished and replaced in the same location with new floodgates. The existing levee with an I-wall cap would be slightly degraded and a new T-wall cap would be built on the existing levee, which would require an increase of approximately 3.0 ft in height. The no action alternative also includes the incorporation of new (post-Hurricane Katrina) engineering standards and design criteria. The no action alternative was evaluated based on a 220-ft wide corridor; construction activities would take place within the existing ROW.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Under alternative 1, the existing floodgates across LA Highway 39 and the railroad would be demolished and replaced with new floodgates constructed to an elevation of approximately +26 ft (NAVD88). The existing levee with an I-wall cap would be slightly degraded and a new T-wall cap would be built on the existing levee, to an elevation of approximately +26 ft (NAVD88). Alternative 1 was evaluated based on a 220-ft wide corridor. Two different alignments associated with alternative 1 were evaluated in this IER and are referred to as alternative 1a and alternative 1b throughout this document.

Alternative 1a (figure 7) would place the new levee with a T-wall cap in essentially the same location as the existing LPV 149 floodwall.

Alternative 1b (figure 8) would incorporate a protected-side shift of approximately 100 ft from the centerline. Alternative 1b would allow the existing wall to remain in place during construction to provide hurricane risk reduction.



Figure 7. Alternative 1a - Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap (Current Alignment)



Figure 8. Alternative 1b – Modification or Replacement of Existing Flood Gates and Construction of a Levee with T-Wall Cap (Current Alignment, Slight Protected-Side Shift)

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Under alternative 2, a new alignment for LPV 149 would be constructed to an elevation of approximately +26 ft (NAVD88) to include a tie-in to the MRL, floodgates across LA Highway 39 and the railroad, a new levee with a T-wall cap to the immediate western side of the EBI property, a new floodgate to accommodate EBI access to the Caernarvon Canal, and a tie-in to the adjacent HSDRRS levee system (figure 9). Alternative 2 was evaluated based on a 220-ft wide corridor for the new T-wall and floodgates and a 50-ft wide corridor for the EBI access. The existing floodgates across LA Highway 39 and the railroad would be demolished. The existing levee and floodwalls would be left in place in order to provide a buffer between the EBI facility and the adjacent residences.

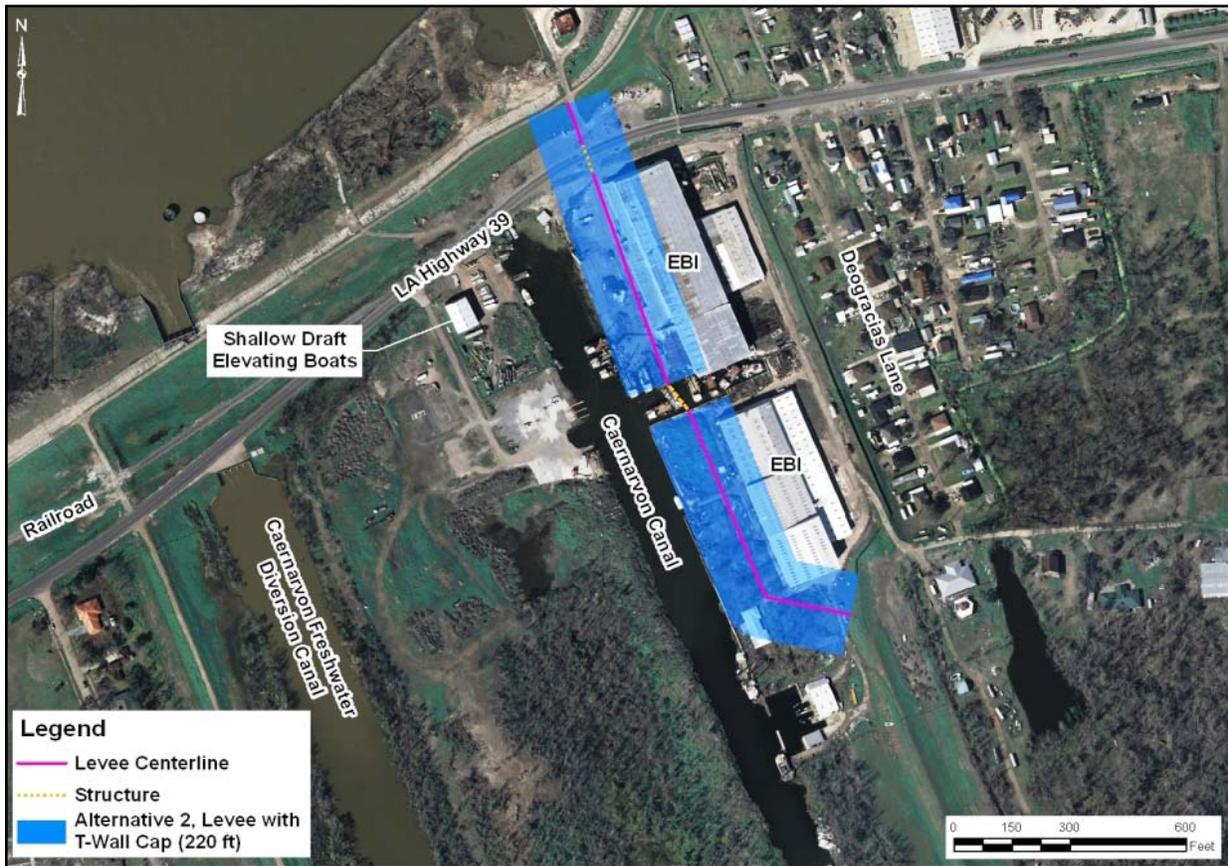


Figure 9. Alternative 2 - Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Alternative 3 consists of a realignment of the existing LPV 149 Caernarvon floodwall and the construction of the following components to an elevation of approximately +26 ft (NAVD88): a tie-in to the MRL, new floodgates across LA Highway 39 and the railroad; a full levee incorporating subsoil mixing for stabilization (footprint of approximately 335 ft), a levee with a T-wall cap (footprint of approximately 335 ft), or T-wall (footprint of approximately 220 ft) on the western side of the Caernarvon Canal; a new flood control structure (footprint of approximately 50 ft) across the Caernarvon Canal; and a tie-in to the adjacent HSDRRS levee system (figure 10). The existing floodgates across LA Highway 39 and the railroad would be demolished, while the existing levee and floodwalls would be left in place.

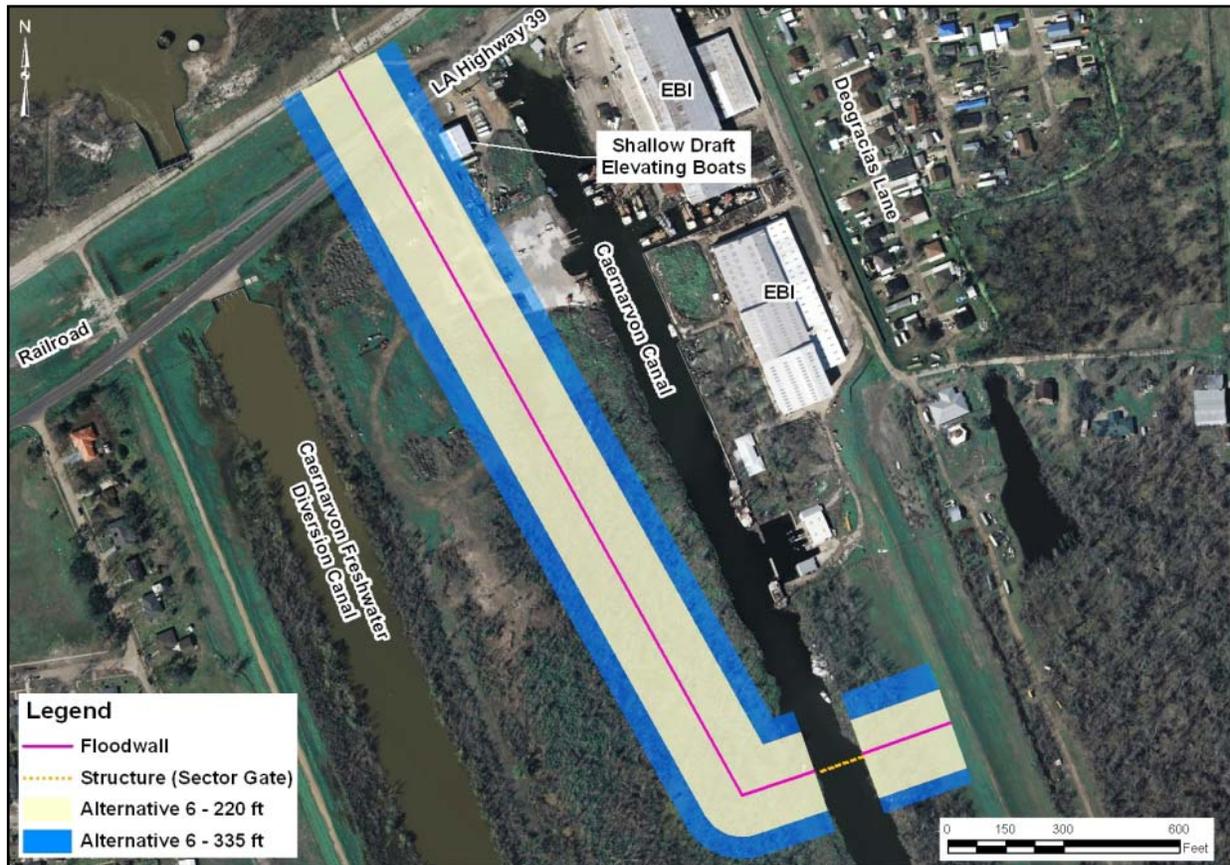


Figure 10. Alternative 3 - Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Alternative 4 consists of a realignment of the existing LPV 149 Caernarvon floodwall and the construction of the following components to an elevation of approximately +26 ft (NAVD88): a new alignment to include a tie-in to the MRL, new floodgates across LA Highway 39 and the railroad; a full levee incorporating subsoil mixing for stabilization (footprint of approximately 335 ft), a levee with a T-wall cap (footprint of approximately 335 ft), or T-wall (footprint of approximately 220 ft) to the western side of the SDEB property (parallel to the CFDC, turning east just south of the Caernarvon Boat Launch towards the Caernarvon Canal, and then running parallel to the Caernarvon Canal); a new flood control structure (footprint of approximately 50 ft) across the Caernarvon Canal; and a tie-in to the adjacent HSDRRS levee system (figure 11). The existing floodgates across LA Highway 39 and the railroad would be demolished and the existing levee and floodwalls would be left in place.

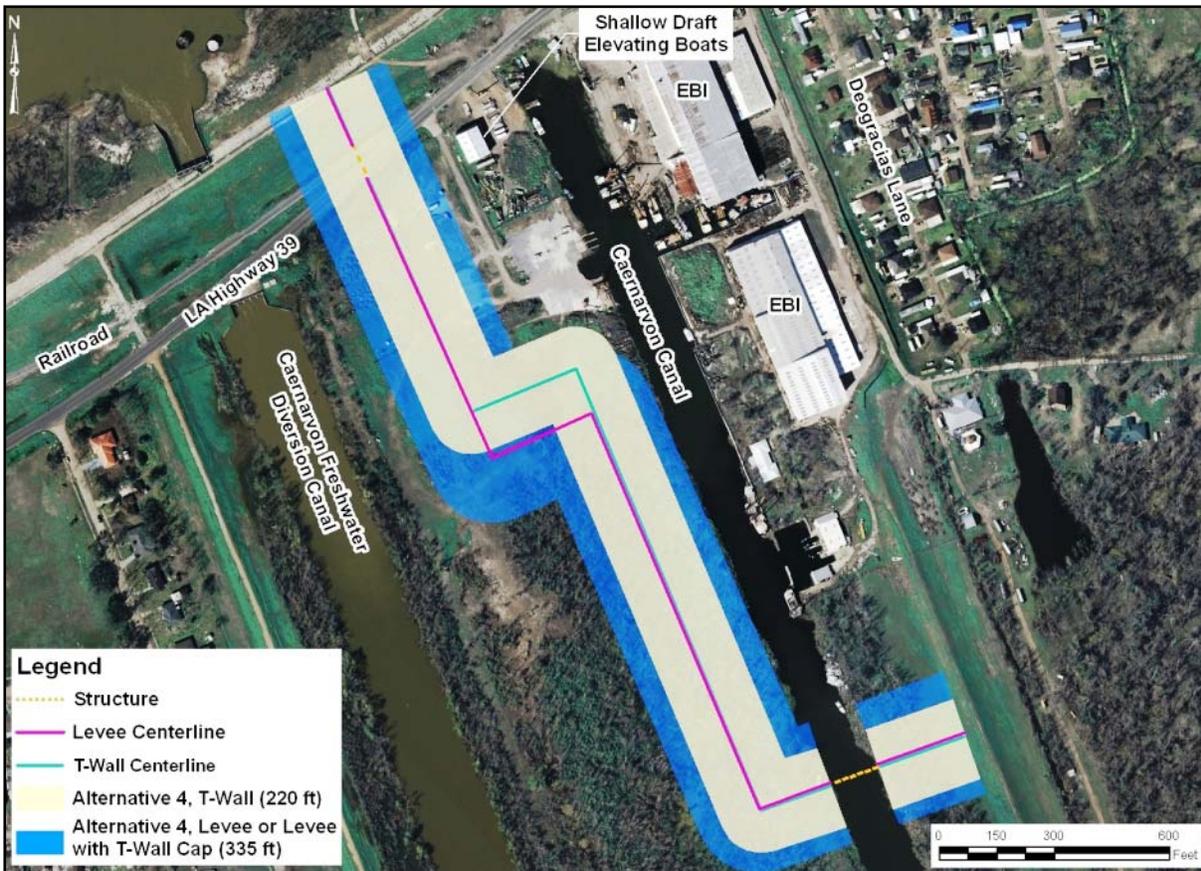


Figure 11. Alternative 4 - Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Alternative 5 – Realignment of Caernarvon Floodwall to Eastern Side of CFDC

Alternative 5 consists of a realignment of the existing LPV 149 Caernarvon floodwall and the construction of the following components to an elevation of approximately +26 ft (NAVD88): a tie-in to the MRL, new floodgates across LA Highway 39 and the railroad; a full levee incorporating subsoil mixing for stabilization (footprint of approximately 335 ft), levee with a T-wall cap (footprint of approximately 335 ft), or T-wall (footprint of approximately 220 ft) running along the eastern side of the CFDC, and then cutting across the wetlands to the Caernarvon Canal; a new flood control structure across the Caernarvon Canal; and a tie-in to the adjacent HSDRRS levee system (figure 12). Alternative 5 could include any number of alignments across the wetlands south of the SDEB and the Caernarvon Boat Launch. The assessment of this alignment is designed to address the maximum amount of wetlands impact from the range of possible alignments south of the SDEB and the Caernarvon Boat Launch. The existing floodgates across LA Highway 39 and the railroad would be demolished, while the existing levee and floodwalls would be left in place.

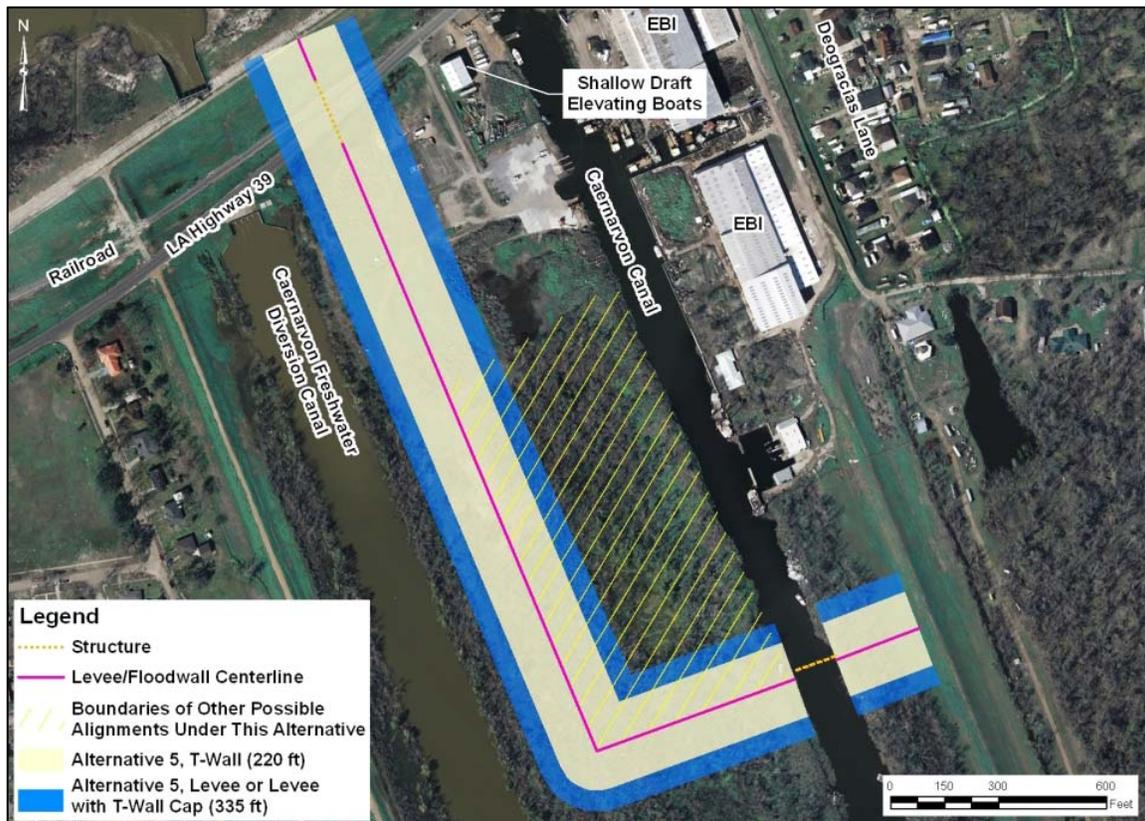


Figure 12. Alternative 5 - Realignment of Caernarvon Floodwall to Eastern Side of CFDC

2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

The following alternatives were eliminated from further consideration because they did not adequately meet the screening criteria.

Realignment of Caernarvon Floodwall to West of SDEB Property (Diagonal to Caernarvon Canal)

Construction of a new LPV 149 alignment to the western side of the SDEB property and the Caernarvon Boat Launch (east of the CFDC, running west of and slightly diagonal to the Caernarvon Canal) was eliminated from further consideration because this alignment runs directly through the wetlands within the project area between the Caernarvon Canal and the CFDC. This alignment is very similar to other alignments that cross the Caernarvon Canal and it does not offer sufficient engineering, cost, or schedule advantages to offset its environmental disadvantages (adverse effects on wetlands).

Non-Structural Alternatives

The following discussion of non-structural alternatives focuses on St. Bernard Parish because the IER # 9 project, along with the other reaches within the LPV Chalmette Loop portion of the HSDRRS (including IERs # 8, # 10, and # 11), would provide the 100-year level of risk reduction primarily for residences and businesses located within that parish. Although construction of the alternatives (with the exception of alternatives 1, 2, and the “no action” alternative) would occur primarily in Plaquemines Parish, the Caernarvon Floodwall and floodgates would provide risk reduction principally for land within St. Bernard Parish. It should be noted, however, that the Lower 9th Ward, which is in Orleans Parish, is located within the Chalmette Loop sub-basin and would be afforded risk reduction by this project.

Section 73 of the WRDA of 1974 requires consideration of nonstructural alternatives in flood damage reduction studies. ER 1105-2-100 provides the following planning guidance on applicable nonstructural measures, which 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 use. St. Bernard Parish already has a flood warning system and evacuation plan in place and regulation of floodplain use is addressed by the National Flood Insurance Program; therefore, only flood proofing and relocation were considered as nonstructural measures. The flood proofing nonstructural measures evaluated in this analysis are to raise in place the existing structure and the acquisition or relocation of the structure, which is defined as a buyout or permanent physical relocation.

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 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 sq ft (USACE 2007a). This includes the cost of administration, design,

inspection, costing, 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 period that the structures are being elevated. There were 20,000 homes in St. Bernard Parish that were damaged by flooding from Hurricane Katrina (U.S. Department of Housing and Urban Development 2006). The \$95 per sq ft average cost results in a cost of approximately \$152,000 to raise a 1,600-sq ft residence above the expected level of flooding. Using these assumptions, the costs to elevate all of the residences in St. Bernard Parish damaged from flooding by Hurricane Katrina would be approximately \$3 billion.

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 different from one another that information would have to be developed for each individual building. However, it can reasonably be assumed that it would equal the costs associated with elevating the residential structures, bringing the total estimated costs for elevating buildings to approximately \$6 billion.

Elevating the 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 mean they would have to be repaired after each storm event. Costs for repairing two-lane asphalt roads with shoulders were estimated at \$400,000 per mile. Of the estimated 363 miles of two-lane roads in St. Bernard Parish, roughly 100 percent were flooded during Hurricane Katrina. Therefore, repair costs would be \$145.2 million in the parish for each storm event that exceeded the level of flood risk reduction. Repair costs were estimated at \$800,000 per mile for four-lane divided roadways. There are approximately 42 miles of four-lane roadways in St. Bernard Parish. The cost of repairs to those roadways would be \$33.6 million for each storm event that exceeded the authorized level of risk reduction. Repair costs to railroads were calculated for the 24 miles of railroad in St. Bernard Parish. Railroad repair costs were estimated at \$100 per LFT. This resulted in railroad repair costs of \$12.7 million in the parish.

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

The total estimated costs as outlined above for elevating all flood-damaged buildings and roads and railroads in the study area could likely approach, if not exceed, \$6.2 billion, which greatly exceeds the funds allocated to achieve the purpose and need of the LPV Chalmette Loop portion of the HSDRRS. However, because these costs are based on the number of homes flooded as a result of Hurricane Katrina, this cost overestimates the cost to raise those homes susceptible to flooding from the 100-year storm. Nonetheless, even if the cost of this non-structural 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 LPV Chalmette Loop area. Therefore, this alternative was eliminated from further consideration.

Real Estate Acquisition and Relocation Assistance

Public acquisition of properties in areas subject to flooding can also 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 in any part of project costs would be subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42

United States Code (USC) Section 4601, et seq., as amended (the Relocation Assistance Act or 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 alternative: acquisition of the site and home or commercial structure by the non-Federal sponsor for demolition and relocation of the displaced residents and businesses in accordance with the Uniform Act or acquisition of the site by the non-Federal 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 home in St. Bernard Parish was \$75,000 (Brookings Institution 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 required for displaced residents. Relocation of these structures is another option. Assuming an average value of \$25,000 per lot in St. Bernard Parish (Louisianaatoz.com 2007) plus an average cost of \$30,000 to move and re-site a 1,600-sq ft structure, the cost of relocation as a nonstructural alternative for residential properties damaged only 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 Hurricane 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 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.

The estimated costs for real estate acquisition and relocation assistance for all flood-prone infrastructure in the study area would exceed the costs of structural alternatives. Therefore, this non-structural alternative was eliminated from further consideration.

2.6 SUMMARY TABLE

Table 2 provides a summary of the preliminary alternatives screening results.

**Table 2.
Summary of Preliminary Alternative Screening Results**

No Action	<input checked="" type="checkbox"/>
Non-Structural	X
Existing Alignment including a slight protected-side shift (Alternative 1)	
▪ Earthen Levee	N/A
▪ T-wall Floodwall	N/A
▪ Earthen Levee with T-wall Floodwall cap	<input checked="" type="checkbox"/>
Flood-side Shift to the Immediate West side of EBI (Alternative 2)	
▪ Earthen Levee	N/A
▪ T-wall Floodwall	N/A
▪ Earthen Levee with T-wall Floodwall cap	<input checked="" type="checkbox"/>
▪ New gates	<input checked="" type="checkbox"/>
New Center Line Alignment (Proposed Action and Alternatives 3, 4, and 5)	
▪ Earthen Levee with Subsoil Mixing	<input checked="" type="checkbox"/>
▪ T-wall Floodwall	<input checked="" type="checkbox"/>
▪ Earthen Levee with T-wall Floodwall cap	<input checked="" type="checkbox"/>
▪ Flood Control Structure across Caernarvon Canal	<input checked="" type="checkbox"/>

X = eliminated from further study.

= considered in detail.

N/A = not applicable.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ENVIRONMENTAL SETTING

General

The IER # 9 project area is located within the lower Mississippi delta alluvial plain in Louisiana. It straddles the St. Bernard-Plaquemines Parish boundary, which runs along the Caernarvon Canal (figure 13). The project area lies just within the southwestern corner of the LPV Chalmette Loop sub-basin (figure 14). The existing reach LPV 149, Caernarvon Floodwall and floodgates, are located at the southwestern corner of the LPV HSDRRS, at the terminus of the Chalmette Loop Levee in St. Bernard Parish and consists of a floodwall located approximately 600 ft northeast and parallel to the Caernarvon Canal and beginning immediately south of the EBI custom boat manufacturing property in St. Bernard Parish. This hurricane risk reduction feature wraps around the eastern side of EBI and runs approximately 0.1 miles north terminating at the MRL System. The floodgates that are part of LPV 149 are located where the floodwall intersects with the railroad tracks and LA Highway 39 (figure 1). All of the alternatives, with the exception of alternatives 1, 2, and the “no action” alternative, occur primarily in Plaquemines Parish. However, the land protected by the proposed action is located principally within St. Bernard Parish.

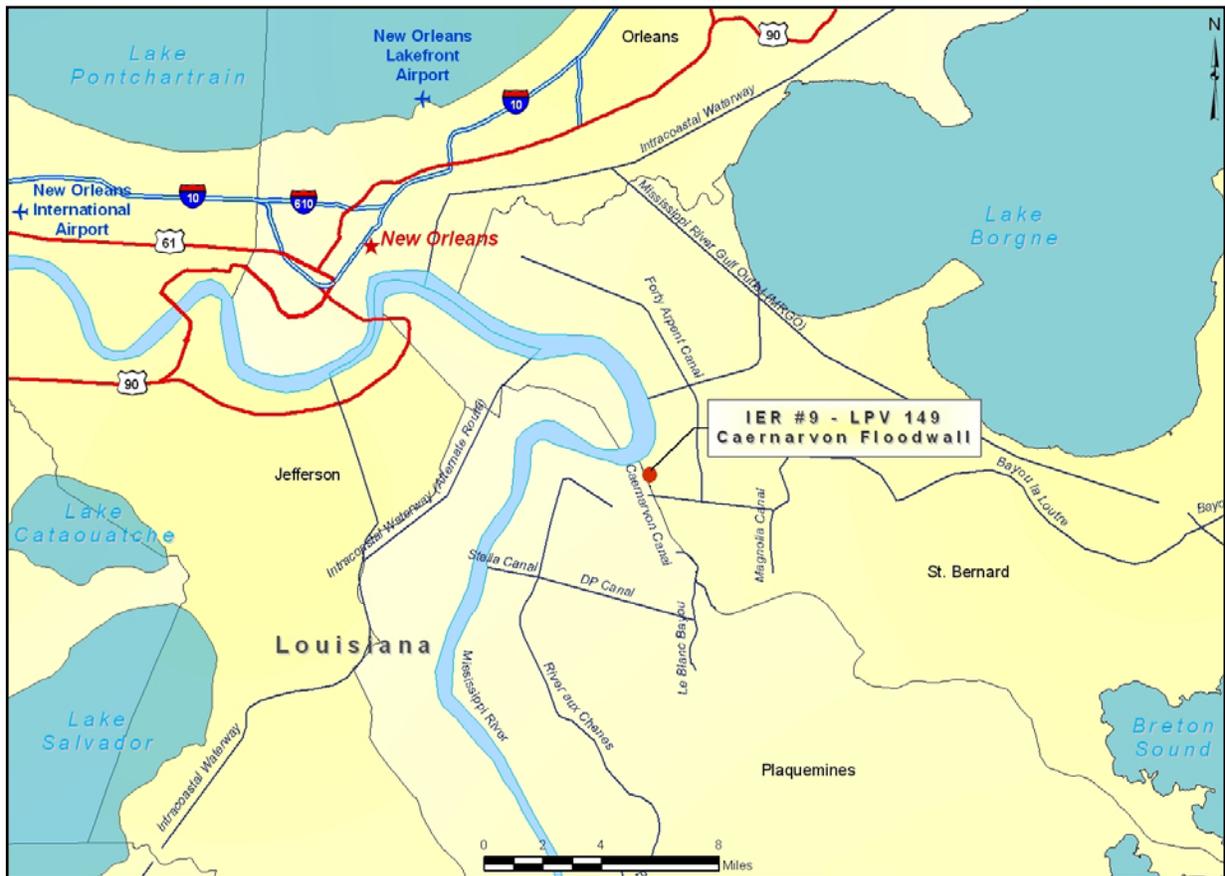


Figure 13. Regional Map in Relation to the IER # 9 Project Area

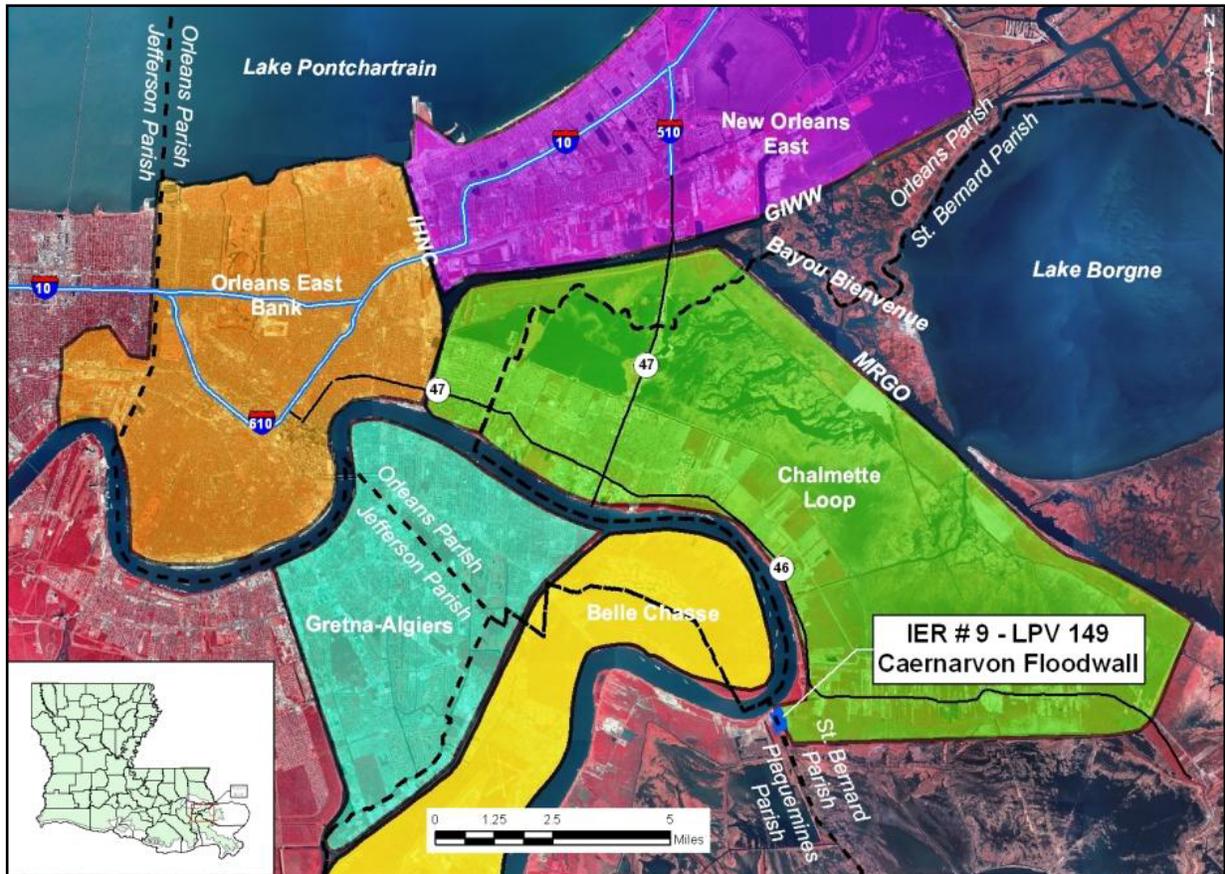


Figure 14. Drainage Sections in the IER # 9 Vicinity

Climate

St. Bernard and Plaquemines Parishes are located within a subtropical latitude. The climate is influenced by the many water surfaces of the nearby wetlands, rivers, lakes, streams, and the Gulf of Mexico. Throughout the year, these water bodies aid in decreasing the range of extremes of both temperature and relative humidity. Summers are long and hot with high average humidity, average daily temperatures of 82 degrees Fahrenheit (°F), and an average daily maximum of 91°F. Winters are influenced by cold, dry polar air masses moving southward from Canada, with an average daily temperature of 54°F, and an average daily minimum of 44°F. Annual precipitation averages 54 inches (USACE 1974; National Oceanic and Atmospheric Administration [NOAA] 1987).

Geology and Soils

The project area is within the St. Bernard Delta Complex, a major deltaic lobe of the lower Mississippi delta alluvial plain and is associated with the delta-building cycle of the Mississippi River. It is located on the east bank of the Mississippi River, south of Lake Pontchartrain and just north of the large pond, Big Mar. Dominant physiographic features in the vicinity include the Mississippi River and its associated natural and man-made levees, Big Mar, Lake Lery, the Plaquemines Wetland Area (PWA) to the southwest and the Caernarvon Canal, which runs parallel to and west of the project site (figures 15 and 16).



Figure 15. Hydrologic Features near the IER # 9 - Caernarvon Floodwall

The St. Bernard Delta Complex was created between 700 years and 4000 years ago as natural ridges formed along the natural bayous near what is now New Orleans. The ridges were formed by bank deposition resulting from the yearly overflow of the Mississippi River. Approximately 700 years ago, the Mississippi River changed its course and abandoned the St. Bernard delta complex (USACE 1976). The area is a low-lying region of slight slope and relief, consisting of naturally occurring and man-made levees and fresh and saline marshes (USACE 1998a). Throughout the project area, gray and brown silt, silty clay, and some very fine sand can be found. The natural levees in the area consist of mostly fat clay and silt, with some lean clays. The marshes in the area consist of gray to black clay of very high organic content and some peat. Land elevations within the area range from below sea level to a maximum of 15 ft to 20 ft above sea level (Zganjar and Beall 2002). The higher lands are the natural and man-made levees along the Mississippi River and its inactive distributaries. Based on USACE data, relative sea level rise in the region ranges from less than 0.5 ft per century to 1 ft to 4 ft per century (Penland et al. 2002).

Hydrology

The project area is located on the northern border of the Breton Sound Basin, adjacent to the Pontchartrain Basin (figure 16). The Breton Sound basin encompasses approximately 676,400 acres, of which 184,100 acres are wetlands. The larger Pontchartrain Basin (3 million acres) contains 483,400 acres of wetlands (LaCoast 1993). The principal hydrologic features within the project area include the Mississippi River and its natural levee ridges, the Caernarvon Canal, and the freshwater diversion at Caernarvon.

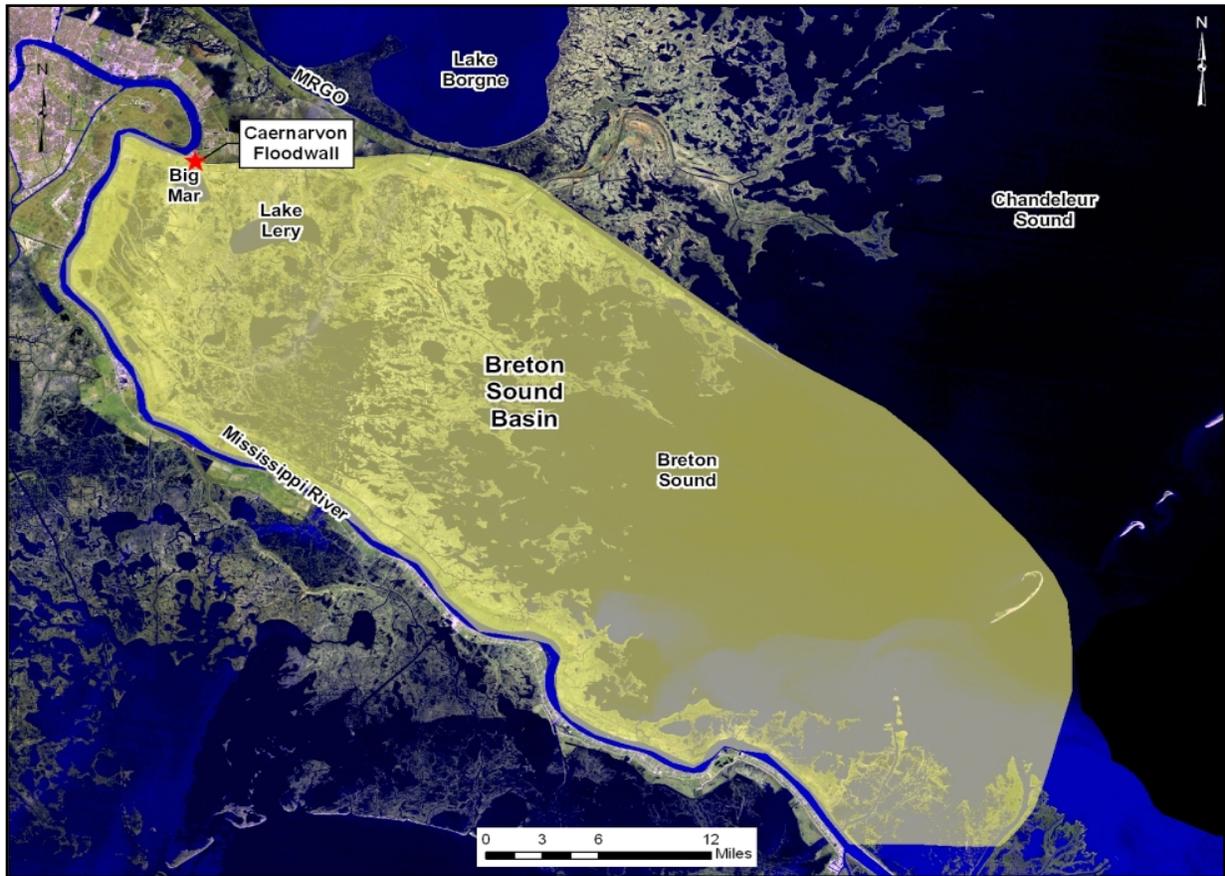


Figure 16. Location of the IER # 9 Project Area in Relation to the Breton Sound Basin

The Breton Sound and Pontchartrain Basins are within the coastal zone delineation and are therefore regulated under Louisiana State and Local Coastal Resources Management Act of 1978. Surface water resources near the project area include: the Central Wetland Area to the east; the PWA, including the Big Mar to the south/southwest; the Caernarvon Canal approximately 600 ft west of the existing floodwall; the CFDC approximately 1,200 ft west of the existing floodwall; a small man-made pond between the Caernarvon Canal and the CFDC south of the SDEB and west of the EBI; and the Mississippi River approximately 400 ft north of the floodwall tie-in to the MRL (see figure 15).

The Caernarvon Canal, several smaller canals, and the CFDC are either part of the project area or border the project area. The Caernarvon Canal is a man-made waterway that provides drainage from the urban areas east of the project area into Big Mar, a lake to the south. The network of these features illustrates the highly manipulated hydrology of the project area. The CFDC is part of a land-building freshwater diversion project that drains to Big Mar. The CFDC is approximately 1 mile long and transports water from the Mississippi River to Big Mar. It was built in 1991 as a freshwater diversion to control flood waters in the river and to provide sediment to build land in the Breton Sound basin. It has been successful at enhancing marsh vegetation, reducing marsh loss, and increasing commercial and recreational fisheries and wildlife in the area (USACE 2008a).

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 defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7).” Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. Cumulative impacts of the proposed action and alternatives are described in this section and are also 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, 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 3 shows those significant resources found within the project area, and notes whether they would be impacted by the proposed action.

**Table 3.
Significant Resources in the Project Study Area**

Significant Resource	Impacted	Not Impacted
Wetlands and Canals	X	
Fisheries	X	
Essential Fish Habitat (EFH)	X	
Wildlife	X	
Threatened and Endangered Species		X
Non-wet Uplands		X
Cultural Resources		X
Recreational Resources	X	
Aesthetic (Visual) Resources	X	
Air Quality	X	
Noise	X	
Transportation	X	
Socioeconomic Resources	X	

3.2.1 Wetlands and Canals

Existing Conditions

The PWA is approximately 460,000 acres of wetlands that occur west and southwest of the LPV 149 Caernarvon floodwall project area, west of the MRGO, and east of the Mississippi River. It contains a variety of habitats, including forested wetlands and fresh, intermediate, brackish, and saline marshes (Penland et al. 2002). Freshwater wetland types occur closest to the CFDC near the project area, with the salinity generally increasing toward Breton Sound in the south.

The wetland areas in the project area are located between the Caernarvon Canal and the CFDC. These wetlands consist of highly disturbed, shallow, forested, and emergent, freshwater wetlands that are elevated above high tides in an area where dredged material was historically deposited between the canals. These wetlands appear to be inundated on a nearly permanent basis.

The forested wetlands may support some mixtures of broadleaf deciduous, needleleaf deciduous, and evergreen trees and shrubs. Species found may include oak (*Quercus* spp.), green ash (*Fraxinus pennsylvanica*), swamp dogwood (*Cornus foemina*), hawthorn (*Crataegus* sp.), black willow (*Salix nigra*), Chinese tallow (*Triadica sebifera*), and many vines and herbaceous species. The emergent wetland areas and herbaceous layer of the forested wetland areas are likely to support rushes (*Juncus* spp.), switchgrass (*Panicum virgatum*), bulltongue (*Sagittaria* sp.), dollarweed (*Hydrocotyl* sp.), duckweed (*Lemna minor*), ludwigia (*Ludwigia* sp.), alligatorweed (*Alternanthera philoxeroides*), cattail (*Typha latifolia*), sedges (*Carex* spp.), and bulrush (*Scirpus* sp.). Vegetation along the banks of the Caernarvon Canal includes common reed (*Phragmites* spp.), and water hyacinth (*Eichornia crassipes*) which was observed in the canal floating on the water surface.

The Caernarvon Canal is a man-made waterway that provides drainage from the urban areas east of the project area into Big Mar, a lake to the south. The canal runs roughly north-south through the general project area, parallel to and just west of the St. Bernard-Plaquemines Parish line (see figure 15). The canal is approximately 100 ft to 150 ft wide in the project area. The canal in this area experiences minimal daily tidal action, and the salinity range usually does not exceed 2 parts per thousand (ppt), based on data from the northwestern end of the Breton Sound Basin (Louisiana Department of Natural Resources [LaDNR] 2003).

Subsidence, saltwater intrusion, erosion of wetlands, levee construction, and oil and gas exploration are believed to have caused major impacts to the Breton Sound Basin (LaCoast 1993). Added to these impacts is an estimate from the U.S. Geological Survey (USGS) that approximately 40 square miles of land were lost within the Breton Sound Basin as a result of Hurricane Katrina (USGS 2006). The rapid decline of wetlands in Louisiana is being addressed through wetland restoration projects such as the CFDC, located immediately west of the project area. The CFDC is approximately 1 mile long, running from the Mississippi River to Big Mar. The CFDC diverts fresh water and its accompanying nutrients and sediments from the Mississippi River into the northwest portion of the Breton Sound Basin. The CFDC, which is operated by the LaDNR, can discharge fresh water and associated nutrients and sediment at the rate of 8,000 cubic feet per second (as designed) from the Mississippi River to the PWA and the coastal bays and marshes in the Breton Sound estuary (USACE 1998b).

The project area wetlands and the Caernarvon Canal, CFDC, PWA, and Mississippi River are Waters of the United States (as defined by 33 CFR 328) and Navigable Waters of the United States (as defined by 33 CFR 329). This project is subject to the USACE regulatory authority under Section 404 of the Clean Water Act (CWA) (33 USC 1344) and Section 10 of the Rivers and Harbors Act (33 USC 401). Dredge and fill activities in the Caernarvon Canal would require compliance with Section 404 of the CWA.

Discussion of Impacts

No Action

Direct Impacts to Wetlands and Canals

Under the no action alternative, the existing levee/floodwall reach and associated gates would be raised to the previously authorized elevation of approximately +16 ft (NAVD88) at the same location as the existing alignment. Effects of the raised structures on wetlands would not differ from those under current conditions. The construction corridor does not contain any wetland areas, and construction of the levee with T-wall would not be expected to have a direct impact on any wetland habitat.

Indirect Impacts to Wetlands and Canals

Under the no action alternative, the construction corridor would be approximately 200 ft east of the Caernarvon Canal. There is a small pond approximately 150 ft from the southeast corner of the construction corridor. Construction activities could potentially cause increased turbidity and sedimentation within the canal and nearby wetlands. However, construction-related runoff would be managed through implementation of best management practices (BMPs) and adherence to regulations governing stormwater runoff at construction sites (SWPPP), which would minimize the potential indirect impacts from the no action alternative on wetlands, the canal, and the pond. The proximity of the floodwall corridor to the pond would alter surface drainage patterns to the pond.

Cumulative Impacts to Wetlands and Canals

Potential cumulative impacts on wetland resources from the no action alternative could involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. However, impacts of the no action alternative on wetlands would be limited to temporary, construction-related impacts. The no action alternative would not be expected to contribute to cumulative impacts on wetlands or canals in the project area.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Wetlands and Canals

The proposed action was evaluated based on a 300-ft wide corridor for the new T-wall and floodgates and a 50-ft wide corridor for the new flood control structure. Assuming that this entire floodwall corridor, the staging area and temporary work area between the alignment and the Caernarvon Canal, and the staging area on the canal south of the proposed flood control structure location are affected by the proposed action, up to 5.2 acres of wetland habitat could be lost. The amount of wetland area that could be lost with the proposed action would be localized and represents only 0.001 percent of the total PWA habitat.

Construction of the flood control structure across the Caernarvon Canal could temporarily disrupt approximately 1.5 acres of water habitat. Approximately 0.3 acre of the canal bottom would be permanently occupied by the flood control structure. Wetland vegetation, biota and sediments in the immediate vicinity of construction activities could be disturbed during the construction period (estimated to be approximately 21 months).

The habitat adjacent to the project area has previously been disturbed for the construction of roads, industrial facilities, and wetland rehabilitation and flood risk reduction projects. The

presence of this existing development (roads, businesses, and water control structures) and ongoing management activities have degraded the value of the wetland habitat in the project area. Therefore, this area does not represent a pristine or high quality example of wetland habitat.

Indirect Impacts to Wetlands and Canals

Construction in the wetlands and Caernarvon Canal could cause indirect impacts of increased turbidity and sedimentation within the nearby wetlands. Construction of the proposed action could have indirect impacts on wetland habitat in the immediate project area by re-suspending sediment and disturbing wetland vegetation that has had only a short time to recover from prior storms. However, construction-related runoff into the wetlands would be managed through implementation of BMPs and a SWPPP, which would minimize the potential indirect adverse impacts from the proposed action on wetlands. Under the proposed action, indirect impacts on wetlands would be mainly localized and short-term, with effects potentially lasting up to several months after project completion.

Approximately 0.6 acre of wetlands habitat would be enclosed by the proposed action, between the floodwall alignment and the Caernarvon Canal (figure 17). The proposed action could result in the loss of the enclosed wetland area through development of the land. This would be a long-term indirect impact. However, these wetlands are currently isolated (they do not have hydrologic connections with adjacent wetlands) and the wetland area is small and of low quality (i.e., mowed) (USFWS 2009a, provided in appendix D).

In order to study flooding caused by rainfall events within the LPV 149 protected area, a 10 percent exceedance frequency (10-yr), 4-day duration design storm was used for the interior drainage analysis to be consistent with similar analyses in the Greater New Orleans area for the HSDRRS. This rainfall and the attendant runoff volume are associated with a surge event with a 1 percent exceedance, 100-year recurrence interval (i.e. from a hurricane). This design storm has a total rainfall depth of 11.4 inches. For comparison purposes, it should be noted that the total rainfall for the New Orleans area from Hurricanes Katrina and Gustav were 12.5 inches and 3.1 inches, respectively.

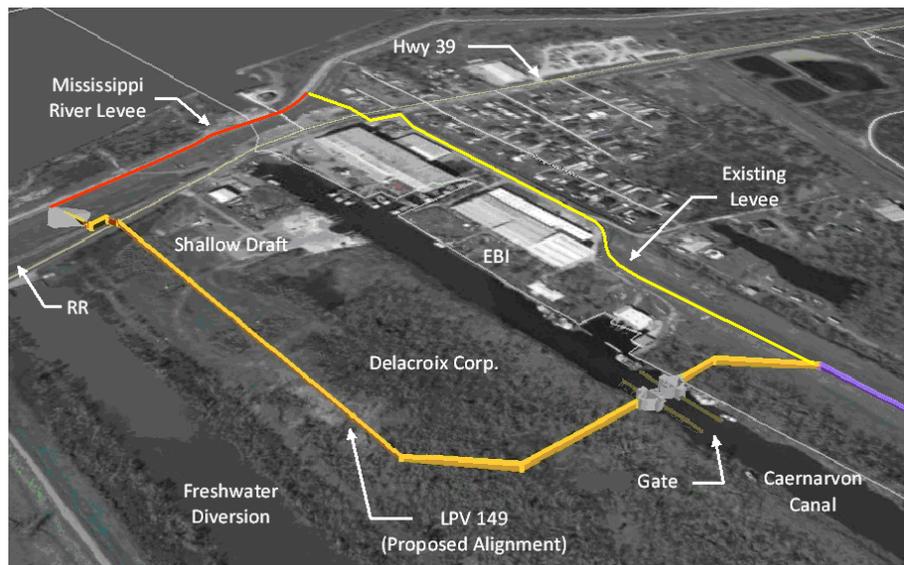


Figure 17. Aerial View of IER #9 Project Area

It is also instructive to compare surge levels pre-and post-project. At the Shell Beach gage north of LPV 149 on the MRGO, the storm surge for Hurricanes Katrina and Gustav was estimated to be 18.8 ft and 8.2 ft, respectively (NAVD 88, Epoch 2004.65). These values approximate stages that would have occurred in the vicinity of the EBI/SDEB/LPV 149 area (without the project in place).

Photo 1, which was taken from a point that will be inside the proposed LPV 149 project area, shows the extent of surge flooding from Hurricane Gustav (8.2 ft). In photo 1, the EBI buildings are behind the men shown standing in the water (photo taken from EBI property). If the 10-year design storm were to occur with the LPV 149 risk reduction in place it would, depending on the assumed starting water surface elevation (SWSE) in the canal, result in 4 ft to 5 ft of ponding (compared to 8.2 ft from Gustav). This assumed the gates were closed at the various assumed SWSEs and conservatively stayed closed for 4 days. During non-hurricane rainfall events, the gate will be open and the existing drainage pattern will continue (for this case, conditions will be relatively the same for the pre- and post-project condition).

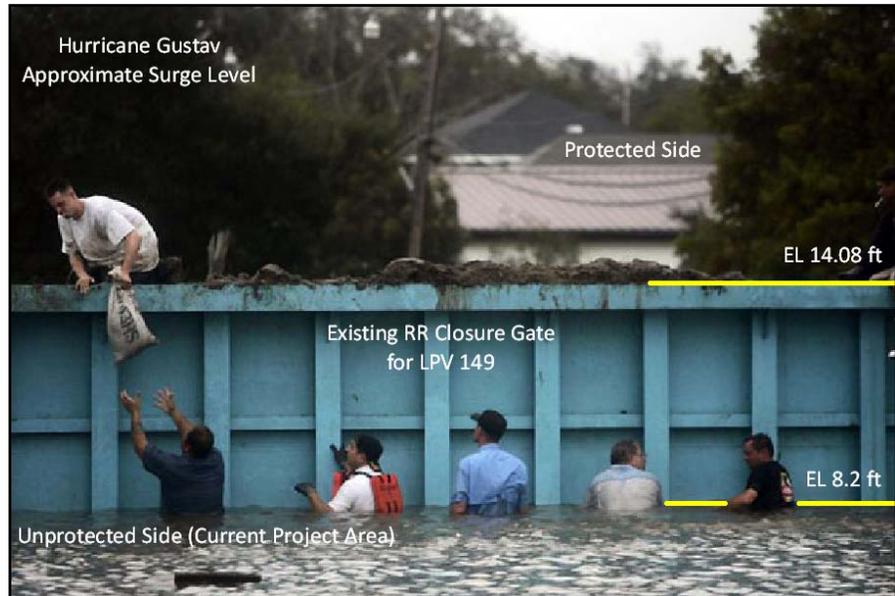


Photo 1. Surge Elevation in LPV 149 from Hurricane Gustav

However, water depths of approximately 4 ft to 5 ft within the LPV 149 protected area could create a variety of problems such as:

- Some of the EBI and SDEB buildings would be inundated (inundation begins at approximately elevation 3.5 ft); and
- The access road to the proposed Caernarvon Canal gate operation machinery building will be inundated (the road will have a minimum crest elevation of approximately 3 ft). The road will run east of the EBI buildings shown in figure 17, toward the proposed gate. If the road is inundated there will be no access to allow the gate to be opened to release the ponded water after the storm event has passed.

As a result of potential water accumulation on the protected side when the floodgate is closed, a gravity drain system (figure 3) would be installed as part of the proposed action to drain storm water enclosed by the alignment into a nearby existing ditch and out of the project area (figure 4). When a pending hurricane or a large storm system raises the water level (from storm surge) in the Caernarvon Canal, the proposed canal gate would be closed at or before the water in the canal reaches elevation 3 ft. This provides a reasonable balance between taking action before inundation begins in the industrial areas (at approximate elevation 3.5 ft) and the number of times the gate is closed in a given year. An elevation of approximately 3 ft to 5 ft is being considered for the maximum closure stage for the IHNC closure gate. The adopted closure levels and attendant closure parameters for the LPV 149 and IHNC gates will be finalized in the coming months as part of the development of the project's Water Control Plan.

Summary:

- When a hurricane or large storm system raises the water level (from storm surge) in the Caernarvon Canal, the proposed canal gate (figure 17) would be closed at or before the water in the canal reaches approximately elevation 3.0 ft.
- A gravity drain system would be installed to prevent runoff from significantly ponding above approximately elevation 3.0 ft (figure 3).

Another potential for indirect impacts by the proposed action is the increase of storm surge flooding in neighboring parishes. Storm surge modeling of the Caernarvon floodwall in its existing location was performed using the Advanced Circulation (ADCIRC) hydrodynamic model. Two situations were modeled: one with the current Federal levee system and heights in place (2007 situation), and one with the new 100-year Federal levee system in place. Note that these modeling runs have been performed with the existing alignment of LPV 149. The effect of the small shift of the levee alignment to the west of the Caernarvon Canal is assessed through expert judgment herein.

Flooding caused by tropical storms is typically characterized by the inundation of land over very large distances (order of magnitude in miles). The change in levee height could relieve storm surge flooding if a levee is lowered and, therefore, spread out the storm surge over a larger area creating only slight changes in water elevation (measured in inches). Equally, storm surge flooding could be increased if a levee is raised and thereby diminishes the spreading out effect and cause it to “pile up” in front of levees. Different levee heights for adjacent systems could relieve storm surge flooding in one area and simultaneously force more water into another area. Both processes were illustrated by the comparison of the 2007 ADCIRC grid (representing the current Federal levee system) and the 2010 ADCIRC grid (100-year Federal levee elevations). The proposed 1 percent levee height elevation for the LPV 149 project is +26 ft. The adjacent non-Federal levee in Plaquemines Parish has a maximum levee elevation of approximately +8 ft, which is lower than what would be required to provide risk reduction from a 1 percent exceedance storm surge event. The comparison between the 2007 and 2010 ADCIRC grids performed, showed changes in the 1 percent flood exceedance level on the order of a foot (0.7 ft to 0.9 ft) at the Plaquemines back levee due to increases in the LPV 148, St. Bernard levee heights.

Construction of the new floodwall (approximately 1,500 ft) at LPV 149 would shift the alignment west into Plaquemines Parish by nearly 1,100 ft. The dimensions of the proposed LPV 149 levee alignment change are very small when compared to the scale on which differences in levee elevations and storm surge are observed. Therefore, minimally-increased water levels (in addition to those caused by LPV 148 in Plaquemines Parish) would be expected from construction of the LPV 149 floodwall and gates under the proposed action.

Cumulative Impacts to Wetlands and Canals

Potential cumulative impacts on wetland resources from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including those projects described in IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. Also, repair work on two Hurricane Katrina-related breaches in the northern stretch of the non-Federal East Bank Back Levee in Plaquemines Parish (near the towns of Braithwaite and Scarsdale) required expanding the levee footprint, which impacted several acres of wetlands (USACE 2006d). While the proposed action would permanently impact wetlands within the project area, these impacts would be mitigated. The operation of the CFDC is increasing the amount of freshwater wetlands and the quality of those wetlands adjacent to the project area (USACE 2008a) which could, in part, off-set the small loss

of lower quality wetlands within the project area. The Louisiana Coastal Area (LCA) Ecosystem Restoration Plan, authorized by the 2007 WRDA, includes a project for modification of the CFDC to allow an increase in the freshwater introduction rate in order to increase wetland creation and restoration outputs for this structure (USACE 2004). Evaluations conducted under Section 404 of the CWA, permitting activities, and the implementation of appropriate mitigation measures would minimize long-term cumulative impacts to wetlands and waters of the United States in the project area. Projects that could contribute to cumulative impacts are discussed in more detail in section 4.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Wetlands and Canals

The location of alternative 1a is essentially the same as the existing alignment and alternative 1b would incorporate a protected-side shift of approximately 100 ft. The construction corridor does not contain any wetland areas. Construction and operation of the levee with T-wall would not be expected to have a direct impact on any wetland habitat.

Indirect Impacts to Wetlands and Canals

Under alternative 1a, the construction corridor would be approximately 200 ft east of the Caernarvon Canal; there is a small pond approximately 75 ft from the southeast corner of the construction corridor under alternative 1b. Construction activities could potentially cause increased turbidity and sedimentation within the canal or pond and nearby wetlands. However, construction-related runoff would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (i.e., the SWPPP), which would minimize the potential indirect impacts from alternative 1a on wetlands, the canal, and the pond. There could be potential long term impacts on the pond associated with alternative 1b, however. The proximity of the floodwall corridor to the pond would alter surface drainage patterns to the pond. Indirect impacts to wetlands and canals would be similar to those described for the proposed action.

Cumulative Impacts to Wetlands and Canals

Alternatives 1a and 1b would not be expected to contribute to cumulative impacts on wetlands or canals in the project area.

Alternative 2 – Realignment of Caernarvon floodwall to Immediate Western Side of EBI Property

Direct Impacts to Wetlands and Canals

There are no wetlands identified in the 220-ft wide construction corridor for alternative 2; therefore, alternative 2 would not be expected to have any direct adverse effect on wetland resources. A new floodgate would be constructed within a 50-ft corridor across the boat slip off of the Caernarvon Canal that extends into the EBI property. Less than 0.3 acre of water bottom would be permanently occupied by the water control structure.

Indirect Impacts to Wetlands and Canals

Construction activities could potentially cause increased turbidity and sedimentation within the Caernarvon Canal and the EBI canal and in nearby wetlands. However, construction-related runoff would be managed through implementation of BMPs and a SWPPP, which would

minimize the potential indirect adverse impacts from alternative 2 on wetlands and the canals. Indirect impacts to wetlands and canals would be similar to those described for the proposed action.

Cumulative Impacts to Wetlands and Canals

Impacts of alternative 2 on wetlands would be limited to temporary, construction-related impacts, and impacts on canals would be minimal. Alternative 2 would not be expected to contribute to cumulative impacts on wetlands or canals in the project area.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct Impacts to Wetlands and Canals

Alternative 3 was evaluated based on an approximate 220-ft wide corridor for the new T-wall and a 335-ft corridor for the full levee or levee with a T-wall cap, and a 50-ft wide corridor for the flood control structure across Caernarvon Canal. If the entire floodwall corridor within the temporary easement and the staging area on the Caernarvon Canal south of the proposed flood control structure, as well as the narrow area between the floodwall alignment and the Caernarvon Canal, are affected by alternative 3, up to 5.9 acres of wetlands could be lost under the T-wall option and up to 7.2 acres under the levee and levee with a T-wall cap options. Alternative 3 would result in the loss of up to 2.4 acres more wetland habitat than the proposed action. Approximately 0.3 acre of canal bottom would be permanently occupied by the water control structure, which also could temporarily disrupt approximately 1.5 acres of water habitat (the same as the proposed action). In summary, the impacts related to alternative 3 would be similar to, but slightly greater than, those described for the proposed action.

Indirect Impacts to Wetlands and Canals

Under alternative 3, indirect impacts would be similar to, but slightly greater than, those described for the proposed action. Based on its larger construction footprint, there would be more ground disturbance under alternative 3 and a greater potential for construction-related runoff into the wetlands. There would be no wetlands enclosed. Indirect impacts to wetlands and canals would be similar to those described for the proposed action.

Cumulative Impacts to Wetlands and Canals

Cumulative impacts for alternative 3 would be similar to, but slightly greater than, those described for the proposed action, and would be mitigated. Wetland impacts would be off-set through protection of other wetlands. Other projects that could contribute to cumulative impacts are discussed in more detail in section 4.

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to Wetlands and Canals

The direct, indirect, and cumulative impacts of alternative 4 on wetlands and canals would be slightly greater than those impacts identified for the proposed action. Alternative 4 would have a larger construction footprint than the proposed action and would result in the loss of up to 2.6 acres more wetland habitat (up to 6.1 acres under the T-wall option and up to 7.7 acres under the levee options) and a greater potential for construction-related runoff into the wetlands. There would be no wetlands enclosed.

Alternative 5 – Realignment of Caernarvon floodwall to Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to Wetlands and Canals

The direct, indirect, and cumulative impacts of alternative 5 on wetlands and canals would be slightly greater than those impacts identified for the proposed action. Alternative 5 would have a larger construction footprint than the proposed action. If alternative 5 is constructed using a floodwall, construction would result in the loss of up to 7.2 acres of wetland habitat. If alternative 5 is constructed using a levee, construction would result in the loss of up to 8.2 acres. Construction of alternative 5 could result in up to 3.0 acres of wetland impact more than the proposed action. The larger construction footprint would also result in a greater potential for construction-related runoff into the wetlands. There would be approximately 0.6 acres of wetlands enclosed under alternative 5. However, these wetlands are currently isolated (they do not have hydrologic connections with adjacent wetlands) and the wetland area is small and of low quality (i.e., mowed) (USFWS 2009a, provided in appendix D).

3.2.2 Fisheries

Existing Conditions

Freshwater areas within the Breton Sound Basin wetlands provide nursery habitat for larval freshwater fish such as the largemouth bass (*Micropterus salmoides*), crappie (*Pomoxis* spp.), various other sunfish species, and catfish (*Ictalurus* spp.; USACE and the State of Louisiana 2004). Some common freshwater fishes that might inhabit the waters near the project area are presented in table 4.

Table 4.
Common Freshwater Fish of the Plaquemines Wetland Areas
and the Lower Mississippi River

Common Name	Scientific Name
Black crappie	<i>Pomoxis nigromaculatus</i>
Blue catfish	<i>Ictalurus furcatus</i>
Bluegill	<i>Lepomis macrochirus</i>
Channel catfish	<i>Ictalurus punctatus</i>
Freshwater drum	<i>Aplodinotus grunniens</i>
Gizzard shad	<i>Dorosoma cepedianum</i>
Largemouth bass	<i>Micropterus salmoides</i>
Redear sunfish	<i>Lepomis microlophus</i>
Spotted gar	<i>Lepisosteus oculatus</i>
Spotted sunfish	<i>Lepomis punctatus</i>
Warmouth	<i>Chaenobryttus gulosus</i>
White crappie	<i>Pomoxis annularis</i>

Source: Louisiana Department of Environmental Quality (LaDEQ) et al. 2007.

In addition to these species, crawfish (*Procambarus* spp.) are an important commercial resource throughout Louisiana, and any freshwater wetlands provide suitable habitat for crawfish. The commercial crawfish harvests in Louisiana are predominately farmed crawfish and the project

wetland and Caernarvon Canal areas are not likely to provide optimum habitat conditions for crawfish harvesting. However, recreational harvests of wild crawfish are common in Louisiana. *Procambarus clarkii* (red swamp crawfish) and *Procambarus zonangulus* (white river crawfish) are the primary species harvested.

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Fisheries

Under the no action alternative, the existing levee/floodwall reach and associated gates would be raised to the previously authorized elevation of approximately +16 ft (NAVD88). Effects of the raised structures on fish habitat would not differ from those under current conditions. Construction and operation of the floodwall and floodgates under the no action alternative would not directly impact any fish habitat. Construction activities could potentially cause indirect impacts through increased turbidity and sedimentation within the canal and nearby wetlands, which could impact fish survival and growth. However, construction-related runoff would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (SWPPP), which would minimize the potential indirect impacts from the no action alternative on adjacent fish habitat. Potential cumulative impacts to fishery resources from the no action alternative would involve the combined effects (increased turbidity and sedimentation that would be minimized through BMPs and a SWPPP) from the multiple reaches within the LPV Chalmette Loop project area as well as other HSDRRS projects throughout the New Orleans area.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Fisheries

Implementation of the proposed action would temporarily impact fish habitat during the construction period (approximately 21 months). Up to 1.5 acres of aquatic habitat in the Caernarvon Canal could be disrupted during the construction period and a much smaller portion (approximately 0.3 acre) of the canal bottom would be permanently occupied by the control structure. Direct impacts to fishery resources from this localized disruption and/or the removal of estuarine habitat within the footprint of the flood control structure would be negligible. The amount and quality of fish habitat within the canal that may be temporarily disturbed or permanently lost due to the construction of this structure would represent a negligible amount of the total similar habitat within the canal.

Sediment suspended during construction of this project could clog fish gills, lower growth rates, and affect egg and larval development (USEPA 2003a). Most of the mobile species would avoid the areas impacted by construction. Impacts to less-mobile benthic species would be short-term, up to 21 months, with effects lasting up to several months after completion. Once the proposed action is complete, the adjacent wetlands and drainageways would stabilize, allowing sediment to settle, benthos to repopulate, and other aquatic species to return.

During construction of the control structure under the proposed action, a cofferdam would be placed across the canal for approximately 12 months to 18 months, resulting in impoundment of approximately 1,800 linear ft of the Caernarvon Canal to the north (approximately 5 acres of aquatic habitat in the canal). This would result in a temporary reduction of surface water flows into the upper reaches of the canal. Fish as well as their prey organisms would be prevented from traveling into or out of the impounded portion of the canal. This potentially could decrease the growth and survival rates of some individual organisms, thereby having temporary, localized

effects on fish populations in the vicinity during the period when passage would be eliminated by the cofferdam. This could have a short-term impact on fishery resources in the project area.

Construction activities associated with the flood control structure across the Caernarvon Canal, such as pile driving, may cause some organisms to avoid the habitat near the project area and cause behavioral changes and sub-lethal impairments to the hearing of some fishes (Hastings and Popper 2005). The occurrence of fish mortality from construction noise is not well understood; however, some literature has documented fish mortality after pile driving activities at various distances (Caltrans 2001; Caltrans 2004). Although some individual aquatic organisms may be destroyed during construction activities for the proposed action, the number of organisms affected would not be expected to impact populations of fishes because most species would be expected to move away from the area to similar nearby habitat.

During the subsequent long-term period of operation after construction, the flood control structure could adversely impact fish through entrapment. However, the structure would only be closed to prevent infrequent flooding associated with major storm events, thus limiting the potential for fish entrapment.

Indirect Impacts to Fisheries

Construction in upland areas (within an approximately 19-acre construction corridor) and in the Caernarvon Canal would cause downstream increases in turbidity and sedimentation that could impact fish survival and growth. However, construction-related runoff into the waterways would be managed through BMPs and a SWPPP would be implemented, which would minimize the potential indirect impacts from the proposed action on fishery resources. Those impacts would be short-term, up to 21 months in duration, with effects lasting up to several months after construction completion. Hearing impairments caused by loud construction activities, such as pile driving, have been shown to reduce some fish species' ability to locate prey, increase risk of predation, and possibly reduce reproductive success (Hastings and Popper 2005). However, activities generating loud underwater noise would be very localized and temporary, and fish could readily avoid proximity to the source.

Cumulative Impacts to Fisheries

Potential cumulative impacts on fishery resources within the project area from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. However, use of BMPs to control release of construction-related runoff would minimize those impacts. The proposed action would be unlikely to have adverse impacts on fishery resources past the overall construction period of 21 months; therefore, it is unlikely to contribute to cumulative impacts on fishery resources beyond that time.

The habitat adjacent to this reach has previously been disturbed for the construction of roads, industrial facilities, and wetland rehabilitation structures. Construction of a new floodwall and a flood control structure across the Caernarvon Canal could compound impacts from these past events. In the long term, operation of the CFDC is increasing the amount of freshwater fish habitat adjacent to the project area. Along with other wetland restoration projects in the area, it would reduce potential adverse cumulative impacts by positively affecting the fishery habitat within the project area.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Fisheries

The location of alternative 1a is essentially the same as the existing alignment and alternative 1b would incorporate a protected-side shift of approximately 100 ft. Construction and operation of the levee and floodgates under alternative 1a and alternative 1b would not directly impact any fish habitat.

Indirect Impacts to Fisheries

Under alternative 1a, the construction corridor would be approximately 200 ft east of the Caernarvon Canal and alternative 1b would be approximately 300 ft east of the canal. Construction activities could potentially cause increased turbidity and sedimentation within the canal and nearby wetlands, which could impact fish survival and growth. However, construction-related runoff would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (SWPPP), which would minimize the potential indirect impacts from alternatives 1a and 1b on adjacent fish habitat.

Cumulative Impacts to Fisheries

Potential cumulative impacts to fishery resources from alternatives 1a and 1b (increased turbidity and sedimentation that would be minimized through BMPs and a SWPPP) would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area as well as other HSDRRS projects throughout the New Orleans area. These cumulative impacts would be similar to, but less than, those identified for the proposed action given that alternatives 1a and 1b do not include construction of a flood control structure in Caernarvon Canal and would not directly impact any fish habitat.

Alternative 2 – Realignment of Caernarvon floodwall to Immediate Western Side of EBI Property

Direct, Indirect, and Cumulative Impacts to Fisheries

The direct, indirect, and cumulative impacts on fisheries from alternative 2 would be similar to, but less than, the impacts under the proposed action. The upland construction corridor for the floodwall in alternative 2 would be approximately 12 acres smaller than for the proposed action. The impacts associated with construction and operation of the flood control structure across the boat slip off of the Caernarvon Canal (on the EBI property) would likely be less than the impacts associated with the larger flood control structure that would be built across the Caernarvon Canal under the proposed action because the alternative 2 flood control structure would have a smaller footprint and would not require impoundment of the canal during construction.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct, Indirect, and Cumulative Impacts to Fisheries

The direct, indirect, and cumulative impacts on fisheries from alternative 3 would be similar to, but slightly greater than, the impacts under the proposed action. The upland construction corridor for the floodwall in alternative 3 would be approximately 3 acres larger than for the proposed action, and the corridor for the levee and levee with a T-wall cap options would be approximately 12 acres larger, with potentially increased construction runoff and turbidity levels. The impacts associated with construction of the flood control structure across the Caernarvon

Canal would be the same; however, a greater area of aquatic habitat in the Caernarvon Canal would be impounded by alternative 3 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to Fisheries

The direct, indirect, and cumulative impacts on fisheries from alternative 4 would be similar to, but slightly greater than, the impacts under the proposed action. The upland construction corridor for the floodwall in alternative 4 would be approximately 5 acres larger than for the proposed action, and the corridor for the levee and levee with a T-wall cap options would be approximately 14 acres larger, with potentially increased construction runoff and turbidity levels. The impacts associated with construction of the flood control structure across the Caernarvon Canal would be the same; however, a greater area of aquatic habitat in the Caernarvon Canal would be impounded by alternative 4 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

Alternative 5 – Realignment of Caernarvon Floodwall to the Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to Fisheries

The direct, indirect, and cumulative impacts on fisheries from alternative 5 would be similar to, but slightly greater than, the impacts under the proposed action. The upland construction corridor for the floodwall in alternative 5 would be approximately 5 acres larger than for the proposed action, and the corridor for the levee and levee with a T-wall cap options would be approximately 14 acres larger, with potentially increased construction runoff and turbidity levels. The impacts associated with construction of the flood control structure across the Caernarvon Canal would be the same; however, a greater area of aquatic habitat in the Caernarvon Canal would be impounded by alternative 5 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

3.2.3 Essential Fish Habitat

Existing Conditions

The Caernarvon Canal in the IER # 9 project area is hydrologically connected to the EFH of the Breton Sound estuary. The fish habitat that could be affected by the proposed action or alternatives is in the northern, terminal segment of the canal. As discussed in section 3.2.1, the salinities in this part of the canal are low, ranging from fresh to intermediate and unlikely to exceed 2 ppt. This small area of man-made aquatic habitat is at the closed end of a canal at the margin of the estuary and does not have characteristics indicating that it provides estuarine habitat of substantial quality, quantity, or productivity. This portion of the canal has steeply sloping banks, lacks oyster beds, and does not support communities of emergent marsh or submerged aquatic vegetation.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) states that EFH consists of “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (16 USC 1802). The 1996 amendments to the MSA set forth a mandate for the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA), Regional Fishery Management Councils (FMCs), and other Federal agencies to identify and protect EFH of economically important marine and estuarine fisheries.

The MSA requires that FMCs identify and protect EFH for every species managed by a Fishery Management Plan (16 USC 1853). Of the EFH species identified by the Gulf of Mexico Fishery Management Council (GMFMC), the species that potentially could occur in estuarine habitats such as those in the vicinity of the IER #9 project area include shrimp (white shrimp [*Litopenaeus setiferus*] and brown shrimp [*Farfantepenaeus aztecus*]), red drum (*Sciaenops ocellatus*), and Gulf stone crab (*Menippe adina*) (GMFMC 2004).

The proposed project is located in an area potentially included as EFH for larval, postlarval, juvenile, subadult, and/or adult life stages of brown shrimp, white shrimp, Gulf stone crab, and red drum (table 5). The primary categories of EFH that may be affected by the proposed project is the estuarine soft (mud) bottom and water column of the Caernarvon Canal. The location of the proposed action and alternatives has very little to no marsh edge and no inner marsh, oyster reef, or submerged aquatic vegetation (SAV). Species and life stages that potentially could occur over the soft mud bottoms that may be present in the canal and could tolerate the low salinities there include: brown and white shrimp as the post-larvae, juveniles, and sub-adults; Gulf stone crabs as juveniles and adults; and red drum as juveniles and adults (though red drum prefer salinities considerably higher than those in the canal). Therefore, the most likely species to occur in the project location are brown shrimp in the sub-adult life stage and red drum in the post-larvae/juvenile life stage.

Table 5.
EFH Requirements by Life Stage*

Species	Life Stage	Ecosystem	EFH
<i>Brown shrimp</i>	larvae	M	planktonic, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	juvenile	E	sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	adult	M	soft bottom of sand/shell/mud
<i>White shrimp</i>	larvae	M	planktonic
	juvenile	E	soft bottom, SAV, emergent marsh, oyster reefs
	adult	M	soft bottom high in organic matter
<i>Gulf stone crab</i>	larvae/postlarvae	E/M	planktonic to semi-benthic, rock jetties, oyster reefs, mud bottoms near structures
	juvenile	E	intertidal mud flats, rock jetties, oyster reefs, mud bottoms near structures and along channel edges
	adult	E	intertidal mud flats, rock jetties, oyster reefs, mud bottoms near structures and along channel edges
<i>Red drum</i>	larvae/postlarvae	E	estuaries, SAV, sand/shell/soft/hard bottom, emergent marsh
	juvenile	E/M	estuaries, SAV, sand/shell/soft/hard bottom, emergent marsh
	adult	E/M	estuaries, SAV, sand/shell/soft/hard bottom, emergent marsh

E = estuarine, M = marine, SAV = submerged aquatic vegetation.

* Species included are estuarine species managed by the GMFMC and having the potential to utilize habitat in the project area.

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to EFH

Under the no action alternative, the existing levee/floodwall reach and associated gates would be raised to the previously authorized elevation of approximately +16 ft (NAVD88). Construction and operation of the levee and floodgates under the no action alternative would not directly impact EFH. Construction activities potentially could cause increased turbidity and sedimentation within the canal as a result of stormwater runoff. However, construction-related erosion would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (SWPPP), which would minimize the potential indirect impacts from the no action alternative on adjacent EFH. Given the lack of direct and indirect impacts from the no action alternative, it would not contribute to adverse cumulative impacts in conjunction with other projects in the region.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to EFH

Implementation of the proposed action would have temporary, direct impacts on EFH during the construction period of approximately 21 months. Up to 1.5 acres of aquatic habitat in the Caernarvon Canal within and adjacent to the flood control structure could be directly impacted by construction-related activities, such as installation of a cofferdam. The cofferdam would be in place across the canal for approximately 12 months to 18 months. This would block hydrological exchange and access of EFH species to the north end of the canal (a reach of 1,800 linear ft), resulting in the temporary loss of approximately 5 acres of EFH within the canal. After the construction period, a much smaller area (approximately 0.3 acre) of the canal bottom would be permanently occupied by the control structure.

Direct impacts to EFH from this localized, temporary impoundment of the canal and the permanent removal of estuarine habitat within the footprint of the flood control structure would be negligible. The amount and quality of EFH within the canal that may be temporarily impacted or permanently lost due to the construction of this structure would represent a negligible amount of the extensive, similar or higher-quality estuarine habitat in the vicinity. During the long-term period of operation of the flood control structure, EFH would not be directly adversely affected by the infrequent, relatively short-term closures of the gate that would occur to prevent flooding associated with major storm events. Species utilizing the EFH in the project area would be unlikely to be directly injured by closure of the structure due to the slow movement of the closure and the mobility of those species.

Indirect Impacts to EFH

Construction within the canal, as well as in adjacent upland areas, could cause increases in turbidity and sedimentation within the EFH of the canal if stormwater runoff is not controlled. However, construction-related runoff and erosion of soil into the canal would be prevented or minimized through implementation of BMPs and a SWPPP, which in turn would minimize the potential for indirect impacts from the proposed action on EFH. The potential for such indirect impacts would be short-term, occurring principally during the construction period. Noise associated with construction activities, such as pile driving, also could indirectly impact EFH by causing mobile life stages of EFH species to avoid the local area. Individuals present as immature life stages may lack the mobility to actively move out of the project area in time to avoid noise impacts, which can range from mortality to altered behavior and impaired predator

avoidance (Hastings and Popper 2005). However, activities generating loud underwater noise would be very localized and temporary, and adult EFH species likely could readily avoid proximity to the source.

Cumulative Impacts to EFH

The proposed action potentially could contribute incrementally to cumulative impacts on EFH in conjunction with the combined effects of other projects occurring within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11), as well as other HSDRRS projects throughout the New Orleans area. Operation of the CFDC immediately to the west of the project area is expected to continue to promote stabilization and rehabilitation of estuarine marsh in the Breton Sound basin, thus improving EFH in the region. The proposed action would not alter these effects of the CFDC. The direct and indirect effects of the proposed action on EFH would be very localized and of short duration. Thus, these effects would contribute minimal adverse cumulative impacts on EFH in the region.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to EFH

The location of alternative 1a is essentially the same as the existing alignment, and alternative 1b would incorporate a protected-side shift of approximately 100 ft. Construction and operation of the levee and floodgates under either alternative 1a or 1b would not directly impact EFH.

Indirect Impacts to EFH

Under alternative 1a, the construction corridor would be approximately 200 ft east of the Caernarvon Canal. Construction activities potentially could cause increased turbidity and sedimentation within the canal as a result of stormwater runoff. However, construction-related erosion would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (SWPPP), which would minimize the potential indirect impacts from alternatives 1a and 1b on adjacent EFH.

Cumulative Impacts to EFH

Given the lack of direct and indirect impacts from alternatives 1a and 1b, they would not contribute to adverse cumulative impacts in conjunction with other projects in the region.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct, Indirect, and Cumulative Impacts to EFH

The direct, indirect, and cumulative impacts on EFH from alternative 2 would be similar to the impacts under alternative 1 and less than the impacts under the proposed action. The upland construction corridor for the floodwall in alternative 2 would be approximately 12 acres smaller than for the proposed action. The flood control structure to be built under alternative 2 across the boat slip on EBI property on the Caernarvon Canal would have a smaller footprint than the structure to be built across the canal under the proposed action and would not require impoundment of the canal during construction. Thus, the impacts of its construction and operation would be substantially smaller than the minimal impacts under the proposed action.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct, Indirect, and Cumulative Impacts to EFH

The direct, indirect, and cumulative impacts on EFH from alternative 3 would be similar to the impacts under the proposed action. Construction activities potentially could cause increased turbidity and sedimentation within the canal as a result of stormwater runoff. However, construction-related erosion would be managed through implementation of BMPs and adherence to regulations governing stormwater runoff at construction sites (through a SWPPP), which would minimize the potential indirect impacts from alternative 3 on adjacent EFH. The impacts associated with construction of the flood control structure across the Caernarvon Canal would be the same as for the proposed action. However, a greater area of EFH within the Caernarvon Canal would be impounded by alternative 3 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to EFH

The direct, indirect, and cumulative impacts on EFH from alternative 4 would be similar to the impacts under the proposed action. Construction activities could generate stormwater runoff that could potentially cause increased turbidity and sedimentation within the canal. However, construction-related erosion would be managed through implementation of BMPs and adherence to a SWPPP, which would minimize the potential indirect impacts from alternative 4 on adjacent EFH. The impacts associated with construction of the flood control structure across the Caernarvon Canal would be essentially the same as for the proposed action. However, a greater area of EFH in the Caernarvon Canal would be impounded by alternative 4 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

Alternative 5 – Realignment of Caernarvon Floodwall to the Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to EFH

The direct, indirect, and cumulative impacts on EFH from alternative 5 would be similar to the impacts under the proposed action. Construction activities potentially could cause increased turbidity and sedimentation within the canal as a result of stormwater runoff. However, construction-related erosion would be managed through implementation of BMPs and adherence to a SWPPP, which would minimize the potential indirect impacts from alternative 5 on adjacent EFH. The impacts associated with construction of the flood control structure across the Caernarvon Canal would be essentially the same as for the proposed action. However, a greater area of EFH in the Caernarvon Canal would be impounded by alternative 5 (approximately 6 acres, compared to approximately 5 acres for the proposed action).

3.2.4 Wildlife

Existing Conditions

The diversity and abundance of wildlife inhabiting the project area are dependent on the quality and extent of suitable habitat present. Many of the areas potentially affected by the proposed project, in addition to the existing floodwall/levee ROW, have been developed for industrial and residential uses and provide negligible habitat for wildlife (see photo 2). On the east (protected) side of the existing floodwall/levee corridor, there is a residential neighborhood. Immediately west of the existing floodwall on the flood side, between the floodwall and the Caernarvon

Canal, is an active industrial area covered largely by buildings and pavement. Thus, potential wildlife habitat in the project area east of the canal is present only in a narrow corridor along the east bank of the canal between the canal and the buildings and floodwall/levee.

Wildlife habitat within the project area is present mainly on the west side of the Caernarvon Canal, in the tract of land between this canal and the CFDC, which is parallel to and approximately 750 ft west of the Caernarvon Canal. The northern half of this tract is largely developed and contains graded parking areas and an industrial building. The undeveloped area extends from approximately 500 ft to 1,800 ft south of LA Highway 39 and covers an area of approximately 22 acres. Much of the northern and western portions of this undeveloped area are slightly more elevated and better-drained. These areas have been recently cleared of secondary growth bottomland hardwoods and scrub shrub and are covered mainly by grasses and herbs that have colonized the area and provide limited wildlife habitat. The remainder of this tract, an area of approximately 13 acres, supports a community of mostly hardwood forested wetlands or floodplain swamp dominated by small to moderately sized trees such as willow, ash, maple, and tallow. A small pond in the central area of the tract provides shallow, freshwater marsh habitat that transitions to swamp as it extends south into the forested area (see photo 3).

Wildlife that typically inhabit swamp and aquatic habitats such as those in the project area 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. Amphibians that may occur in these habitats include the southern dusky salamander (*Desmognathus auriculatus*), central newt (*Notophthalmus viridescens louisianensis*), three-toed amphiuma (*Amphiuma tridactylum*), western lesser siren (*Siren intermedia nettingi*), Gulf coast toad (*Bufo valliceps*), northern cricket frog (*Acris crepitans crepitans*), green treefrog (*Hyla cinerea*), bullfrog (*Rana catesbeiana*), and southern leopard frog (*Rana utricularia*) (Conant and Collins 1998; Felley 1992; Wigley and Lancia 1998).

Reptiles that typically utilize habitats such as those of the project area include the American alligator (*Alligator mississippiensis*), Mississippi mud turtle (*Kinosternon subrubrum hippocrepsis*), red-eared slider (*Trachemys scripta elegans*), common snapping turtle (*Chelydra serpentina*), green anole (*Anolis carolinensis*), broadhead skink (*Eumeces laticeps*), yellowbelly water snake (*Nerodia erythrogaster flavigaster*), eastern garter snake (*Thamnophis sirtalis sirtalis*), western mud snake (*Farancia abacura reinwardtii*), rough green snake (*Opheodrys*



Photo 2. Industrial and Residential Development near LA Highway 39



Photo 3. Marsh and Forest Edge Looking South from the Caernarvon Boat Launch

aestivus), speckled kingsnake (*Lampropeltis getula holbrooki*), and western cottonmouth (*Agkistrodon piscivorus leucostoma*) (Conant and Collins 1998; Felley 1992; Wigley and Lancia 1998).

Mammals that may occur in the habitats of the project corridor include the nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), river otter (*Lutra canadensis*), mink (*Mustela vison*), 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*) (Whitaker 1998; Wigley and Lancia 1998).

Birds that may utilize the habitats of 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 bald eagle (*Haliaeetus leucocephalus*), anhinga (*Anhinga anhinga*), double-crested cormorant (*Phalacrocorax auritus*), wood duck (*Aix sponsa*), purple gallinule (*Porphyryla martinica*), great blue heron (*Ardea herodias*), tricolor heron (*Hydranassa tricolor*), snowy egret (*Egretta thula*), yellow-crowned night heron (*Nyctanassa violacea*), green heron (*Butorides virescens*), white ibis (*Eudocimus albus*), barred owl (*Strix varia*), downy woodpecker (*Picoides pubescens*), common crow (*Corvus brachyrhynchos*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), common yellowthroat (*Geothlypis trichas*), 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*), barn swallow (*Hirundo rustica*), and prothonotary warbler (*Protonotaria citrea*). Migratory birds that may occur in the area only during winter include the mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), American woodcock (*Scolopax minor*), red-breasted nuthatch (*Sitta canadensis*), gray catbird (*Dumetella carolinensis*), hermit thrush (*Catharus guttatus*), rusty blackbird (*Euphagus carolinus*), swamp sparrow (*Melospiza georgiana*), and song sparrow (*Melospiza melodia*) (Dunn and Alderfer 2006; Wigley and Lancia 1998).

Although the bald eagle was recently delisted as a Federally threatened species (August 2007), it continues to be protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act. Habitats suitable for use by the bald eagle occur in Plaquemines Parish and St. Bernard Parish, and occurrences of the bald eagle have been recorded in both parishes. According to U.S. Fish and Wildlife Service [USFWS] records, bald eagle nests have been documented near the Verret to Caernarvon levee reach in St. Bernard Parish to the east of the Caernarvon floodwall and the Caernarvon Canal (USFWS 2006). According to the USFWS (2006), because the forested wetlands in the LPV Chalmette Loop area provide nesting habitat for bald eagles, there is a possibility of undocumented nests in the vicinity that are not registered in their database. However, habitats in the immediate IER # 9 project area do not have characteristics that could be particularly attractive to bald eagles for foraging, such as large areas of open water, or for nesting, such as bald cypress or other tall trees. Consequently, the bald eagle would not be expected to nest or regularly forage in the project area.

Discussion of Impacts

No Action

Direct Impacts to Wildlife

Under the no action alternative, the current levee/floodwall reach and associated gates would be raised to the previously authorized elevation of approximately +16 ft (NAVD88) and routine maintenance of the structures would continue. The greatest potential for effects on wildlife associated with the implementation of the no action alternative would occur during the

construction period. The presence of construction-related activity, machinery, and noise could be expected to cause most wildlife to avoid the construction area as well as adjacent habitats outside the levee/floodwall footprint during the construction period. Under the no action alternative the footprint of the levee would remain the same as the existing alignment, which is within a developed area with an industrial facility to the west side and a residential area to the east side of the corridor. Therefore, there would be essentially no loss of wildlife habitat. Effects of raising the levees and other structures on wildlife would not differ from those under existing conditions, as described previously; thus, there would be no impacts on wildlife.

Indirect and Cumulative Impacts to Wildlife

It is unlikely that the no action alternative would contribute to indirect or cumulative wildlife impacts in the project area. Any potential impacts would occur during construction and be temporary.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Wildlife

The construction of a new floodwall alignment under the proposed action could reduce wildlife habitat in the area within the footprint of the new alignment between the Caernarvon Canal and the CFDC. The northern half of the proposed alignment would be located within an area that largely has been previously cleared of secondary growth bottomland hardwoods and scrub shrub and provides minimal habitat for wildlife. The southern half of the proposed alignment could result in the permanent loss of forested wetland habitat adjacent and parallel to the Caernarvon Canal due to the removal of bottomland hardwoods and scrub shrub, filling of wetlands to construct the T-wall, and potential loss of wetlands within the staging areas during construction. In addition, construction of a flood control structure across the Caernarvon Canal could result in the loss of forested habitat along both banks of the canal where the flood control structure would be constructed.

The greatest potential for effects on wildlife associated with the implementation of the proposed action would occur during the construction period (estimated to be approximately 21 months). The presence of construction-related activity, machinery, and noise could be expected to cause most wildlife to avoid the construction area as well as adjacent habitats outside the levee footprint during the construction period. Although birds are highly mobile and able to move to other habitats in the vicinity, local populations of species that nest in colonies could be affected if construction activities caused abandonment of nesting sites. The reproductive capacity of local or regional populations of one or more species may depend on a given nesting colony, so disturbance of a colony could adversely affect these populations. However, the Caernarvon floodwall area is not known to be utilized for colonial nesting by wading birds such as herons, egrets, and ibises or waterbirds such as the anhinga and double-crested cormorant. Although these birds nest in trees and potentially could nest in the forested wetland habitat within and adjacent to the floodwall corridor, nesting colonies have not been recorded in this area and none were observed on site visits. In order to minimize the potential for construction under the proposed action to disturb colonial-nesting wading birds should they become established in the area, procedures recommended by the USFWS would be followed (USFWS 2009b). Prior to construction, the project area would be inspected by the USFWS or other qualified personnel for the presence of nesting colonies during the nesting season (typically 15 February through 1 September in this region, depending on the species). Construction-related activities that would occur within 1,000 ft of a colony would be restricted to the non-nesting period. The 1,000-ft buffer would be maintained during the nesting season (USFWS 2009b).

Because bald eagle nests have been documented near the Verret to Caernarvon levee reach in St. Bernard Parish to the east of the Caernarvon floodwall and the Caernarvon Canal, there is a possibility of undocumented nests in the vicinity (USFWS 2006). In order to minimize the potential for construction activities under the proposed action to disturb nesting bald eagles, procedures recommended by USFWS (USFWS 2009b) based on the National Bald Eagle Management Guidelines (USFWS 2007b) would be followed. Prior to construction, the project area would be inspected by USFWS or other qualified personnel for the presence of nest trees, including both active and alternate nests. If nests are present, the USFWS recommended guidelines would be implemented to prevent their disturbance. Implementation of the procedures for preventing disturbance to nesting bald eagles would reduce the potential for direct effects during the period of construction of the proposed action at the Caernarvon floodwall. Following the completion of construction, the subsequent long-term presence of the structures included in the proposed action would have a negligible potential to affect the bald eagle, particularly given the eagle's low likelihood of occurrence in the project area under current conditions and the limited loss of marginal habitat that could occur under the proposed action. Thus, the potential short-term or long-term direct effects on the bald eagle resulting from the proposed action at the Caernarvon floodwall would be minimal and unlikely to adversely affect the eagle.

There could be minimal impacts to other birds, mammals, reptiles, and amphibians from construction of the proposed action because the project corridor could affect a very small area relative to the large extent of forested wetland habitat in the vicinity to the south and east. Wildlife currently using the habitats in the project corridor could move to adjacent habitats at the start of construction, though some may return to the corridor after the area is re-vegetated with turf grasses following construction.

Indirect Impacts to Wildlife

Potential indirect impacts on wildlife from the proposed action mainly would involve temporary displacement of wildlife populations from the project area. Movement of the limited numbers of wildlife that currently inhabit this area into surrounding, unimpacted habitats would not be expected to result in exceedances of the carrying capacity of the extensive, adjacent habitats. Approximately 0.6 acre of wetlands (freshwater swamp) would be enclosed by the proposed action, between the floodwall alignment and the Caernarvon Canal. This could result in loss of the enclosed wetland area as wildlife habitat through development of the land. This would be a long-term indirect impact. However, these wetlands are currently isolated (they do not have hydrologic connections with adjacent wetlands) and the wetland area is small and of low quality (i.e., mowed) (USFWS 2009a, provided in appendix D).

Cumulative Impacts to Wildlife

Potential cumulative impacts on wildlife from the proposed action mainly would involve the combined effects on wildlife from habitat loss and displacement of wildlife populations from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. These projects are discussed in detail in section 4. Also, repair work on two Hurricane Katrina-related breaches in the northern stretch of the non-Federal East Bank Back Levee in Plaquemines Parish (near the towns of Braithwaite and Scarsdale) required expanding the levee footprint, which impacted wetlands and wildlife habitat. While the proposed action would permanently impact wetlands within the project area, these impacts would be mitigated. Mitigation could create habitat suitable for wildlife.

The wetlands that could be affected by the proposed action are not a unique habitat but are similar to extensive areas of wetland habitat in the region. The potentially impacted habitat area

is very small in the context of similar habitat in the region. If the area impacted were added to the areas of forested wetland habitats potentially impacted by other LPV projects, the loss of this type of wildlife habitat would be small compared to the available habitat remaining. Movement of the limited numbers of wildlife that currently inhabit these areas into surrounding, unimpacted habitats would not be expected to result in exceedances of the carrying capacity of the extensive, adjacent habitats. Habitat restoration, creation, and stabilization projects proposed or constructed in nearby areas are discussed in section 4.2.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Wildlife

Impacts to wildlife from the construction of a levee with a T-wall cap and changes to the existing highway and railroad gates under alternatives 1a and 1b would be smaller than those described for the proposed action. The greatest potential for effects on wildlife associated with the implementation of alternatives 1a or 1b would occur during the construction period. The presence of construction-related activity, machinery, and noise could be expected to cause most wildlife to avoid the construction area as well as adjacent habitats outside the levee footprint during the construction period. Under alternatives 1a and 1b, the footprint of the levee would remain the same as (alternative 1a) or adjacent to (alternative 1b) the existing alignment, which is within a developed area with an industrial facility to the west side and a residential area to the east side of the corridor. Thus, there would be essentially no loss of wildlife habitat.

Indirect Impacts to Wildlife

Wildlife would not likely be adversely affected by indirect effects from alternatives 1a or 1b, and any such effects would occur during construction and would be temporary.

Cumulative Impacts to Wildlife

Wildlife would not likely be adversely affected by cumulative effects from alternatives 1a or 1b.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct, Indirect, and Cumulative Impacts to Wildlife

The direct, indirect, and cumulative impacts on wildlife from alternative 2 would be essentially the same as those described for alternative 1.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct, Indirect, and Cumulative Impacts to Wildlife

The direct, indirect, and cumulative impacts on wildlife from alternative 3 would be similar to those described for the proposed action, although a greater area of wildlife habitat (approximately 12 additional acres) could be lost due to the wider footprint of the levee and the greater length of the alignment under alternative 3.

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to Wildlife

The direct, indirect, and cumulative impacts on wildlife from alternative 4 would be similar to those described for the proposed action, although a greater area of wildlife habitat (approximately 14 additional acres) could be lost due to the wider footprint of the levee and the greater length of the alignment under alternative 4.

Alternative 5 – Realignment of Caernarvon Floodwall to Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to Wildlife

The direct, indirect, and cumulative impacts on wildlife from alternative 5 would be similar to those described for the proposed action, although a greater area of wildlife habitat (approximately 14 additional acres) could be lost due to the wider footprint of the levee and the greater length of the alignment under alternative 5.

3.2.5 Threatened and Endangered Species

Existing Conditions

Occurrences of rare, threatened, and endangered species are tracked by the Louisiana Natural Heritage Program (LaNHP) and reported by parish (Louisiana Department of Wildlife and Fisheries and Louisiana Natural Heritage Program [LaDWF] and LaNHP 2007). The project area is located on the Plaquemines Parish-St. Bernard Parish line. In the project area, the parish line runs along the east bank of the Caernarvon Canal to the Mississippi River. Potential habitat for threatened and endangered species in the project area includes the canal and the wooded wetland area immediately west of the canal in Plaquemines Parish. Six wildlife species that are federally listed as endangered or threatened in Louisiana have been reported as occurring in Plaquemines Parish and/or St. Bernard Parish (USFWS 2007a; LaDWF and LaNHP 2007). Of these species, three potentially could occur in the area of the proposed project: the West Indian manatee (*Trichechus manatus*) and brown pelican (*Pelecanus occidentalis*), which are Federally listed as endangered, and the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), which is Federally listed as threatened (USFWS 2009b).

In accordance with the consultation provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the CEMVN submitted a letter to the USFWS on 7 November 2007 and re-coordinated on 29 December 2008, requesting review of the proposed actions in Orleans, Jefferson, and St. Bernard Parishes (IER # 5 through IER # 11), including IER # 9. In response and in accordance with the provisions of the ESA, the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended; 16 USC 668a-d), the Migratory Bird Treaty Act of 1918 (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 USC 661 et seq.), the USFWS responded in a letter on 2 February 2009 (USFWS 2009b). The USFWS concurred that the proposed action would be not likely to adversely affect the species under their jurisdiction with a potential to occur in the project vicinity (manatee and brown pelican).

One of the listed species potentially occurring in the area, the threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*), was not evaluated by the USFWS for its potential to be impacted. As noted in the USFWS letter (USFWS 2009b), the responsibility for protection of the Gulf sturgeon in estuarine habitats is shared by the USFWS with the NMFS, and the responsible agency is dependent on the Federal agency requesting consultation. For the USACE

and all but four other Federal agencies, consultation regarding the Gulf sturgeon is handled by NMFS (USFWS 2009b). CEMVN submitted a letter to NMFS on 7 August 2007 requesting review of the proposed actions for IERs # 9 and # 8. The CEMVN determined that the proposed action would have no effect on the threatened or endangered species under NMFS jurisdiction that potentially could occur in the region, the Gulf sturgeon. Consequently, written concurrence from NMFS was not required. The manatee, brown pelican, and Gulf sturgeon are discussed below.

West Indian Manatee

The West Indian manatee is Federally and state-listed as endangered and is also protected under the Marine Mammal Protection Act of 1972, under which it is considered depleted (USFWS 2001). It occurs in both freshwater and saltwater habitats within tropical and subtropical regions and includes two subspecies, the Florida manatee (*T. manatus latirostris*) and the Antillean manatee (*T. manatus manatus*). The primary human-related threats to the manatee include watercraft-related strikes (impacts and/or propeller strikes), crushing and/or entrapment in water control structures (flood gates, navigation locks), and entanglement in fishing gear (discarded fishing line, crab traps) (USFWS 2007c).

The Florida manatee can occur throughout the coastal regions of the southeastern U. S. and may disperse greater distances during warmer months; it has been sighted as far north as Massachusetts and as far west as Texas. However, the manatee is a subtropical species with little tolerance for cold, and it returns to and remains in the vicinity of warm-water sites in peninsular Florida during the winter (USFWS 2007c; USFWS 2007d). Thus, the manatee is not a year-round resident in Louisiana, but it may migrate there during warmer months. Manatees prefer access to natural springs or man-made warm water and waters with dense beds of submerged aquatic or floating vegetation. Manatees prefer to forage in shallow grass beds that are adjacent to deeper channels. They seek out quiet areas in canals, creeks, lagoons, or rivers, using deeper channels as migratory routes (USFWS 1999).

There have been 110 reported sightings of manatees in Louisiana since 1975 (LaDWF 2005a). Sightings in Louisiana have been uncommon and sporadic, and have included occurrences in Lake Pontchartrain and in the vicinity of the MRGO and Bayous Bienvenue and Dupre (Abadie et al. 2000). Although manatees potentially could enter the project area at the upper end of the Caernarvon Canal by swimming up waterways within the Breton Sound basin, preferred food sources are not abundant in the project area. Manatees would not be expected to swim the distances necessary to reach the project area in a dead-end canal that provides minimal habitat. Accordingly, it is unlikely that manatees would occur in the project area.

Brown Pelican

The brown pelican is Federally and state-listed as endangered in Louisiana. Populations along the Atlantic Coast and on the Gulf Coast in Florida and Alabama have recovered and the species has been delisted in these areas. However, the species remains listed as endangered in Louisiana, Texas, and the West Coast. Critical habitat has not been designated for the brown pelican (USFWS 2007c).

The brown pelican feeds mainly on fish captured by diving in bays, tidal estuaries, and along the coast. It typically uses sand spits or offshore sandbars as daily resting and nocturnal roosting areas. It nests in colonies on small coastal islands, typically among the dunes of barrier islands, locations that provide protection from mammalian predators such as raccoons and sufficient elevation to avoid flooding of nests. The nests are on the ground or in shrub thickets, such as mangroves (LaDWF 2005b).

Gulf Sturgeon

The Gulf sturgeon is federally listed as threatened throughout its range and is state-listed as threatened in Louisiana. It supported an important commercial fishing industry during the late 19th and early 20th centuries. A minor commercial fishery was reported to exist for Gulf sturgeon in Lake Pontchartrain and its tributaries during the late 1960s (USFWS and NOAA 2003). Throughout most of the 20th century, Gulf sturgeon suffered population declines due to over fishing, habitat loss, water quality deterioration, and barriers to historic migration routes and spawning areas (dams). In 1991, the Gulf sturgeon was listed as a threatened species under the Endangered Species Act (16 USC 1531 et seq.). The present range of the species extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida (USFWS and NOAA 2003).

The Gulf sturgeon is an anadromous fish that migrates from saltwater into large coastal rivers to spawn and spend the warm months. Subadults and adults typically spend the three to four coolest months in estuaries or Gulf of Mexico waters before migrating into rivers as temperatures increase. This migration typically occurs from mid-March through June. Most adults would spend eight to nine months each year in rivers before returning to the estuary or the Gulf of Mexico by mid-November to early December. Thus, the Gulf sturgeon spends the majority of its life in freshwater (USFWS and GSMFC 1995), yet subadult and adult Gulf sturgeon do not feed significantly in freshwater; instead, they rely almost entirely on the estuarine and marine areas for feeding. Young-of-the-year and juveniles feed mostly in the riverine environment (USFWS and NMFS 2003).

Critical habitat identifies specific areas that are essential to the conservation of a listed species. Various activities in or adjacent to each of the critical habitat units may affect certain physical and biological features necessary to the preservation of the species and, therefore, may require special management considerations or protection. Fourteen geographic areas (units) among the Gulf of Mexico rivers and tributaries have been designated as critical habitat for this species. Offshore critical habitat for the Gulf sturgeon extends from Lake Borgne and the Rigolets along the Gulf Coast to the Suwannee Sound, Florida. Of the 14 units designated by USFWS and the NMFS among Gulf of Mexico rivers and tributaries, Units 1 to 7 are river systems and Units 8 to 14 are estuarine and marine systems (USFWS and NMFS 2003). The closest critical habitat unit to the project area is Unit 8, which encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, the Rigolets, Lake Catherine, Lake Borgne, and the Mississippi Sound. Critical habitat follows the shorelines of each water body. Estuaries and bays located adjacent to riverine units were designated as critical habitat to protect unobstructed passages for sturgeon between feeding and spawning areas (USACE 2006a). Sturgeon migrations to rivers that enter Lake Pontchartrain follow routes through Lake Borgne and the Rigolets. Studies conducted by the LaDWF have shown the presence of Gulf sturgeon in Lake Pontchartrain, the Rigolets, and Lake Borgne during the winter and during periods of migration to and from marine environments. Thus, critical habitat was designated for the Gulf sturgeon in each of these areas (USACE 2006a).

The IER # 9 project area at the upper end of a man-made canal in the Breton Sound basin is not within or adjacent to designated critical habitat for the Gulf sturgeon, is not in the vicinity of Gulf sturgeon migration routes, and does not provide habitat with characteristics preferred by the Gulf sturgeon. Thus, it is very unlikely that Gulf sturgeon would occur in the project area.

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Threatened and Endangered Species

Under the no action alternative, the current levee/floodwall reach and associated gates would be brought to the previously authorized elevation of approximately +16 ft (NAVD88). The footprint of the levee would remain the same as the existing alignment, which is within a developed area with an industrial facility to the west side and a residential area to the right side of the corridor. As discussed above, threatened or endangered species are unlikely to utilize habitat within the proposed project area. Thus, endangered and threatened species would be unlikely to be adversely affected by direct or indirect effects, and the no action alternative would not contribute to any cumulative effects on threatened or endangered species, or their critical habitat.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Threatened and Endangered Species

The construction of a new levee/floodwall alignment under the proposed action could reduce aquatic habitat within the footprint of the new alignment in the Caernarvon Canal. Although the manatee and brown pelican potentially could occur in this area, their use of this small, isolated area of habitat is not expected, and these species are not likely to be adversely affected by the direct effects of the proposed action. The Gulf sturgeon is not expected to occur in the project area, and the proposed action would have no direct effect on this species.

Indirect Impacts to Threatened and Endangered Species

Endangered and threatened species would be unlikely to be adversely affected by indirect effects from the proposed action. The endangered and threatened species with a potential to occur in the project area, the manatee and brown pelican, are not likely to be adversely affected by indirect effects such as reduced availability of food, impaired water quality, or altered nesting habitat as a result of the proposed action. Similarly, the proposed action would have no indirect effects on the Gulf sturgeon.

Cumulative Impacts to Threatened and Endangered Species

Potential cumulative impacts on endangered and threatened species from the proposed action mainly could involve the combined effects on regional populations of each species from habitat loss and displacement of individuals from construction of the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. The habitats affected by these projects are principally wetlands. The wetlands that could be affected at the Caernarvon floodwall are similar to extensive areas of wetland habitat in the region, but they do not have characteristics of habitats substantially utilized by threatened and endangered species in the vicinity. The small area of aquatic habitat potentially impacted by the proposed action would be negligible in the context of similar habitat in the region, and it is unlikely to be utilized by endangered or threatened species. Thus, the proposed action would not contribute to cumulative impacts on endangered or threatened species.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Threatened and Endangered Species

Under alternatives 1a and 1b, the footprint of the levee would remain the same as (alternative 1a) or adjacent to (alternative 1b) the existing alignment, which is within a developed area with an industrial facility to the west side and a residential area to the right side of the corridor. Thus, there would be no loss of habitat for endangered or threatened species and no direct impacts to these species.

Indirect Impacts to Threatened and Endangered Species

Under alternatives 1a and 1b, as discussed for the proposed action, endangered and threatened species would be unlikely to be adversely affected by indirect effects.

Cumulative Impacts to Threatened and Endangered Species

Because alternatives 1a and 1b would be not likely to adversely affect endangered or threatened species, they would not contribute to any cumulative effects on these species.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct, Indirect, and Cumulative Impacts to Threatened and Endangered Species

The direct, indirect, and cumulative impacts on endangered and threatened species from alternative 2 would be essentially the same as those described for alternative 1.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct, Indirect, and Cumulative Impacts to Threatened and Endangered Species

The direct, indirect, and cumulative impacts on endangered and threatened species from alternative 3 would be essentially the same as those described for the proposed action.

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to Threatened and Endangered Species

The direct, indirect, and cumulative impacts on endangered and threatened species from alternative 4 would be similar to those described for the proposed action.

Alternative 5 – Realignment of Caernarvon Floodwall to Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to Threatened and Endangered Species

The direct, indirect, and cumulative impacts on endangered and threatened species from alternative 5 would be essentially the same as those described for the proposed action.

3.2.6 Non-wet Uplands

Existing Conditions

The IER #9 project area is located on part of the highest natural land in St. Bernard Parish, a natural levee of the Mississippi River (Heinrich 2005). Natural levees in this region typically are ridges no more than 10 ft in elevation that formed when sediment was deposited over geologic time along the banks of rivers and streams during flood events (LaCoast 2008). Natural levees are highest near the river channel and slope gently away from the river until they transition to lower-elevation marshes or swamps (Heinrich 2005). This appears to have been the original topography in the project area, with the natural levee extending approximately 0.5 mile south from the river bank to the marshes to the south. The project area extends north from the southern margin of the natural levee.

The man-made levee system along the Mississippi River immediately north of the project area, which was built by the Federal government and maintained by local sponsors, was constructed atop the existing natural levee. Man-made levees are not considered natural uplands. Since Federal regulations require that man-made levees, such as the MRL and the HSDRRS at LPV 149, remain cleared of any vegetation but mown grass, they do not provide natural upland habitat (LaCoast 2008).

The higher ground of natural levees provides land suitable for development and, as a result, much of the land surrounding the project area is occupied by residential areas and industrial uses, such as shipbuilding. The nearby communities of Caernarvon in St. Bernard Parish and Braithwaite in Plaquemines Parish developed on these uplands (Heinrich 2005). The majority of the project area consists of developed uplands, paved surfaces, grassed ROWs, and vacant land that has been cleared of native trees and is now covered by herbaceous vegetation. Native terrestrial vegetation remaining on the natural levee is limited to a forest community along the Mississippi River (north of the man-made river levee adjacent to the project area) and small areas of non-wet forest between the CFDC and Caernarvon Canal.

Prime and unique farmlands are a potential component of non-wet uplands. The Farmland Protection Policy Act (7 USC 4201 et seq.) requires Federal agencies to take into account the adverse effects of their actions on prime or unique farmlands. The purpose of the Act is “to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.” The CEMVN initiated consultation with the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) on 9 September 2009 to determine if there are prime or unique farmlands located in the project area. According to the NRCS response dated 10 September 2009, the project area does contain such farmland. (The Farmland Conversion Impact Rating form completed by NRCS is provided in appendix D.)

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Non-wet Uplands

The no-action alternative would involve construction along a previously disturbed and/or developed corridor on the uplands immediately east of the Caernarvon Canal, within the existing ROW. Thus, there would be no additional direct, indirect, or cumulative impacts to non-wet uplands under these alternatives.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct, Indirect, and Cumulative Impacts to Non-wet Uplands

While the project area is located on a natural levee, the principal undeveloped area in the vicinity, a forest community located north of and adjacent to the project area, would not be affected under this alternative. Areas for staging, access roads, and other temporary easements would be required; however, no construction would occur on the flood (north) side of the existing MRL where the forested area is located.

Under the proposed action, levees and/or floodwalls would be constructed on non-wet uplands between the CFDC and Caernarvon Canal. Some of the uplands within the footprint are undeveloped and forested. These upland areas would be impacted by the removal of upland vegetation communities and the preclusion of other land uses in these areas, but the extent of the affected areas would be small. In St. Bernard Parish, for example, the natural levees that are sufficiently elevated to be suitable for agriculture or urban development cover about 58 square miles (Heinrich 2005), or 37,120 acres. The impacted area of upland within the footprint of the proposed action would be approximately 10 acres, which is only 0.0003 percent of that parish total. Given the relatively minor upland acreage potentially affected, the impacts on non-wet uplands from the proposed action would be minimal, and no substantial direct, indirect, or cumulative impacts to non-wet uplands would be expected to result from the proposed action.

The NRCS land evaluation performed for the project area identified 4 acres of prime and unique farmland within the proposed action footprint (see the Farmland Conversion Impact Rating form completed by NRCS, provided in appendix D). This land represents only 0.0002 percent of farmland in St. Bernard Parish. Conversion of these 4 acres of prime and unique farmland to nonagricultural uses is an unavoidable impact of the proposed action. However, considering the small area of farmland potentially affected and the minor percentage of parish farmland it represents, the impacts on prime and unique farmlands from the proposed action would be minimal, and no substantial direct, indirect, or cumulative impacts on these lands would be expected to result from the proposed action.

Alternatives 1 and 2

Direct, Indirect, and Cumulative Impacts to Non-wet Uplands

Both alternatives 1 and 2 would involve construction along a previously disturbed and/or developed corridor on the uplands immediately east of the Caernarvon Canal. All construction and all permanent and temporary ROW in the project areas would be located on previously developed, industrial land. Thus, there would be no additional direct, indirect, or cumulative impacts to non-wet uplands under these alternatives.

Alternatives 3 through 5

Direct, Indirect, and Cumulative Impacts to Non-wet Uplands

The direct, indirect, and cumulative impacts to non-wet uplands from alternatives 3 through 5 would be similar to those described for the proposed action. Approximately 10 acres of undeveloped uplands would be permanently impacted by the construction of new levee/floodwall under each of these alternatives. This would be only about 0.0003 percent of the total area of natural upland available for use in St. Bernard Parish. Approximately 4 acres of prime and unique farmlands would be converted to nonagricultural uses, which represent 0.0002 percent of farmland in St. Bernard Parish.

3.2.7 Cultural Resources

Existing Conditions

Records on file at the Louisiana Division of Archaeology and the CEMVN indicate previously recorded archaeological sites are located within the IER # 9 project area and its vicinity. Known prehistoric shell midden sites are primarily located on the high natural levee areas adjacent to the Mississippi River and smaller waterways, as well as along the relatively high lake and bay shoreline ridges located in the general vicinity. Similarly, historic period archaeological sites and standing structures are located in these same areas and include forts, plantations, farmsteads, and cemeteries; residential, commercial, and industrial districts; and river and lake port facilities. Historic period watercraft sites are recorded in the Mississippi River, Lake Pontchartrain, and other river and bayou channels in the region. Specific historical information on the IER # 9 project area can be found in the following reports summarized below.

Three previous cultural resources investigations are particularly relevant to the IER # 9 project area. In the first study, conducted by Richard Shenkel in 1977, the author describes the results of a pedestrian survey and shovel testing within IER # 9 along a proposed revetment alignment that included the Mississippi River shoreline, bank, and both sides of the levee. No cultural resources were identified. In the second study, Flayharty and Muller (1982) conducted a pedestrian survey along the existing Twenty Arpent canal levee from Caernarvon to Verret. No cultural resources were identified, although the testing did not account for buried cultural deposits in vegetated areas.

The last study was conducted by R. Christopher Goodwin and Associates, Inc. in 1987 (Poplin et al. 1987). Background research determined that the IER # 9 project area was once associated with nineteenth century Caernarvon Plantation sugar fields, and that the structures from that time period were all apparently destroyed from the construction of subsequent railway, highway, levee and golf course development. The IER # 9 project area was also found to be the precise site of the intentional levee breach that was executed in 1927 to prevent flooding of New Orleans from rising Mississippi waters.

Researchers conducted a pedestrian survey and shovel testing throughout a portion of the IER # 9 project area from Caernarvon Canal west to the Braithwaite golf course. The pedestrian survey identified one archaeological site, 16PL150, in the northwest portion of the project area. The site was described as a sparse surface scatter of brick fragments, coal slag and manganese glass. Shovel tests in the site area were negative. Researchers concluded that the site was most likely re-deposited surface material and was not eligible for listing on the National Register of Historic Places. Shovel testing throughout the project area was also negative and no buried archaeological material was identified.

The CEMVN contracted R. Christopher Goodwin & Associates, Inc. to conduct reconnaissance level cultural resources investigations of the IER # 9 project area (Lackowicz and Titelbaum 2007). A 124-acre project area encompassing the proposed action and five alternative alignments was investigated. Researchers utilized background research, previous cultural resource investigations review, soil and topographic analyses, and field reconnaissance survey data to locate cultural resources, assess historic structures, and to identify high potential areas for archaeological resources.

Background research identified one previously recorded archaeological site in the project area. As mentioned above, Site 16PL150 was a light scatter of re-deposited surface debris that was not considered eligible for listing on the National Register of Historic Places. Researchers could not confirm the location of Site 16PL150 during field reconnaissance. Extensive disturbance

associated with infrastructural development was apparent throughout the project area and included previous lot grading, floodwall construction, canal excavation, and commercial and residential development. Commercial and residential structures in the project area are modern and not historically significant. Previous disturbance relating to the creation of the artificial Caernarvon Crevasse in 1927 was also apparent. Researchers evaluated the results from the previous cultural resources investigations noted previously, along with soil data and field reconnaissance information, and concluded that there is negligible archaeological potential in the project area. No further cultural resources investigations are recommended.

In letters to the State Historic Preservation Officer (SHPO) and Indian Tribes dated 15 October 2007, 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 concurred with the CEMVN's "no historic properties affected" finding in a letter dated 7 December 2007. The Mississippi Band of Choctaw Indians concurred with the effect determination in an e-mail dated 29 November 2007. No other Indian Tribes responded to the request for comments.

Section 106 consultation for the proposed project actions is concluded. However, if any unrecorded cultural resources are determined to exist within the proposed project boundaries, then no work will 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. The following discussion of impacts is based on the preliminary information summarized previously.

Discussion of Impacts

No Action

Direct Impacts to Cultural Resources

Under the no action alternative, the proposed action would not be constructed and the existing floodwall and floodgates would be raised to the previously authorized elevation. Routine maintenance of the floodwall and gates would continue. Recent cultural resources investigations have confirmed that the likelihood for intact and undisturbed cultural resources in the project area is extremely minimal. Implementation of the no action alternative would have no direct impacts on significant cultural resources.

Indirect and Cumulative Impacts to Cultural Resources

The no action alternative would be expected to have no indirect or cumulative impacts on cultural resources in the general project vicinity. All known or unknown cultural resources would continue to be exposed to conditions as they currently exist.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Cultural Resources

The proposed action would have no direct impacts on cultural resources. Recent investigations found no cultural resources in the project area (Lackowicz and Titelbaum 2007). Researchers found that previous ground disturbing activities associated with levee, floodwall, canal, commercial construction had severely impacted subsurface deposits. The likelihood for intact and undisturbed cultural resources in the proposed action project area is considered extremely

minimal. The reported location of Site 16PL150 could not be confirmed during recent reconnaissance level field investigations and is thought to have been destroyed.

Indirect Impacts to Cultural Resources

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

Cumulative Impacts to Cultural Resources

Implementation of the proposed action would have beneficial cumulative impacts on cultural resources in the region. This proposed action is part of the ongoing Federal effort to reduce the threat to property posed by flooding. Potential cumulative impacts on cultural resources from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including those projects described in IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. The combined effects from construction of the multiple projects underway and plans for the HSDRRS would reduce flood risk and storm damage to significant archaeological sites, individual historic properties, engineering structures and 19 historic districts.

Alternatives 1 through 5

Direct, Indirect, and Cumulative Impacts to Cultural Resources

Implementation of alternatives 1 through 5 would have similar direct, indirect, and cumulative impacts as those described for the proposed action.

3.2.8 Recreational Resources

Existing Conditions

Recreational resources near the project area include boat launches, a state park, and a public golf course. Dean's Free Boat Launch, a facility open to the public, is located at the north end of the Caernarvon Canal. The Caernarvon Boat Launch is a private facility located on the west bank of the canal. Both launches are located within the project area. St. Bernard State Park, a 358-acre facility offering trails, picnicking, boating, camping, and fishing, is located approximately 0.2 miles east of the existing LPV 149 floodwall near the community of Caernarvon. Hidden Oaks Golf Course, located approximately 0.3 miles southwest of the project area (across the CFDC) in Braithwaite, is temporarily closed while undergoing restoration. Recreational activities that are popular in the general area are fishing, motor boating for pleasure, crabbing, shrimping, hunting, and passive activities such as wildlife observation.

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Recreational Resources

Under the no action alternative, the current levee/floodwall reach and associated gates would be raised to the previously authorized elevation. This alternative would have no direct impact on recreational uses or facilities in the project area with the exception of construction-related activities that could lead to temporary restriction on use of Dean's Free Boat Launch. Assuming proper methods would be used to prevent sediment loading to the adjacent fish habitat from run-

off, such as through use of BMPs and a SWPPP, no indirect adverse impacts would be expected within the project area. With the level of risk reduction improved to the authorized elevation, St. Bernard State Park could be expected to experience less flooding than previously, but would still be susceptible to a 1 percent exceedance surge event.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Recreational Resources

Implementation of the proposed action would temporarily impact fish habitat during the construction period by disrupting aquatic habitat in the Caernarvon Canal. The area of aquatic habitat directly affected by the proposed action would be relatively small (approximately 1.5 acres). Material suspended by construction could temporarily impact recreational fishing; it could clog fish gills, lower growth rates, and affect egg and larval development. Impoundment of the northern part of the Caernarvon Canal by a cofferdam could decrease the growth and survival rates of some individual organisms, thereby having temporary, localized effects on fish populations. If the proposed action were selected, following construction the adjacent wetlands and drainageways would stabilize, allowing sediment to settle, benthos to repopulate, and other mobile aquatic species to return, thereby restoring recreational fishing opportunities to previous levels.

During construction of the proposed action, access to Dean’s Free Boat Launch and to the private Caernarvon Boat Launch would be interrupted for 12 months to 18 months while the cofferdam across the Caernarvon Canal would be in place. If the proposed action were selected and constructed, access to the boat ramps would be expected to return to normal following completion of construction.

Indirect Impacts to Recreational Resources

There would be no indirect impacts to recreational resources in the project area under the proposed action.

Cumulative Impacts to Recreational Resources

Potential cumulative impacts to recreational resources from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area, which could temporarily affect recreational fishing. The proposed action would be unlikely to have adverse impacts on fishery resources past the overall construction period of 21 months; therefore, it is unlikely to contribute to cumulative impacts on fishery resources beyond that time.

Over the long term, operation of the CFDC is increasing the amount of freshwater fish habitat adjacent to the project area. Along with other wetland restoration projects in the area, it would reduce potential adverse cumulative impacts by providing additional recreational fishing opportunities within the project area.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct, Indirect, and Cumulative Impacts to Recreational Resources

The location of alternative 1a is essentially the same as the existing alignment; the location of alternative 1b would incorporate a protected-side shift of approximately 100 ft. Operation of the

levee and floodgates would not be expected to impact any recreational fishing or public boat launches. However, construction-related activities could lead to temporary restriction on use of Dean's Free Boat Launch lasting 12 months to 18 months. Assuming proper methods would be used to prevent sediment loading to the adjacent fish habitat from run-off, such as through use of BMPs and a SWPPP, no direct or indirect adverse impacts on fish populations would be expected within the project area.

Potential cumulative impacts on recreational fishing from alternatives 1a or 1b (increased turbidity and sedimentation that would be minimized through BMPs and a SWPPP) would involve the combined effects from the multiple HSDRRS projects through the area. These cumulative impacts would be similar to, but less than, those identified for the proposed action given that alternatives 1a and 1b do not include construction of a flood control structure in Caernarvon Canal and would not directly impact any fish habitat.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct, Indirect, and Cumulative Impacts to Recreational Resources

The direct, indirect, and cumulative impacts for alternative 2 would be very similar to those for the proposed action, with the exception that they could be less substantial based on the smaller amount of aquatic (fish) habitat that would be disturbed during construction of a flood control structure across the boat slip on the EBI property rather than across the Caernarvon Canal itself and because impoundment of the canal during construction would not be required.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct, Indirect, and Cumulative Impacts to Recreational Resources

The direct, indirect, and cumulative impacts on recreational resources for alternative 3 would be very similar to those for the proposed action, with the exception that they could be more substantial based on the probable permanent loss of the private Caernarvon Boat Launch, which is located within the construction corridor. However, Dean's Free Boat Launch would still be available for recreational fishermen to use after completion of the construction of this alignment.

Alternative 4 – Realignment of Caernarvon Floodwall to Western Side of SDEB Property (Zigzag Configuration)

Direct, Indirect, and Cumulative Impacts to Recreational Resources

The direct, indirect, and cumulative impacts of alternative 4 on recreation would be very similar to those for the proposed action.

Alternative 5 – Realignment of Caernarvon Floodwall to Eastern Side of CFDC

Direct, Indirect, and Cumulative Impacts to Recreational Resources

The direct, indirect, and cumulative impacts on recreational resources for alternative 5 would be very similar to those for the proposed action.

3.2.9 Aesthetic (Visual) Resources

Existing Conditions

The existing Caernarvon Floodwall is a relatively short stretch of floodwall running parallel to the Caernarvon Canal and adjacent to the EBI manufacturing facility in St. Bernard Parish, LA. The project area also includes the SDEB boat manufacturing facility on the west bank of the canal in Plaquemines Parish, LA. The area is developed and can be classified into three predominant land use categories: industrial, residential, and some non-developed (vacant) natural areas (uplands and wetlands). The features in the vicinity of the project area that possess aesthetic value include the east bank of the Mississippi River and a small forested wetland area located southwest of the SDEB facility property, between the CFDC and the Caernarvon Canal. Piles of trash and debris are located in this wetland area (photo 4) and in a cleared area adjacent to the EBI parking lot. The project area is scattered with debris ranging from fallen trees to household trash. This, in conjunction with the existing industrialized area, creates an area with low visual character and aesthetic quality.



Photo 4. Debris Area in Wetlands Southwest of the SDEB Facility

View sheds to the Mississippi River are blocked by the existing levee system and provide no real aesthetic value from public thoroughfares or residential parcels in the area. However, for a significant portion of the study area, view sheds of the main channel of the Mississippi River are offered from atop the levee system. For those who participate in outdoor activities, such as recreational walking, hiking, biking, nature/ecological study, fishing, and/or birdwatching, the visual characteristics are much more apparent and important.

The natural areas present on the south side of LA Highway 39 (in the vicinity of the project area) provide little to no aesthetic value to the study area overall, since the majority of the project corridor runs between and adjacent to a manufacturing facility to the west and a residential area along Deogracias Lane to the east. Although the wetland area southwest of SDEB can be seen from LA Highway 39, it is not likely that this view is highly valued by the public, given the industrial nature of surrounding areas in the immediate vicinity of the project area. The view sheds from residences near the project area rest on the protected sides of two existing levees that run parallel to the Caernarvon Canal. These view sheds are primarily screened by the levees blocking the view into the industrial area and by the debris that litters the banks of the canals and natural areas in the project vicinity. This also holds true for the previously mentioned neighborhood along Deogracias Lane and the neighborhood along Park Avenue (on the western side of the project area).

Discussion of Impacts

No Action

Direct Impacts to Aesthetic Resources

With the no action alternative, the floodwall and associated gates would be raised to the previously authorized elevation at their current location. The increased wall height could

provide further buffering between the residential and industrial areas. However, impacts to the visual character of the project area would continue. The concrete walls would still create an unnatural, man-made element that provides little in the way of positive visual quality.

The visual resources of the project corridor would also be temporarily impacted by construction activities related to implementing the no action alternative and by transport activities needed to move equipment and materials to and from the site. In order to construct a floodwall to the previously authorized elevation, the existing floodwall would have to be demolished. During this time, EBI and other industrial activities currently blocked from view would be clearly visible to residences along Deogracias Lane to the east of the floodwall corridor.

Indirect and Cumulative Impacts to Aesthetic Resources

With implementation of the no action alternative, other activities in the vicinity would continue to affect visual quality in the project area. Major contributors to decreases in visual quality in the general vicinity include other man-made elements disrupting view sheds, such as earthen berm levees and other concrete floodwalls. Implementation of the proposed action would add another layer to the already extensive levee system in the area.

Over time, if the continued practices of littering and poor maintenance persist, then the vistas and scenic quality of the area would further degrade.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Aesthetic Resources

The existing levee and floodwall, which would remain in place under the proposed action, would still serve as a buffer between the residential and industrial areas. Construction of a floodwall to the west of the SDEB property would disturb views from LA Highway 39 and from the Caernarvon Canal. The expanse of wetlands in the PWA would be obscured from the view of motorists traveling along the portion of the highway north of the CFDC. Boaters using Dean's Free Boat Launch near the head of the canal and the private Caernarvon Boat Launch on the west bank would have their field of view restricted by the floodwall until they pass through the proposed flood control structure across the canal and emerge into the open wetlands area beyond. View sheds in the immediate project vicinity would include unnatural earthen levees and large concrete walls. Due to a lack of forested areas near the project area, and the requirement that floodwall corridors be clear of trees and other foliage, it is unlikely there would be any chance of naturally screening the proposed floodwall from view.

The visual resources of the project corridor could also be temporarily impacted by construction activities related to implementing the proposed action and by equipment and material transport activities to and from the site.

Indirect and Cumulative Impacts to Aesthetic Resources

A possible beneficial indirect impact from the proposed action would be that during construction, the project area would likely be cleaned up, with a large portion of debris and litter removed from the site. Other activities in the vicinity would continue to affect visual quality in the project area. Potential cumulative impacts to aesthetic resources from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. Manmade elements such as existing features of the HSDRRS (i.e., earthen levees and concrete floodwalls) contribute to decreases in visual quality within the region.

Implementation of the proposed action would add another layer to the already extensive levee system in the area.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Aesthetic Resources

Direct impacts under alternatives 1a and 1b would be similar to those discussed under the no action alternative. The increased wall height could provide further buffering between the residential and industrial areas. However, the concrete walls would still create an unnatural, man-made element that provides little in the way of positive visual quality.

Visual resources of the project corridor would also be temporarily impacted by construction activities related to implementing alternatives 1a and 1b and by transport of equipment and materials to and from the site. In order to construct a new floodwall, the existing floodwall would have to be demolished. During this time, EBI and other industrial activities currently blocked from view would be clearly visible to residences along Deogracias Lane to the east of the floodwall corridor.

Indirect and Cumulative Impacts to Aesthetic Resources

Under alternatives 1a and 1b, indirect and cumulative impacts would be similar to those described for the proposed action.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct Impacts to Aesthetic Resources

Under alternative 2, direct impacts to the visual character of the project area would be minimal. The continuation of the existing floodwall would still serve as a buffer between the residential and industrial areas. View sheds from the two canals in the project vicinity would enhance visual quality by offering additional views of the wetlands and other natural areas to the south of the industrialized area where litter and debris are less apparent. However, view sheds in the immediate project vicinity would include unnatural earthen levees and large concrete walls. Due to a lack of forested areas near the project, and the requirement that floodwall corridors be clear of trees and other foliage, it is unlikely there would be any chance of naturally screening the proposed or existing floodwalls from view.

The visual resources of the project corridor could also be temporarily impacted by construction activities related to implementing the alternative 2 and by equipment and material transport activities to and from the site.

Indirect and Cumulative Impacts to Aesthetic Resources

Under alternative 2, indirect and cumulative impacts would be similar to those described for the proposed action.

Alternatives 3 Through 5

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources

Direct, indirect, and cumulative impacts for alternatives 3 through 5 would be similar to those described for the proposed action.

3.2.10 Air Quality

Existing Conditions

The USEPA, under the requirements of the Clean Air Act of 1963 (CAA), has established National Ambient Air Quality Standards (NAAQS) for seven contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM_{2.5}), lead (Pb), and sulfur dioxide (SO₂). The NAAQS were established at levels sufficient to protect public health and welfare from the adverse effects associated with pollutants in the ambient air.

Areas that meet the NAAQS for a criteria pollutant are designated as being “in attainment” and areas where a criteria pollutant level exceeds the NAAQS are designated as being “in non-attainment.” The proposed action and alternatives would occur in Plaquemines Parish and St. Bernard Parish, LA, an area that is currently designated as in attainment for all criteria pollutants. Therefore, further requirements mandated by the CAA, general conformity rule (Section 176(c)), would not apply for the proposed Federal action or the alternatives to the proposed action.

Discussion of Impacts

Emissions from non-road construction equipment, on-road vehicles, water craft, and fugitive dust were calculated using several models and documents. Non-road construction vehicle emissions were calculated using the USEPA-developed NONROAD2005 emission factor model (USEPA 2008). Delivery trucks and workers’ commuting vehicles emissions were calculated using the USEPA-developed Mobile6.2 emission factor model (USEPA 2003b). Water craft emissions were estimated using the USEPA document *Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data* (USEPA 2000). Construction site fugitive dust estimations were made using emission factors from the Mid-Atlantic Regional Air Management Association document *Fugitive Dust Construction Area Source Category Calculation Methodology Sheet* (MARAMA 2004). A summary of the total emissions for the proposed action is presented in table 6. See appendix E for model input variables and results.

Table 6.
Total Air Emissions (Tons/Year) from Construction Activities

Pollutant Total	(tons/year)
CO	20.8
VOCs	3.0
NO ₂	73.8
PM ₁₀	4.2
PM _{2.5}	3.2
SO ₂	2.5

No Action

Direct, Indirect and Cumulative Impacts to Air Quality

Under the no action alternative, the existing floodwall and floodgates would be raised to the previously authorized elevation (an increase in height of approximately 2 ft). Temporary impacts to air quality from increased air emissions would occur from the operation of equipment and disturbance of soils during construction activities. All impacts on ambient air quality would 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.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Air Quality

During the construction of the proposed action, temporary and minor increases in air emissions along the floodwall alignment area would occur from the operation of construction equipment and disturbance of soils. These emissions would include (1) exhaust emissions from operation of various types of non-road construction equipment such as loaders, excavators, cranes, generators, etc.; (2) exhaust emissions from water craft required to complete construction in the Caernarvon Canal and to deliver construction materials and equipment to the project site; (3) exhaust emissions from commuter and delivery vehicles; and (4) fugitive dust due to earth disturbance.

Operation of construction equipment and support vehicles would generate volatile organic compounds (VOCs), PM₁₀, PM_{2.5}, NO₂, CO, O₃, and SO₂ emissions from gasoline and diesel engine combustion. Particulate emissions (PM₁₀ and PM_{2.5}) would also be generated by activities that disturb and suspend soils, such as equipment operating on disturbed soils, bulldozing, compacting, truck dumping, and grading operations. The principal air quality concern associated with the proposed activities would be emission of fugitive dust near demolition and construction areas. The on-road trucks and private autos used to access the work area would also contribute to construction phase air pollution in the project neighborhood when traveling along local roads.

Site-specific construction effects would be temporary and dust emissions would be controlled using standard BMPs. For instance, application of water to control dust and periodic street sweeping and/or wetting down of paved surfaces could aid in preventing fugitive dust from becoming airborne. Construction activities related to the proposed action would not all occur at once, but would occur in increments through the estimated construction period. Construction activities would be similar to those activities that have already occurred in the general area since Hurricane Katrina. All impacts on ambient air quality would 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 indirect impacts on air quality within the project area or the region from implementation of the proposed action.

Cumulative Impacts to Air Quality

Potential cumulative impacts on air quality within the project area from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. Air emissions from other HSDRRS-related construction activities in the

New Orleans metropolitan area would have temporary cumulative impacts on air quality in the region. The principal air quality concern associated with the proposed activities would be emission of pollutants from heavy construction equipment and emission of fugitive dust near construction areas. However, standard BMPs would be implemented in all HSDRRS construction projects, reducing these temporary cumulative impacts. The concurrent timing of many of these projects in conjunction with the relative large scale of much of the construction work would represent a cumulative impact to air quality within the region. These impacts would be temporary, however, and no further air emissions from HSDRRS projects would be expected following completion of construction for these projects. Potential air quality impacts related to all CEMVN construction activities will be addressed on a system-wide scale in the draft CED.

Alternatives 1 through 5

Direct, Indirect, and Cumulative Impacts to Air Quality

Direct, indirect, and cumulative impacts on air quality from alternatives 1 through 5 would be similar to those described for the proposed action.

3.2.11 Noise

Existing Conditions

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as 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 USEPA and has been adopted by most Federal agencies (USEPA 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. (The A-weighted sound level, used extensively in this country for the measurement of community and transportation noise, represents the approximate frequency response characteristic of the average young human ear.) Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 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 about 10 dBA lower than those during the day.

Noise levels surrounding the project area are variable depending on the time of day and climatic conditions. Land uses near the existing Caernarvon floodwall are primarily residential to the east and commercial/industrial to the west. The commercial/industrial activities generate noise during normal operations. Additionally, vehicles traveling along LA Highway 39 contribute to noise levels in the area. To the south of the project area are primarily undeveloped woodlands and wetlands with minimal noise generated by recreational users.

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Noise

Under the no action alternative, noise receptors near the Caernarvon floodwall would experience construction-related noise associated with activities required to bring the existing floodwall and gates to the previously authorized elevation. The construction corridor, which would follow the existing alignment, could extend into the adjacent residential community on the east and require the taking of up to 11 residences, with associated demolition noise. Noise receptors in the vicinity would continue to experience ambient noise from trucks and cars traveling along LA Highway 39 and normal operational noise levels from the industrial facilities along the project area.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Noise

Table 7 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 at 50 ft range from 76 dBA to 101 dBA based on data from the Federal Highway Administration (FHWA 2006).

Table 7.
A-weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances¹

Noise Source	50 ft	100 ft	200 ft	500 ft	1000 ft
Backhoe	78	72	68	58	52
Crane	81	75	69	61	55
Dump Truck	76	70	64	56	50
Excavator	81	75	69	61	55
Front end loader	79	73	67	59	53
Concrete mixer truck	79	73	67	59	53
Auger drill rig	84	78	72	64	58
Dozer	82	76	70	62	56
Pile driver	101	95	89	81	75

Source: FHWA 2006. “Highway Construction Noise Handbook.”

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

Assuming the worst case scenario of 101 dBA, as would be the case during the construction of a floodwall along the project corridor, all areas within 1,000 ft of the project corridor could experience noise levels exceeding 65 dBA. Construction noise levels could attenuate to 75 dBA at a distance of 350 ft from construction activities.

During the approximately 21-month construction period, construction activities would be expected to create temporary noise impacts above 65 dBA to sensitive receptors within 1,000 ft of the project corridor, including residences located to the east in Caernarvon and to the west in Braithwaite. Construction activities, including pile driving, would take place a minimum of 12

hours per day, and possibly up to 18 hours per day. In addition to noise created by construction equipment, there would also be impacts from noise generated by construction vehicles and personal vehicles for laborers that could use public roads and highways for access to construction sites. Following construction, noise levels would return to existing conditions.

Indirect Impacts to Noise

Potential indirect impacts from noise include those related to residents, traffic, fishermen, avoidance of the area by wildlife, and emotional and mental stress that could result from the noise levels in the area during construction. Most of these impacts, with the exception of emotional and mental stress, are discussed in other sections of this document corresponding to the resource being impacted by the construction-related noise levels. However, it is reasonable to assume that the emotional and mental stress created by noise levels would be compensated by the relief associated with the hurricane risk reduction provided by the project.

Cumulative Impacts to Noise

Potential cumulative impacts due to noise from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including those projects described in IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. Noise resulting from ongoing and planned construction activities in the LPV Chalmette Loop project area would not likely cause noise levels in the project area to surpass the maximum levels of noise described previously for the direct impacts. However, if construction activities for the proposed action were to take place concurrent with construction of the northern end of the IER 10 (LPV 148) project, noise levels in the project area could exceed those described under direct impacts.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Noise

Implementation of alternative 1a or 1b would take place in essentially the same location as the existing floodwall, while there would be a slight protected-side shift of the centerline for alternative 1b. Alternative 1a would require demolition of portions of the EBI buildings and the taking of nine houses on the west side of Deogracias Lane, one on the north side of LA Highway 39, and one residence on an unpaved road southwest of Dean Drive. Under alternative 1b, the construction corridor would cover both sides of Deogracias Lane, involving the taking of 23 residences: 18 houses on Deogracias Lane, one house on Dean Drive, the house southwest of Dean Drive, and three houses on the north side of LA Highway 39.

The amount and type of equipment and materials required for construction of alternative 1a or 1b would vary somewhat from those required for the proposed action. Although the construction period would likely be shorter, alternatives 1a and 1b would take place closer to existing residences and would require demolition of some residences and EBI buildings. Therefore, the impacts associated with noise during construction of alternatives 1a and 1b would be somewhat greater than those described for the proposed action. However, with the possible relocation of the EBI operations, long-term noise levels in the immediate area would be expected to decrease.

Indirect and Cumulative Impacts to Noise

The indirect and cumulative noise impacts from alternatives 1a and 1b would be similar to, but somewhat greater than, those described for the proposed action.

Alternatives 2 through 5

Direct, Indirect, and Cumulative Impacts to Noise

The direct, indirect, and cumulative impacts to noise levels from alternatives 2 through 5 would be similar to those described for the proposed action.

3.2.12 Transportation

Existing Conditions

The proposed project lies between the Mississippi River to the north and wetlands to the south. Development and highways in the project vicinity tend to be along narrow corridors, which are constrained by the Mississippi River, wetlands, and canals (figure 18).

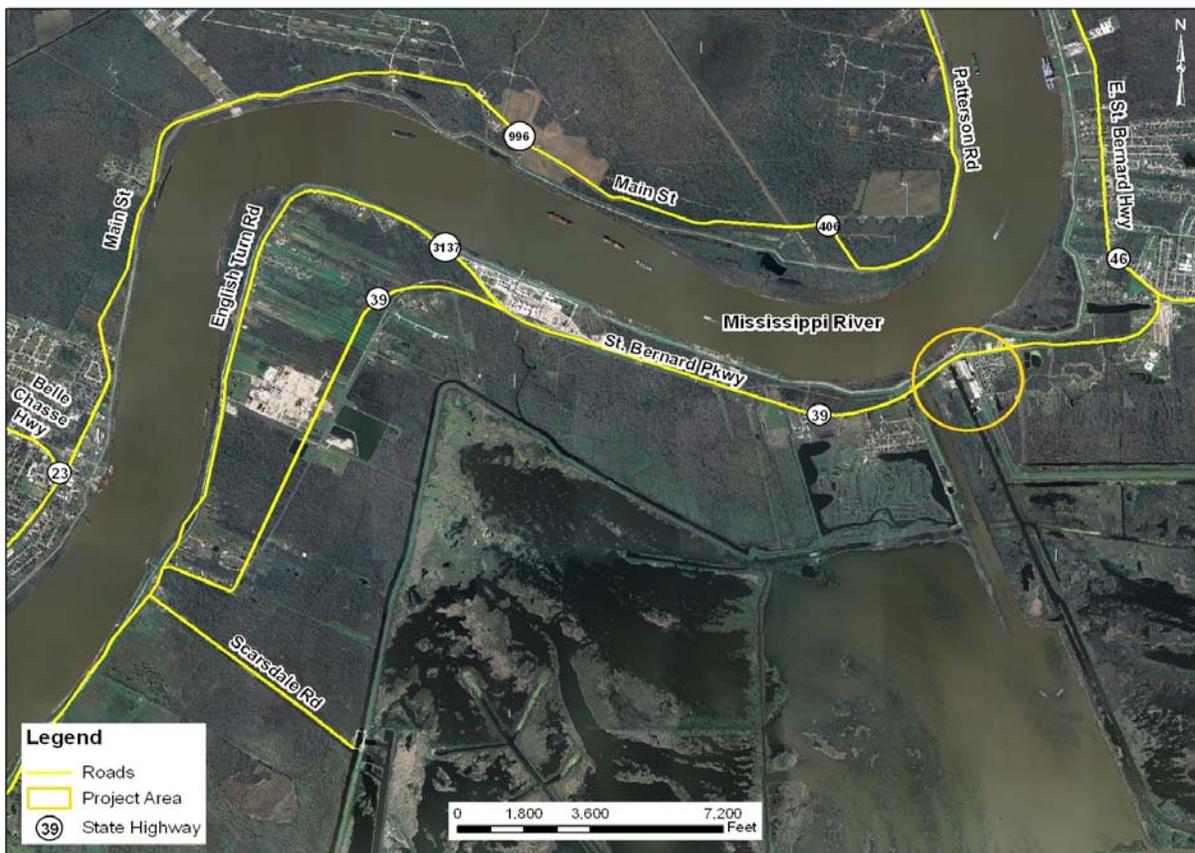


Figure 18. Major Roads and Highways near the IER # 9 Project Area

Development is dispersed and consists of a mixture of residential, commercial, and light to medium industrial land uses. The main highway corridors within the project vicinity are LA Highway 39, LA Highway 46, and LA Highway 23 (figure 18).

Population centers along these highway corridors within a 5-mile radius of the project site, including year 2000 population levels (U.S. Census Bureau [USCB] 2007a), are:

- Poydras (population: 3,886)
- Violet (population: 8,555)
- Meraux (population: 10,192)
- Belle Chasse (population: 9,848)

Although the proposed project is 10 linear miles from the City of New Orleans, the project area is relatively remote from large population centers due to the constricted highway network in the project vicinity.

The proposed project lies on LA Highway 39, the only paved road crossing the project area. LA Highway 39 consists of two lanes and has no access control. LA Highway 39 is functionally classified as a “minor arterial” in the immediate vicinity of the project site. (An arterial is a moderate- or high-capacity roadway designed to carry traffic between neighborhoods.) West of the proposed project, LA Highway 39 becomes a “major collector” (see figure 18). (A collector is a low- or moderate-capacity roadway that leads traffic from local roads or neighborhoods to arterial roads or activity centers.) LA Highway 23, a “principal arterial” connects to LA Highway 39 from the west via the Belle Chasse-Braithwaite Ferry. East of the project area, LA Highway 39 becomes a “principal arterial.” LA Highway 46, a “minor arterial,” connects to LA Highway 39 from the east (LaDOTD 2006). In the event of a hurricane evacuation, these highways would be the primary highway routes for evacuating people from St. Bernard and Plaquemines Parishes to the routes (i.e., I-10 East and I-10 West) that evacuate southeast Louisiana.

A rail line runs generally parallel to LA Highway 39 in the project vicinity. The Mississippi River borders the proposed project. Just up-river is the Port of New Orleans, which is one of the world’s busiest ports with many transportation modes intersecting: river and sea vessels, rail, and highway (Port of New Orleans 2007).

Operational conditions on a highway are described by “level-of-service” (LOS) classifications. 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, comfort, and convenience. The “Highway Capacity Manual” (Transportation Research Board 2000) defines six LOSs, designating each level with the letters A to F. LOS “A” represents the best operating condition, and LOS “F” represents the worst operating condition. LOS “C” or “D” is generally considered acceptable. 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; and (2) they have poorer operating capabilities than passenger cars, particularly in respect to acceleration, deceleration, and the ability to maintain speed on grades. 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, which are difficult to fill by passing maneuvers. The resulting inefficiencies in the use of roadway space cannot be completely overcome.

The most recent traffic volume available from the Louisiana Department of Transportation and Development for LA Highway 39 is from 2008. The annual average daily traffic (AADT) was 2,027 vehicles per day (vpd), while the AADT was 1,874 vpd in 2006 and 2,369 vpd in 2003 (LaDOTD 2009b). The reduced traffic in 2006 may be due to population shift that resulted in the aftermath of Hurricane Katrina in 2005.

Based on field observations (Schrohenloher 2007), the highways in the project area are not congested during off-peak times. However, the area does have a relatively large amount of truck traffic due to nearby shipping, manufacturing, and agricultural industries. Additionally, an increased level of truck traffic exists due to the on-going rebuilding efforts resulting from the nearby destruction caused by Hurricane Katrina.

From 2003 to 2007, St. Bernard Parish reported 4 fatalities from highway crashes involving large trucks and Plaquemines Parish reported 3 fatalities. For both parishes in 2007, there were no fatalities involving large trucks (National Highway Traffic Safety Administration [NHTSA] 2009).

Discussion of Impacts

No Action

Direct, Indirect, and Cumulative Impacts to Transportation

Under the no action alternative, the existing floodwall and gates would be raised to the previously authorized elevation. Local roads and waterways would experience a minor increase in traffic associated with construction activities. Therefore, under the no action alternative, there would be temporary impacts to transportation within the project area.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Transportation

It is assumed that construction materials could be brought to the project site by both truck and barge or rail. The project is next to the Mississippi River. There is a docking facility at the project site. In addition, there is a rail line and LA Highway 39 that runs next to the project site. A staging area on the Caernarvon Canal adjacent to the project site would provide additional access for waterborne shipments. Because of the remoteness of the project site and required bridge crossings for trucks, it is assumed that manufactured materials (e.g., steel products, riprap, floodgates, concrete materials) could be brought to the project site by either barge or rail. It is assumed that fill material could be trucked in from sites within the project's vicinity. Trucks would get to the project site via LA Highway 39.

Transferring materials from river barge or railcar to the project site would require crossing LA Highway 39; therefore, impacting traffic on the highway. The two proposed staging areas are located on either side of the roadway and vehicles merging from those staging areas onto the road would affect traffic flow and possibly safety. There are no practical alternate routes to LA Highway 39. Without adequate maintenance of traffic, moving materials across LA Highway 39 could substantially impact traffic, including emergency vehicles (i.e., police, fire, rescue, medical transport) response times. Without detailed construction staging transportation routing plans, a more detailed impact evaluation of the LA Highway 39 traffic impacts cannot be completed, but will be addressed in more detail in the CED.

A temporary bypass road for LA Highway 39 and a temporary railroad shoofly for the Norfolk Southern rail line would be built to allow continued operation of these transportation routes during construction of the floodgates across the highway and the rail line. Traffic on the highway and rail line would be affected (slowed down) but would not be interrupted during construction of the proposed action.

Installation of a cofferdam across the Caernarvon Canal, which would be in place for 12 months to 18 months during construction of the flood control structure, would eliminate waterborne

access to the lower reach of the canal for the properties located along the canal north of the proposed flood control structure location. It would also temporarily eliminate access to the public to Dean's Free Boat Launch. However, a staging area for the construction contractor would be established on the Caernarvon Canal south of the proposed flood control structure location (see figure 2). It would include a boat launch, docking facility, and off-load points for use during construction. A separate access road would be provided for the industrial facilities located on the west bank of the canal (SDEB and the Delacroix Corporation Caernarvon Boat Launch) to reach the staging area on the west bank. This would provide access to the canal during the time the cofferdam would be in place.

Most of the truck traffic associated with the proposed action would use LA Highway 39. Impacts to highway capacity can be predicted using the methodology from the "Highway Capacity Manual" for multi-lane highways (Transportation Research Board 2000). Two models were built for this project—Base and Additional Trucks—to evaluate the highway capacity impacts that additional trucks would have to LA Highway 39 and other area highways. The "Base" model looked at future conditions with no construction activity, which serves as a comparison. The "Additional Trucks" model looked at the future conditions where the calculated number of trucks supporting project construction were operating in addition to the "Base" traffic stream during the peak hour.

LA Highway 39 had an AADT of 1,874 vpd in 2006 and 2,027 in 2008. It was assumed that there would be 2,000 vpd in the "Base" condition, 10 percent of which would be operating in the peak hour, 5 percent of the base vehicles would be trucks, and base free-flow speed would be 50 miles per hour. For the "Additional Trucks" condition six trucks per hour in one direction were added to the "Base condition." Because the sources of fill material are not known at this time, it was assumed that all trucks would be coming from one direction; therefore, creating a worst-case scenario. For the "Base" and "Additional Trucks" conditions, LA Highway 39 would operate at LOS "A" with an average vehicle speed of 45 miles per hour. The additional truck traffic would be expected to have a minimal impact on the LOS of LA Highway 39; that is, the LOS would not change. These results can be applied to other area two-lane arterials and major collectors, because of similar roadway conditions.

Access roads (e.g., terminal access, staging areas) used by the trucks may have substantial changes in their LOS. Without a detailed transportation routing plan, a more detailed impact evaluation to the LOS of minor highways and roads cannot be completed, but will be addressed in more detail in the CED.

Upon completion of the project, operation of the proposed action would have a temporary, direct impact on traffic on LA Highway 39. Closure of the floodgate across the highway would temporarily eliminate movement of vehicles on the highway. However, the emergency access route that would be established to bypass the floodgate across LA Highway 39 would provide a means of access for authorized vehicles before, during, and after storm events when the roadway gate is closed. Timing of the closing of the gate would depend on the specifics of the storm event. Closure of the gate would be the responsibility of the non-Federal sponsor as outlined in the emergency operations plan.

Indirect Impacts to Transportation

Heavy trucks are the primary loading source of pavement degradation. The additional truck traffic resulting from the proposed action could contribute to additional wear-and-tear of pavement on roads within the project vicinity.

Cumulative Impacts to Transportation

Potential cumulative impacts on transportation from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (including IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. Ongoing construction related to other HSDRRS projects in the project vicinity could contribute to an increase in truck traffic and could, therefore, increase the wear-and-tear on roads and add to area congestion. In addition, boat and barge traffic in local waterways could increase. The cumulative impacts, except for road wear-and-tear, would be temporary, occurring during the construction period.

Alternatives 1 through 5

Direct, Indirect, and Cumulative Impacts to Transportation

Direct, indirect, and cumulative impacts to transportation from the alternative actions would be similar to those described for the proposed action.

3.3 SOCIOECONOMIC RESOURCES

Existing Conditions

The project area is located near the community of Caernarvon in southwest St. Bernard Parish, on the East Bank of the Mississippi River adjacent to Plaquemines Parish. The area protected by the Caernarvon floodwall portion of the LPV HSDRRS encompasses the residential area of Caernarvon.

The primary urbanized areas of St. Bernard Parish are located along the East Bank of the Mississippi River within the current levee system. Developed communities in the upper portion of the parish include (from north to south) Arabi, Chalmette, Meraux, Violet, and Poydras, which is just north of Caernarvon (figure 19). The East Bank urbanized area extends southward into Plaquemines Parish, with the community of Braithwaite located southwest of Caernarvon and the project area.



Figure 19. Location Map, Including Major Communities, Industrial Facilities, and Highways

Lower St. Bernard Parish is rural in nature, with communities centered along the bayous and marshes. LA Highway 46 (St. Bernard Highway) and LA Highway 39 (Judge Perez Drive) are the main arteries through St. Bernard, running roughly parallel with the Mississippi River from the parish boundary with the City of New Orleans on the north and continuing to the lower portion of the parish. LA Highway 47 (Paris Road) runs across St. Bernard Parish from the Mississippi River ferry landing north into eastern New Orleans. The majority of retail and commercial development in St. Bernard Parish has historically occurred along LA Highway 39, LA Highway 46, and LA Highway 47. Industrial development is predominately located between the Mississippi River and LA Highway 46. Major refining operations such as the American Sugar Refinery in Arabi and the Exxon Mobil Chalmette Refinery are located in the St. Bernard Port area and the Murphy Oil USA Refinery is located farther downstream in Meraux (St. Bernard Parish Net 2007).

The community of Caernarvon is a small cluster of primarily residential structures that straddles LA Highway 39. The Mississippi River lies to the north. St. Bernard State Park is located east of Caernarvon. Immediately to the west of the community, between the Caernarvon floodwall and the Caernarvon Canal, is the EBI boat manufacturing facility. The EBI property includes an unused residence and also a small sea plane hangar and servicing facility. On the west bank of the Caernarvon Canal in Plaquemines Parish are the SDEB manufacturing business and, to the south, the Delacroix Corporation's Caernarvon Boat Launch. Farther west is the CFDC. To the south in both parishes are undeveloped woodlands and wetland areas.

St. Bernard Parish encompassed 465 square miles of land plus 1329 square miles of water in the year 2000 (USCB 2007b). With a population of 67,229 reported in the 2000 Census, the parish had a population density of 145 persons per square mile (compared to 103 persons per square mile for the state of Louisiana). A total of 65,929 residents in St. Bernard Parish (based on the 2000 Census) were within the Lake Pontchartrain and Vicinity Hurricane Protection Project, as authorized (USACE 2006b). The estimated population had declined slightly to 65,364 in July 2005 (prior to Hurricane Katrina). Following Katrina, the population experienced a drastic decline to an estimated 15,514 in July 2006, which represents a 77 percent decrease from 2000 (USCB 2006 and 2007b). Also, approximately 19 square miles of coastal wetlands were lost due to Hurricanes Katrina and Rita, reducing the land area of the parish (Louisiana Speaks 2007).

According to the 2000 Census, 88.3 percent of the population of St. Bernard Parish was white, 7.6 percent was African American, and the remaining 4.1 percent was primarily Asian and persons identified as two or more races. The median household income was \$35,939 and approximately 13.1 percent of individuals residing in St. Bernard Parish were identified as living below the Federal poverty level (USCB 2007c). In 2004, median household income had risen to \$36,566 while persons below the poverty level increased to 15.1 percent, compared to \$35,216 and 19.2 percent for Louisiana (USCB 2007d).

St. Bernard Parish is included in the New Orleans-Metairie-Kenner, Louisiana, Metropolitan Statistical Area. Between 2000 and 2004, employment in St. Bernard Parish grew from 16,029 to 17,386, representing an increase of 8 percent. In 2004, health care/social assistance and retail trade represented the largest sectors of employment followed by educational services, manufacturing, accommodation/food services, and construction. In 2005, employment declined by 19.6 percent to 13,985. The distribution of employment across sectors remained the same except for educational services, which declined to the point that data were not published to avoid disclosing data for individual employers (Louisiana Department of Labor [LaDOL] 2002; 2005; 2006). In 2006, the annual average unemployment rate in St. Bernard Parish was 3.1 percent, which is lower than the annual average unemployment rate of 4.0 percent for Louisiana (LaDOL 2007).

Discussion of Impacts

No Action

Direct Impacts to Socioeconomic Resources

Under the no action alternative, the existing levee/floodwall reach and associated gates would be raised to the previously authorized elevation. The construction corridor, which would follow the existing alignment, could extend into the adjacent residential community on the east and require the taking of up to 11 residences. Also, vibration from pile driving near EBI for construction of the new floodwall could interfere with operations at the facility during the 21-month construction period, requiring periodic shut down of several computer-controlled milling machines used for fabrication of crane components. The level of risk reduction under the no action alternative would be less than the level provided by the proposed action. Under the no action alternative, this portion of the LPV Chalmette Loop project would not be brought to the 100-year level of risk reduction. This could have adverse impacts on the social and economic situation in the parish and the potential for residents and businesses to return and rebuild.

There would be short-term beneficial economic impacts from construction activities associated with the no action alternative, including purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional, depending on where the goods, services, and workers are obtained. The impact on the economy would be minor.

Indirect Impacts to Socioeconomic Resources

Under the no action alternative, the reduction in flood risk would encourage recovery and economic prosperity in the parish; however, it would be provided at a lower level than under the proposed action. Under the no action alternative, the project area would be provided the previously authorized level of risk reduction. St. Bernard Parish could be expected to have fewer flooding incidences than under current conditions but would still be susceptible to flooding from a 1 percent exceedance surge event.

Cumulative Impacts to Socioeconomic Resources

The no action alternative could contribute to adverse cumulative impacts on socioeconomic resources in the New Orleans metropolitan area. Without improvement of the Caernarvon floodwall, there would be a gap in the New Orleans HSDRRS for 100-year level of risk reduction. Parts of St. Bernard Parish would remain vulnerable to flooding from a 100-year event and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

Direct Impacts to Socioeconomic Resources

Existing land uses would not be directly impacted by construction activities because the proposed floodwall would be constructed on vacant land. However, potential future development of the land within the floodwall footprint would be precluded.

There would be short-term beneficial economic impacts from construction activities associated with the proposed action, including purchase of materials, equipment, and services and a temporary increase in employment and income. This increase would be local or regional,

depending on where the goods, services, and workers are obtained. The impact on the economy would be minor.

Installation of a cofferdam across the Caernarvon Canal, which would be in place for 12 months to 18 months during construction of the flood control structure, would eliminate waterborne access to the lower reach of the canal for the properties located along the canal north of the proposed flood control structure. This would temporarily adversely impact the two manufacturing businesses on that part of the canal, EBI and SDEB, whose operations depend in part on water access and the Delacroix Corporation's Caernarvon Boat Launch. It would also temporarily eliminate access to the public Dean's Free Boat Launch. However, a staging area for the construction contractor would be established on the Caernarvon Canal south of the proposed flood control structure location (see figure 2). It would include a boat launch, docking facility, and off-load points for use during construction. A separate access road would be provided within the temporary easement for SDEB and Delacroix Corporation to reach the staging area on the west bank of the canal; public use of this road would be prohibited. This would provide access to the canal during the time the cofferdam would be in place.

Upon completion of the proposed action, water access for the businesses and the free boat launch would no longer be restricted, except during closure of the proposed flood control structure in connection with a storm event. The CEMVN has met with the businesses that use the Caernarvon Canal and those businesses indicated that a 50-ft opening is sufficient for the vessels that currently use the canal. Therefore, the proposed 56 ft-wide flood control structure would be adequate to accommodate the businesses along the canal. Timing of the closing of the gate would depend on the specifics of the storm event. Closure of the gate would be the responsibility of the non-Federal sponsor as outlined in the emergency operations plan.

Indirect Impacts to Socioeconomic Resources

Following completion of the proposed action, land use patterns in St. Bernard Parish are not expected to change since raising the Caernarvon floodwall reach to the 100-year level of flood risk reduction would not encourage one type of land use over another. However, the potential exists for an increase in the rate of urban development, given the increased risk reduction from flooding provided by the raised floodwall and floodgates. Businesses such as EBI and SDEB, which are currently located outside the HSDRRS and would be within the protected area under the proposed action, would have increased incentive for investment in their businesses with a corresponding potential increase in employment. Although the proposed action would reduce, but not eliminate the risk of flooding, it could have beneficial impacts on population and long-term employment and income levels in St. Bernard Parish if the raised floodwall segment stimulated growth in urban development in the protected area. Increased property values in the protected area would encourage economic growth and be beneficial to nearby communities.

Property values in nearby portions of Plaquemines Parish that are outside of the protected area, such as the community of Braithwaite located across the CFDC and approximately 700 ft southwest from the project area, would not be expected to be significantly adversely impacted as a result of the proposed action. The proposed LPV 149 floodwall alignment would be expected to only minimally increase the water level in nearby areas, including those areas within the neighboring non-Federal Plaquemines Parish levee (see Section 3.2.1). However, property values in those areas would not be adversely affected in relation to actual changes in flood risk because flooding could occur in this area regardless of the increased height of the HSDRRS. National flood insurance would continue to be available in Plaquemines Parish regardless of whether the proposed action is implemented, as long as the parish enforces flood plain management ordinances established by the program.

Cumulative Impacts to Socioeconomic Resources

The proposed action would have beneficial cumulative impacts on socioeconomic resources in the New Orleans metropolitan area. Potential cumulative impacts on socioeconomic resources from the proposed action would involve the combined effects from the multiple reaches within the LPV Chalmette Loop project area (IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. The proposed action would provide 100-year level of flood risk reduction for the area within the LPV Chalmette Loop portion of the HSDRRS. This would have a beneficial impact on social and economic resources in St. Bernard Parish and a small portion of Plaquemines Parish.

The proposed 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 flood events and, thereby, encourage recovery.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

Direct Impacts to Socioeconomic Resources

Implementation of alternative 1a would take place in essentially the same location as the existing floodwall, whereas there would be a slight protected-side shift of the centerline under alternative 1b. Under alternative 1a, the construction corridor would extend into the EBI facility on the west and into the adjacent residential community on the east. It would require demolition of sections of the EBI buildings, as well as the taking of 11 residences: nine houses on the west side of Deogracias Lane, one on the north side of LA Highway 39, and one residence on an unpaved road southwest of Dean Drive. Under alternative 1b, the construction corridor would cover both sides of Deogracias Lane, involving the taking of 23 residences: 18 houses on Deogracias Lane, one house on Dean Drive, the house southwest of Dean Drive, and three houses on the north side of LA Highway 39.

Under alternative 1a, the EBI manufacturing facility located west of the proposed new floodwall would need to be demolished and relocated. Employees of the business could be temporarily or permanently terminated or displaced as a result of alternative 1a. This could have an adverse impact on the economy of St. Bernard Parish. Under alternative 1b, vibration from pile driving adjacent to EBI for construction of the new floodwall could interfere with operations at the facility during the 21-month construction period, requiring periodic shut down of several computer-controlled milling machines used for fabrication of crane components.

The loss of 11 residences under alternative 1a or 23 residences under alternative 1b could have a substantial impact on housing in the Caernarvon community, but a minor impact on the housing stock of St. Bernard Parish. The loss of 11 homes in a small, tight-knit community such as Caernarvon could adversely affect community cohesion. Community cohesion is the force that unifies a group due to shared characteristics, such as race, income, ethnicity, religion, and language. It keeps group members together long enough to establish meaningful interactions, common institutions, etc. Many of the residents who live near the alternative 1 alignment are related and their families have lived in the community for generations. Implementation of either alternative 1a or 1b would require relocation of up to 65 persons (based on 23 residences and an average household size of 2.8 persons [Environmental Systems Research Institute, Inc. (ESRI) 2008]), possibly to locations outside of the community.

As described in the discussion of non-structural alternatives in section 2.5 of this document, public acquisition of properties as part of a Federal project may include, in addition to compensation for real property, payment to displaced persons for personal or business-related moving expenses, costs of property lost as a result of moving or discontinuing a business, expenses in searching for a replacement business, and expenses for reestablishment of a displaced business at its new location.

Although the amount and type of equipment and materials required for construction of alternative 1a or 1b could vary somewhat from those required for the proposed action, the short-term beneficial economic impacts associated with alternatives 1a and 1b would be essentially the same as those described for the proposed action.

Indirect Impacts to Socioeconomic Resources

Loss of the EBI operation under alternative 1a could result in a decrease in sales for those firms that provide materials or services to that business. The other indirect impacts on land use and socioeconomic resources from alternatives 1a and 1b would be the same as those described for the proposed action.

Cumulative Impacts to Socioeconomic Resources

The cumulative impacts on land use and socioeconomic resources from alternatives 1a and 1b would be similar to those described for the proposed action. Alternatives 1a and 1b would have beneficial cumulative impacts on socioeconomic resources in the New Orleans metropolitan area, involving the combined effects from the multiple reaches within the LPV Chalmette Loop project area (IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. The combined effects from construction of the multiple projects underway and plans 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 flood events and, thereby, encourage recovery.

Alternatives 1a and 1b would provide 100-year level of flood risk reduction for the area within the Chalmette Loop HSDRRS. This would have a beneficial impact on social and economic resources in St. Bernard Parish.

Alternative 2 – Realignment of Caernarvon Floodwall to Immediate Western Side of EBI Property

Direct Impacts to Socioeconomic Resources

Implementation of alternative 2 would take place outside of the existing floodwall corridor. It would require the construction of a new levee with a T-wall cap on the western side of the EBI property, running along the Caernarvon Canal. Land uses would be directly impacted by construction activities because the construction corridor includes the western sections of the EBI buildings and the unused residence located to the south (on the canal), which would need to be demolished. This could have a minor adverse impact on the economy of St. Bernard Parish. Also, vibration from pile driving adjacent to EBI for construction of the new floodwall could interfere with operations at the facility during the 21-month construction period, requiring periodic shut down of several computer-controlled milling machines used for fabrication of crane components. As described previously for alternative 1, costs would be incurred by the Federal government for acquiring the real estate as well as for reimbursing property and business owners for certain relocation expenses.

Although the amount and type of equipment and materials required for construction of alternative 2 would vary somewhat from those required for the proposed action, the short-term beneficial economic impacts associated with alternative 2 would be essentially the same as those described for the proposed action.

Indirect Impacts to Socioeconomic Resources

Loss of the EBI operation would result in a decrease in sales for those firms that provide materials or services to that business. The other indirect impacts on land use and socioeconomic resources from alternative 2 would be the same as those impacts described for the proposed action.

Cumulative Impacts to Socioeconomic Resources

The cumulative impacts on land use and socioeconomic resources from alternative 2 would be similar to those described for the proposed action. Alternative 2 would have beneficial cumulative impacts on socioeconomic resources in the New Orleans metropolitan area, involving the combined effects from the multiple reaches within the LPV Chalmette Loop project area (IERs # 8, # 10, and # 11) as well as other HSDRRS projects throughout the New Orleans area. The combined effects from construction of the multiple projects underway and plans 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 flood events and, thereby, encourage recovery.

Alternative 2 would provide 100-year level of flood risk reduction for the area within the Chalmette Loop HSDRRS. This would have a beneficial impact on social and economic resources in St. Bernard Parish.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

Direct Impacts to Socioeconomic Resources

Implementation of alternative 3 would take place outside of the existing floodwall corridor. It would require construction of a new levee, levee with a T-wall cap, or floodwall (T-wall) on the western side of the Caernarvon Canal. This alignment would be longer than the proposed action (it extends farther south) and the construction corridor for alternative 3 could be wider if a full levee or a levee with a T-wall cap were selected. The upland construction corridor for the floodwall in alternative 3 would be approximately 3 acres larger than for the proposed action, and the corridor for the levee options would be approximately 12 acres larger. The SDEB property, located at the northern end of the alternative 3 corridor, and the Caernarvon Boat Launch south of the SDEB facility would need to be demolished and relocated. As a result of alternative 3, employees of the SDEB could be temporarily or permanently terminated or displaced and the Caernarvon Boat Launch would no longer be available for use by the owner or by boaters with permission to use it. This could have a minor adverse impact on the economy of St. Bernard Parish. As described above for alternative 1, costs could be incurred by the Federal government for acquiring the real estate as well as for reimbursing property and business owners for certain relocation expenses.

Installation of a cofferdam across the Caernarvon Canal, which would be in place for 12 months to 18 months during construction of the flood control structure, would eliminate waterborne access to the northern part of the canal. This would adversely impact the EBI facility on that part of the canal, whose operations depend in part on water access. It would also temporarily eliminate access to the public Dean's Free Boat Launch. As described previously for the proposed action, water access for EBI and the public boat launch would no longer be restricted

upon completion of alternative 3, except during closure of the proposed flood control structure in connection with a storm event. The CEMVN has met with the businesses that use the Caernarvon Canal and those businesses indicated that a 50-ft opening is sufficient for the vessels that currently use the canal. Therefore, the proposed 56 ft-wide flood control structure would be adequate. Timing of the closing of the gate would depend on the specifics of the storm event and would be the responsibility of the non-Federal sponsor as outlined in the emergency operations plan.

Although the amount and type of equipment and materials required for construction of alternative 3 would vary somewhat from those required for the proposed action, the short-term beneficial economic impacts associated with alternative 3 would be essentially the same as those described for the proposed action.

Indirect Impacts to Socioeconomic Resources

Loss of the SDEB operation would result in a minor decrease in sales for those firms that provide materials or services to the business. The other indirect impacts on land use and socioeconomic resources from alternative 3 would be the same as those impacts described for the proposed action.

Cumulative Impacts to Socioeconomic Resources

The cumulative impacts on land use and socioeconomic resources from alternative 3 would be similar to those described for the proposed action.

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

Direct Impacts to Socioeconomic Resources

Implementation of alternative 4 would take place in the same general location as the proposed action, to the west of the SDEB property and Caernarvon Boat Launch. However, this alignment would be longer (it extends farther south than the proposed action) and the construction corridor for alternative 4 could be wider if a full levee or a levee with a T-wall cap were selected. The upland construction corridor for the floodwall in alternative 4 would be approximately 5 acres larger than for the proposed action, and the corridor for the levee options would be approximately 14 acres larger. As for the proposed action, alternative 4 would not directly impact land use because it would be constructed on vacant land. However, potential future development of the land within the floodwall or levee footprint would be precluded.

Installation of a cofferdam across the Caernarvon Canal, which would be in place for 12 months to 18 months during construction of the flood control structure, would eliminate waterborne access to the lower reach of the canal for the properties located along the canal north of the proposed flood control structure location. This would adversely impact the two manufacturing businesses on that part of the canal, EBI and SDEB, whose operations depend in part on water access and the Delacroix Corporation's Caernarvon Boat Launch. It would also temporarily eliminate access to the public Dean's Free Boat Launch. However, a staging area for the construction contractor would be established on the Caernarvon Canal south of the proposed flood control structure location. As described previously for the proposed action, it would provide access to the canal for SDEB and Delacroix Corporation during the time the cofferdam would be in place.

Upon completion of alternative 4, water access for the businesses and boat launches along the upper part of the Caernarvon Canal would no longer be restricted, except during closure of the

proposed flood control structure in connection with a storm event. The CEMVN has met with the businesses that use the Caernarvon Canal and those businesses indicated that a 50-ft opening is sufficient for the vessels that currently use the canal. Therefore, the proposed 56 ft-wide flood control structure would be adequate. Timing of the closing of the gate would depend on the specifics of the storm event. Closure of the gate would be the responsibility of the non-Federal sponsor as outlined in the emergency operations plan.

Although the amount and type of equipment and materials required for construction of alternative 4 would vary somewhat from those required for the proposed action, the short-term beneficial economic impacts associated with alternative 4 would be essentially the same as those described for the proposed action.

Indirect Impacts to Socioeconomic Resources

The indirect impacts on land use and socioeconomic resources from alternative 4 would be the same as those described for the proposed action.

Cumulative Impacts to Socioeconomic Resources

The cumulative impacts on land use and socioeconomic resources from alternative 4 would be the same as those described for the proposed action.

Alternative 5 – Realignment of Caernarvon Floodwall to Eastern Side of CFDC

Direct Impacts to Socioeconomic Resources

Implementation of alternative 5 would take place in the same general vicinity as the proposed action; that is, west of the SDEB property and Caernarvon Boat Launch. However, the construction corridor for alternative 5 is farther to the west, running along the eastern side of the CFDC before cutting directly to the Caernarvon Canal to the east, and it would be longer than the proposed action. It could potentially have a wider footprint than the proposed action if a full levee or a levee with a T-wall cap versus a floodwall (T-wall) were built. The upland construction corridor for the floodwall in alternative 5 would be approximately 5 acres larger than for the proposed action, and the corridor for the levee options would be approximately 14 acres larger. Land uses would not be directly impacted by construction activities because the levee or floodwall would be constructed on vacant land. However, the land within the floodwall or levee footprint would no longer be available for potential future development.

Installation of a cofferdam across the Caernarvon Canal, which would be in place for 12 months to 18 months during construction of the flood control structure, would eliminate waterborne access to the lower reach of the canal for the properties located along the canal north of the proposed flood control structure location. This would adversely impact the two manufacturing businesses on that part of the canal, EBI and SDEB, whose operations depend in part on water access and the Delacroix Corporation's Caernarvon Boat Launch. It would also temporarily eliminate access to the public Dean's Free Boat Launch. However, a staging area for the construction contractor would be established on the Caernarvon Canal south of the proposed flood control structure location. As described previously for the proposed action, it would provide access to the canal for SDEB and Delacroix Corporation during the time the cofferdam would be in place.

Upon completion of alternative 5, water access for the businesses and boat launches along the upper part of the Caernarvon Canal would no longer be restricted, except during closure of the proposed flood control structure in connection with a storm event. The CEMVN has met with the businesses that use the Caernarvon Canal and those businesses indicated that a 50-ft opening

is sufficient for the vessels that currently use the canal. Therefore, the proposed 56 ft-wide flood control structure would be adequate. Timing of the closing of the gate would depend on the specifics of the storm event. Closure of the gate would be the responsibility of the non-Federal sponsor as outlined in the emergency operations plan.

Although the amount and type of equipment and materials required for construction of alternative 5 would vary somewhat from those required for the proposed action, the short-term beneficial economic impacts associated with alternative 5 would be essentially the same as those described for the proposed action.

Indirect Impacts to Socioeconomic Resources

The indirect impacts on land use and socioeconomic resources from alternative 5 would be essentially the same as those described for the proposed action.

Cumulative Impacts to Socioeconomic Resources

The cumulative impacts on land use and socioeconomic resources from alternative 5 would be the same as those described for the proposed action.

3.4 ENVIRONMENTAL JUSTICE

Environmental Justice (EJ) is institutionally significant because of Executive Order 12898 of 1994 and the Department of Defense's Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. The USEPA defines EJ as "the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions."

The methodology to accomplish this analysis includes identifying low-income and minority populations within the study area using up to date economic statistics, aerial photographs, 2000 Census data (USCB 2000), ESRI estimates (ESRI 2008), as well as conducting community outreach activities such as small neighborhood focus meetings. The smallest political unit(s) containing an EJ project area is/are considered the reference community of comparison, whose population is therefore considered the reference population for comparison purposes. A potential disproportionate impact may occur when the percent minority and/or percent low-income population in an EJ study area are greater than those in the reference community. References cited in this EJ section explain this rationale in more detail.

The sources for the data used in the analysis include aerial imagery and the 2000 U.S. Census and estimates from ESRI. Despite the 2000 U.S. Census being 9 years old, it serves as a logical baseline of information for the following reasons:

- Census 2000 data is the most accurate source of data available due to the sample size of the Census decennial surveys; with one of every six households surveyed, the margin of error is negligible;
- The Census reports data at a much smaller geographic level than other survey sources, providing a more defined and versatile option for data reporting; and

- Census information sheds light upon the demographic and economic framework of the area, pre-Hurricane Katrina. By accounting for the absent population, the analysis does not exclude potentially low-income and minority families that wish to return home.

Due to the considerable impact of Hurricane Katrina upon the New Orleans metropolitan area and the likely shift in demographics and income, the 2000 Census data are supplemented with more current data, including 2008 estimates and 2013 projections provided by ESRI. For this analysis, an area within a 1-mile radius of the IER # 9 proposed action footprint was surveyed and evaluated as the IER # 9 EJ study area.

Existing Conditions

Demographic characteristics of populations within the IER # 9 EJ study area and the reference locations of St. Bernard Parish and the State of Louisiana are presented in table 8.

**Table 8.
Demographic Characteristics of the IER # 9 EJ Study Area and Reference Locations**

Population	IER # 9 EJ Project Area		St. Bernard Parish		Louisiana	
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)
Minority Population, 2000	2,607	25.8	10,804	16.0	1,689,422	37.8
Estimated Minority Population, 2008	3,290	36.6	7,828	28.6	1,831,734	39.6
Low-Income Population, 2000	1,549	16.5	8,687	13.1	851,113	19.6
*Estimated Low-Income Population, 2008	588	19.7	2,306	23.5	345,777	20.5

* Note: 2008 does not use the equivalent definition for "low-income" due to the limited information available in 2008 at the Block Group level. In 2000, the definition is equivalent to all populations living below the poverty line, whereas in 2008, the definition uses all households earning less than \$15,000 per year.

According to USCB data from 2000, approximately 26 percent of the population of the IER # 9 EJ study area was minority, indicating that at that time, the area was a non-minority community. The IER # 9 EJ study area had a greater percentage of persons living in poverty compared to St. Bernard Parish as a whole, but fewer than the State of Louisiana; therefore, it is unlikely that the IER # 9 EJ study area was a low-income community in 2000.

According to ESRI estimates, low-income and minority populations increased from 2000 to 2008 within the IER # 9 EJ study area. Based on current estimates, 36.6 percent of the population is minority, and 19.7 percent of the population is low income. Similar to 2000, these values are comparable to parish and state data; therefore, the IER # 9 EJ study area likely remains a non-minority, non-low income area. Detailed demographic and income data are presented in table 9.

**Table 9.
Detailed Demographic and Income Data**

IER # 9 EJ Project Area	2000	2008	2013
Population	10,099	8,629	9,643
Households	3,408	2,983	3,367
Families	2,662	2,353	2,629
Average Household Size	2.84	2.82	2.80
Owner Occupied Housing Units	2,889	2,573	2,878
Renter Occupied Housing Units	519	410	489
Median Age	36.4	38.7	40.2
Median Household Income	\$35,683	\$45,214	\$47,258
Households with Income < \$15,000	723	588	628
<i>Race and Ethnicity</i>			
White Alone	7,976	5,708	2,514
Black Alone	1,776	30	209
American Indian Alone	50	3	65
Asian Alone	124	100	369
Pacific Islander Alone	2	6,230	2,989
Some Other Race Alone	59	33	212
Two or More Races	112	3	69
Hispanic Origin (Any Race)	563	107	423
St. Bernard Parish	2000	2008	2013
Population	67,229	25,956	37,786
Households	25,123	9,838	14,459
Families	18,301	7,097	10,341
Average Household Size	2.64	2.62	2.60
Owner Occupied Housing Units	18,753	7,402	10,703
Renter Occupied Housing Units	6,370	2,436	3,756
Median Age	36.6	38.7	39.7
Median Household Income	\$35,883	\$33,494	\$36,665
Households with Income < \$15,000	4,851	2,306	3,043
<i>Race and Ethnicity</i>			
White Alone	59,356	19,535	5,265
Black Alone	5,122	104	407
American Indian Alone	329	13	214
Asian Alone	889	418	1,407
Pacific Islander Alone	14	28,438	7,665
Some Other Race Alone	494	153	592
Two or More Races	1,025	18	312
Hispanic Origin (Any Race)	3,425	608	2,049

**Table 9.
Detailed Demographic and Income Data**

State of Louisiana	2000	2008	2013
Population	4,468,976	4,500,627	4,717,658
Households	1,656,053	1,683,990	1,776,640
Families	1,156,438	1,173,672	1,228,557
Average Household Size	2.62	2.60	2.58
Owner Occupied Housing Units	1,125,135	1,174,441	1,227,519
Renter Occupied Housing Units	530,918	509,549	549,121
Median Age	34.0	35.6	36.6
Median Household Income	\$32,809	\$38,063	\$41,758
Households with Income < \$15,000	400,016	345,777	328,952
<i>Race and Ethnicity</i>			
White Alone	2,856,161	2,791,775	2,886,476
Black Alone	1,451,944	1,512,095	1,610,621
American Indian Alone	25,477	29,914	33,139
Asian Alone	54,758	70,991	80,555
Pacific Islander Alone	1,240	1,530	1,728
Some Other Race Alone	31,131	36,450	40,357
Two or More Races	48,265	57,872	64,782
Hispanic Origin (Any Race)	107,738	122,882	134,490

Source: ESRI Business Analyst Online 2008.

Discussion of Impacts

No Action

Under the no action alternative the proposed construction would not occur, although construction to bring the HSDRRS system up to the previously authorized level of risk reduction would occur. This level of risk reduction would not protect against 100-year flood or storm surge events, thus continuing the current potential risk of negative impacts affecting property, public safety, and local economic stability in the IER # 9 EJ study area.

Construction to meet the previously authorized level of risk reduction is designed to minimize major impacts, e.g. installing floodwalls in lieu of levees in locations where space is limited. Structural improvements would incorporate new construction standards set forth after Hurricane Katrina, and would potentially impact communities should the project footprint change to meet the new standards. The construction corridor, which would follow the existing alignment, could extend into the adjacent residential community on the east and require the taking of up to 11 residences. No community would be excluded from the HSDRRS that was not already within the previously authorized project area.

Temporary adverse effects from construction activities would impact residential communities within 1 mile of the project area. However, this impact would be shared by minority, non-minority, low-income, and non-low income communities. No other public safety or

environmental impacts would occur in the IER # 9 EJ study area that have not already been evaluated for the existing, previously authorized projects.

All additional impacts would be the combination of other impacts to minority and/or low-income communities by other Federal, state, local, and private efforts. All population groups inside the HSDRRS system would benefit equally from the completed risk reduction system.

Proposed Action – Realignment of Caernarvon Floodwall to West of SDEB Property

The following are demographic and land use characteristics along specific portions of the proposed action alignment:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, is vacant land, railroad and river levee.
- The portion of the alignment to the south of LA Highway 39 and to the west of the Caernarvon Canal would be located within currently vacant land.
- The portion of the alignment to the east of the Caernarvon Canal would be partially located on EBI property.
- The flood control structure would be located across Caernarvon Canal, which flows into Lake Leary to the south.

Under the proposed action, land would be acquired to accommodate the new alignment. These easements would be obtained on either public land or from commercial/industrial owners, and would not involve any minority and/or low-income population.

Residential communities exist on both sides of the proposed alignment and within close proximity to the IER # 9 footprint; but would only experience temporary impacts from construction activities within 1 mile of the project area. Implementation of the proposed action would also enhance risk reduction in areas that currently have a lower level of risk reduction, thus possibly increasing the desirability for the area to be further developed for community use.

Additional impacts would be the combination of effects on minority and/or low-income communities from this project and any other Federal, state, local, and/or private efforts. With implementation of the proposed action, enhancements to the Federal HSDRRS would provide potentially unforeseen impacts on community development in the area. Potential beneficial impacts include an increase in demand for desirable properties, while adverse impacts include potential safety hazards from nearby construction activities. However, these impacts will be equally borne by all population groups in the proposed project vicinity.

Alternative 1 – Modification or Replacement of Existing Floodgates and Construction of a Levee with T-Wall Cap

The following are demographic and land use characteristics along specific portions of alternatives 1a and 1b:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, contains some vacant land, railroad, river levee, and one residential or commercial structure.

- The portion of the alignment to the south of LA Highway 39 follows the existing floodwall (alternative 1a) and would be located within the immediate vicinity of residential and commercial/industrial properties. The residential community within the immediate vicinity of this alignment is low-income and non-minority in character and the residential community to the west of the alignment is non-low income and non-minority in character.
- The portion of the alignment to the south of LA Highway 39 follows the existing floodwall with a protected-side shift of approximately 100 ft (alternative 1b). The protected-side shift would relocate the floodwall on Deogracias Lane, i.e. within a residential community. This residential community is low-income and non-minority in character. The residential community to the west of the alignment is non-low income and non-minority in character.

Construction of alternatives 1a and 1b would involve acquiring property, including portions of the EBI facility as well as various houses along Deogracias Lane and Dean Drive. Although these adverse impacts would affect a low-income population, their representation is comparable to or less than the reference population within the IER # 9 EJ study area. Therefore, adverse human health and environmental impacts would not disproportionately affect minority and/or low-income populations. Any additional impacts associated with alternative 1a or 1b would be similar to those described for the proposed action.

Alternative 2 – Realignment of Caernarvon floodwall to Immediate Western Side of EBI Property

The following are demographic and land use characteristics along specific portions of the alternative 2 alignment:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, contains some vacant land, railroad and river levee.
- The portion of this alignment to the south of LA Highway 39 runs parallel to the eastern shore of Caernarvon Canal immediately to the west of the EBI property, tying in to the existing levee to the southeast of EBI property. The residential community to the east of the alignment is low-income and non-minority in character and the residential community to the west of the alignment is non-low income and non-minority in character.

Under alternative 2, impacts to a portion of EBI property and a residential community adjacent to the proposed site would occur due to construction activities. Although these impacts would temporarily affect a low-income population, their representation is comparable to or less than the reference population within the IER # 9 EJ study area. Additional impacts associated with alternative 2 would be similar to those described for the proposed action and, therefore, adverse human health and/or environmental impacts, would not disproportionately affect any minority and/or low-income community.

Alternative 3 – Realignment of Caernarvon Floodwall to Western Side of Caernarvon Canal

The following are demographic and land use characteristics along specific portions of the alternative 3 alignment:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, contains some vacant land, railroad and river levee.

- The portion of this alignment to the south of LA Highway 39 runs parallel to the western shore of Caernarvon Canal immediately to the west of EBI property, tying in to the existing levee to the east of Caernarvon Canal and southeast of EBI property. The residential community to the east of the alignment is low-income and non-minority in character and the residential community to the west of the alignment is non-low income and non-minority in character.

Under alternative 3, portions of SDEB property would be acquired. Other temporary impacts from construction activities would affect adjacent residential communities, including both low-income populations and non-low-income, non-minority populations. Additional impacts associated with alternative 3 would be similar to those described in the proposed action.

Alternative 4 – Realignment of Caernarvon Floodwall to West of SDEB Property (Zigzag Configuration)

The following are demographic and land use characteristics along specific portions of the alternative 4 alignment:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, contains some vacant land, railroad and river levee.
- The portion of this alignment to the south of LA Highway 39 runs parallel to the eastern shore of CFDC to the west of SDEB property, tying in to the existing levee to the east of Caernarvon Canal and southeast of EBI property. The residential community to the east of the alignment is low-income and non-minority in character and the residential community to the west of the alignment is non-low income and non-minority in character.

Construction of alternative 4 would involve acquiring a portion of SDEB property. These impacts would temporarily affect adjacent residential communities in both low-income populations and non-low-income, non-minority populations. Additional impacts associated with alternative 4 would be similar to those described for the proposed action.

Alternative 5 – Realignment of Caernarvon floodwall to Eastern Side of CFDC

The following are demographic and land use characteristics along specific portions of the alternative 5 alignment:

- The north end of this alignment, located between LA Highway 39 and the Mississippi River, contains some vacant land, railroad and river levee.
- The portion of this alignment to the south of LA Highway 39 runs parallel to the western shore of Caernarvon Canal to the west of SDEB property, tying in to the existing levee to the east of Caernarvon Canal and southeast of EBI property. The residential community to the east of the alignment is low-income and non-minority in character and the residential community to the west of the alignment is non-low income and non-minority in character.

The impacts from alternative 5 would involve acquiring land that is currently vacant. Impacts from construction activities would affect adjacent residential communities, including both low-income and non-low-income, non-minority populations. Additional impacts associated with alternative 5 would be similar to those described for the proposed action.

3.5 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Under ER 1165-2-132 the reasonable identification and evaluation of 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.

Two American Society for Testing and Materials (ASTM) E 1527-05 Phase I Environmental Site Assessments were completed for the project area in order to identify the potential presence of HTRW (USACE 2006c and USACE 2008b). These Phase I Environmental Site Assessments documented the recognized environmental conditions (RECs) for the project area.

The following RECs were found in the vicinity of the project area:

- Two suspected leaking transformers (potential polychlorinated biphenyls [PCBs]);
- A temporary staging area for leaking drums and containers (potential used oil, petroleum products, and unknown materials);
- Stained gravel (potential petroleum products);
- Above-ground storage tanks (ASTs) and other materials (potential diesel, gasoline, used oils, mineral spirits, hydraulic oil, methyl ethyl ketone, and metals);
- ASTs, drums, and miscellaneous materials (potential petroleum products);
- Existing and former boat launches, boat slips, and boat docks (potential petroleum products); and
- Properties within and adjacent to the Caernarvon Canal and CFDC impacted by Hurricanes Katrina and Rita.

An ASTM E 1903-97 Phase II Environmental Site Assessment was completed in order to evaluate some of the RECs identified in the Phase I Environmental Site Assessment, for the purpose of providing sufficient information regarding the nature and extent of contamination (USACE 2008c). Chemical data were collected near RECs, including 14 soil samples and 2 sediment samples. Evaluation of the data indicated that release of contaminants had occurred on the property; however, levels of most detected contaminants were low. Contaminant concentrations exceeding the LaDEQ Risk Evaluation/Corrective Action Program (RECAP) guidelines non-industrial screening standards were limited to three locations, consistent with industrial activities, within the alternative alignments. Should one of these alternatives be selected and hazardous waste is encountered during construction, the contamination would be managed following RECAP screening and management options. Contaminant sources are presumed to include historical industrial use of the property, anthropogenic sources, and the movement of contaminants by Hurricanes Rita and Katrina.

Based on data collected during the 2008 Phase I investigation, there are no RECs within the footprint of the proposed action; therefore, it is unlikely that HTRW would be encountered during construction, should the proposed action be selected.

A copy of the Phase I and Phase II Environmental Site Assessments for the IER # 9 project area will be maintained on file at the CEMVN office in New Orleans and are incorporated herein by reference. Copies of the reports are available by requesting them from the CEMVN, or select reports can be downloaded at www.nolaenvironmental.gov.

4.0 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. A cumulative impact is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7).” Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts were addressed for each alternative and resource in the preceding sections.

4.1 METHODOLOGY

To successfully 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 following guidelines were used to assess the cumulative impacts for this document:

- The temporal and geographic proximity of the IER # 9 project to other projects;
- The probability of IER # 9 project actions affecting the same environmental resource as another project, especially resources that are susceptible to development pressures;
- The likelihood that the IER # 9 project or other relevant project would lead to a wide range of effects or additional associated projects;
- Whether the effects of other projects are similar to those of the IER # 9 project;
- The likelihood that the project would occur; and
- The probability of the projects and related impacts being imminent.

4.2 DESCRIPTIONS OF PROJECTS CONSIDERED

Rebuilding efforts as a result of Hurricane Katrina are occurring throughout southeast Louisiana and along the Mississippi and Alabama Gulf Coast. The Insurance Information Institute (III) has estimated that the total insured losses from Hurricane Katrina were \$40.6 billion in six states, and in Louisiana the insured losses are estimated at \$25.3 billion (III 2007); much of those insured losses will be a component of the regional rebuilding effort. Although the full extent of construction in St. Bernard Parish and Plaquemines Parish and throughout the Gulf Coast over the next 5 years to 10 years is unknown, a large-scale rebuilding effort is underway.

The Water Resources Development Act of 2007 (WRDA 07) became law in November 2007. This bill authorized several additional projects and studies in the greater New Orleans area that could contribute to cumulative impacts. WRDA 07 included authorization of the LPV and WBV HSDRRS projects to raise risk reduction levels to 100-year levels, as well as coastal restoration projects, Morganza-to-the-Gulf hurricane risk reduction, hurricane risk reduction in Jean Lafitte and lower Jefferson Parish, a study of coastal area damage that could be attributable to the USACE, the MRGO deep-draft de-authorization, 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. The WRDA does not guarantee financing of these projects, but does allow Congress to allocate money for them in future spending bills (Alpert 2007). These additional projects could contribute to resource impacts, either adversely or with long-term positive impacts.

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 following discussion provided below describes an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed.

4.2.1 CEMVN HSDRRS IERs

Federal HSDRRS projects for the greater New Orleans area are 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 discussions in this IER because their alignments are not located within the project region and, with the exception of some positive cumulative impacts to socioeconomics, 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 20 shows LPV and WBV IER projects. A summary of the projects that fall within the New Orleans Metropolitan area is provided below:

- **IER #1, LPV, La Branche Wetlands Levee St. Charles Parish, Louisiana** – evaluates the potential impacts associated with raising approximately 9 miles of earthen levees; replacing over 3,000 ft of floodwalls; rebuilding, modifying or closing five drainage structures; and modifying one railroad gate along the existing levee system on the north side of U.S. 61 (Airline Highway) between the Bonnet Carré Spillway and the northwest end of the Louis Armstrong New Orleans International Airport near the St. Charles/Jefferson Parish line.
- **IER # 2, LPV, West Return Floodwall Jefferson and St. Charles Parishes, Louisiana** – evaluates the potential impacts associated with the proposed replacement of 17,900 ft (3.4 miles) of floodwalls along the line between Jefferson Parish and St. Charles Parish in the northeastern portion of the Mississippi River deltaic plain. The project area is adjacent to the Parish Line Canal from the north side of the Louis Armstrong New Orleans International Airport to the south shore of Lake Pontchartrain.
- **IER # 3, LPV, Lakefront Levee, Jefferson Parish, Louisiana** – evaluates the potential impacts associated with the proposed rebuilding of 9.5 miles of earthen levees, upgrading of the foreshore protection, the replacement of two floodgates, and the construction of fronting protection and construction or modification of breakwaters at four pumping stations just east of the St. Charles Parish and Jefferson Parish line to the western side of the 17th Street Canal.
- **IER # 4, LPV, New Orleans Lakefront Levee, Orleans Parish, Louisiana** – investigates improvement of the levee, floodwall, and Bayou St. John Sector Gate extending from the 17th Street Canal to the IHNC.

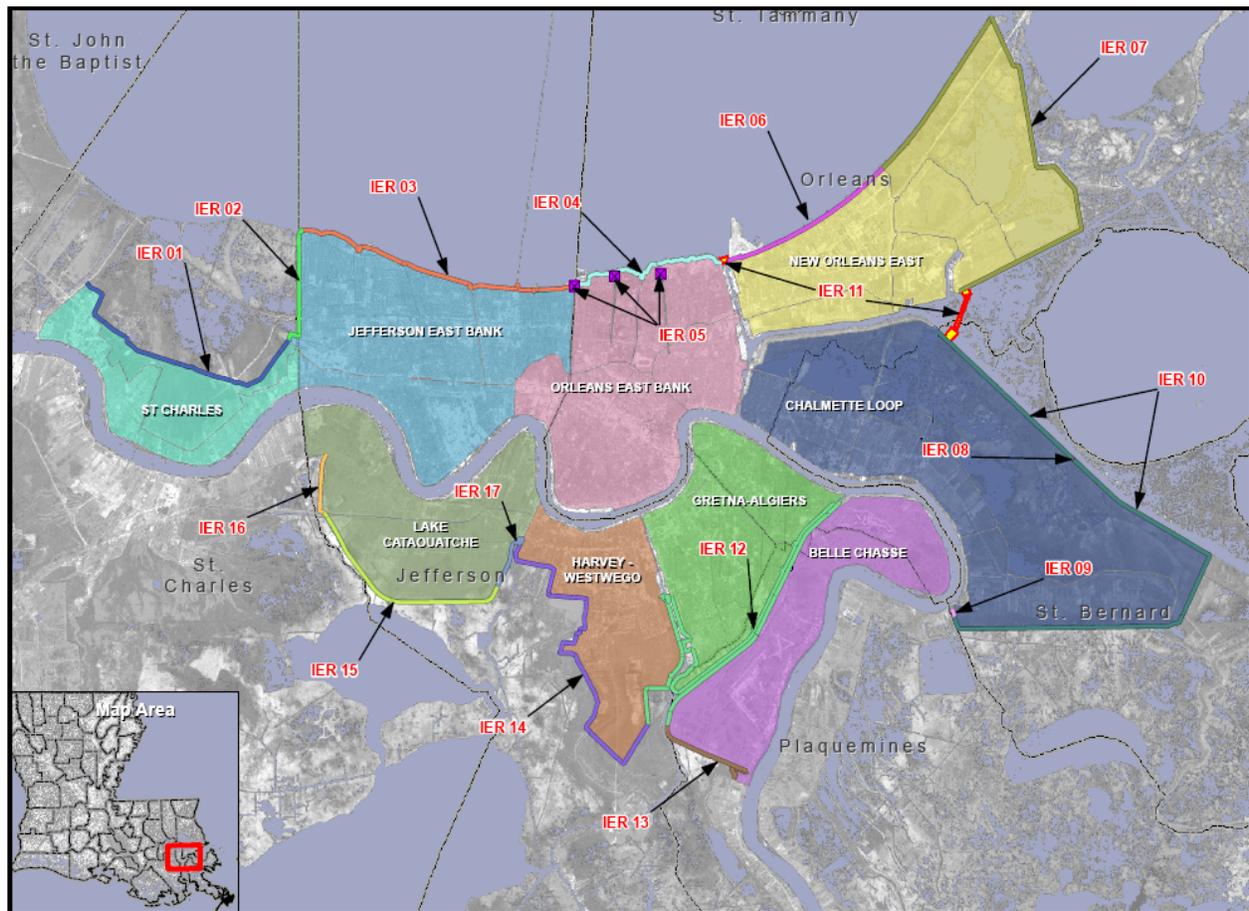


Figure 20. HSDRRS Lake Pontchartrain and Vicinity and West Bank and Vicinity IER Projects

- **IER # 5, LPV, Permanent Protection System for the Outfall Canals Project on 17th Street, Orleans Avenue, and London Avenue Canals, Jefferson and Orleans Parishes, Louisiana** – evaluates the impacts of a new permanent pump station and closure (i.e. gates) at or near the mouth of each of the outfall canals operating in series with the existing Sewerage and Water Board of New Orleans pump stations.
- **IER # 6, LPV, New Orleans East, Citrus Lakefront Levee, Orleans Parish, Louisiana** – investigates improvement of approximately 6 miles of levees, floodwalls, and floodgates 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.
- **IER # 7, LPV, New Orleans East, New Orleans East Lakefront to Michoud Canal, Orleans Parish, Louisiana** – investigates improvement of approximately 19.3 miles of levee and three floodgates 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 National Wildlife Refuge (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, Louisiana** – evaluates the impacts of the construction of a new flood control structure on Bayou Dupre with steel sector gates and floodwall tie-ins, constructed on the floodside of and adjacent to the existing structure.
- **IER # 10, LPV, Chalmette Loop Levee, St. Bernard Parish, Louisiana** – evaluates the impacts of constructing a T-wall on top of the existing LPV Chalmette Loop levee.
- **IER # 11, Improved Protection on the IHNC, Orleans and St. Bernard Parishes, Louisiana (Tier 2 Borgne)** – evaluates the potential impacts associated with constructing surge barriers on Lake Borgne. This is the Tier 2 review for alternatives to protect against storm surge from the IHNC originating from Lake Borgne. This project was initially evaluated in IER # 11 Tier 1 (USACE 2008d). Currently, this project is under construction; dredging and piles tests are complete and approximately 1.2 million cubic yards of dredged material has been beneficially used for marsh nourishment within 205 acres of open water ponds near the project area.
- **IER # 11, Improved Protection on the IHNC, Orleans Parish, Louisiana (Tier 2 Pontchartrain)** – evaluates a new structure proposed within the Pontchartrain 2 location range which extends from the Seabrook Bridge to 2,500 ft 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 2008d).
- **IER #11, Improved Protection on the IHNC, Orleans and St. Bernard Parishes, Louisiana (Tier 2 Borgne Supplemental)** – evaluates the potential impacts associated with constructing a vertical lift gate on Bayou Bienvenue in lieu of a sector gate, which was evaluated in the original Tier 2 Borgne document.
- **IER # 12, GIWW WCC, Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana** – includes a sector gate across the GIWW and levee tie-ins to the adjacent Hero Canal levee to the east and the V-line levee to the west. Approximately 3 miles of levee and floodwall would be constructed, along with a closure complex across the GIWW, a pump station, fronting protection, and a bypass channel. Levees would generally be raised to 14 feet, requiring 3.1 million cubic yards of earthen material and 310,000 tons of stone.
- **IER # 13, WBV, Hero Canal Levee and Eastern Terminus, Plaquemines Parish, Louisiana** – evaluates 22,000 linear feet of levee improvements and the construction of 1,500 linear feet of floodwalls.
- **IER # 14, WBV, Westwego to Harvey Levee, Jefferson Parish, Louisiana** – evaluates 12 miles of levee, construction of 7,013 linear feet of floodwalls, and modifications to three pump stations.
- **IER # 15, WBV, Lake Cataouatche Levee, Jefferson Parish, Louisiana** – evaluates 8 miles of levee and fronting protection modifications for one pump station.
- **IER # 16, WBV, Western Tie-In, Jefferson and St. Charles Parishes, Louisiana** – evaluates construction of a new levee section to complete the western terminus of the West Bank and Vicinity Hurricane Protection Project.
- **IER # 17, WBV Company Canal Floodwall, Jefferson Parish, Louisiana** – evaluates 442 linear feet of floodwalls and fronting protection modifications to two pump stations.

- **IER # 18 - Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana and IER # 19 – Pre-Approved Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi** – 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.
- **IER # 20, LPV Hurricane Protection Project – Mitigation: Manchac Wildlife Management Area Shoreline Protection Modification, St. John the Baptist Parish, Louisiana** – This mitigation IER will be completed to document the mitigation plan for unavoidable impacts from the resulting actions of the aforementioned IERs # 1 to # 11.
- **IER # 21, WBV Hurricane Protection Project – Mitigation** – This mitigation IER will be completed to document the mitigation plan for unavoidable impacts from the resulting actions of the aforementioned IERs # 12 to # 17.
- **IER # 22, Government Furnished Borrow Material # 2, Jefferson and Plaquemines Parishes, Louisiana and Hancock County, Mississippi** – evaluates the potential impacts associated with the actions taken by the USACE while excavating borrow areas for use in construction of the HSDRRS.
- **IER # 23, Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi** – evaluates 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.
- **IER # 24, Stockpile Sites for Borrow Material, Orleans and St. Bernard Parishes, Louisiana** – evaluates the potential impacts associated with the actions taken by commercial contractors as a result of stockpiling borrow material for use in construction of the HSDRRS.
- **IER # 25, Government Furnished Borrow Material # 3, Orleans, Jefferson, and Plaquemines Parishes, Louisiana** – evaluates the potential impacts associated with the actions taken 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** – evaluates 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.
- **IER # 28, Government Furnished Borrow Material # 4, Plaquemines, St. Bernard, and Jefferson Parishes** – evaluates the potential impacts associated with the possible excavation of two government furnished borrow areas, and an access road to a previously-approved government furnished borrow area.
- **IER # 29, Pre-Approved Contractor Furnished Borrow Material # 4, Orleans, St. John the Baptist, and St. Tammany Parishes** - evaluates 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.
- **IER # 30, Contractor-Furnished Borrow Material # 5, St. Bernard and St. James Parishes, Louisiana, and Hancock County, Mississippi** - evaluates the potential impacts

associated with the actions taken by commercial contractors as a result of excavating three proposed borrow areas for use in construction of the HSDRRS.

A discussion of habitat restoration, stabilization, and creation projects that would contribute to cumulative impacts to resources in the IER # 9 study area are discussed in the following section.

Table 10 provides a summary of the cumulative impacts to be mitigated for the HSDRRS projects completed (draft or final) to date. In addition to the impacts shown in table 10, approximately 170.5 acres of impacts to forested habitats requiring mitigation would occur as part of projects for the raising of the MRL.

Updated technical analyses and more sophisticated examination of the MRL system has revealed additional system improvements are required to complete the HSDRRS for 100-year risk reduction (1 percent annual chance of exceedance risk reduction). The figures provided show the location (figure 21) and extent (figure 22) of the anticipated improvements.

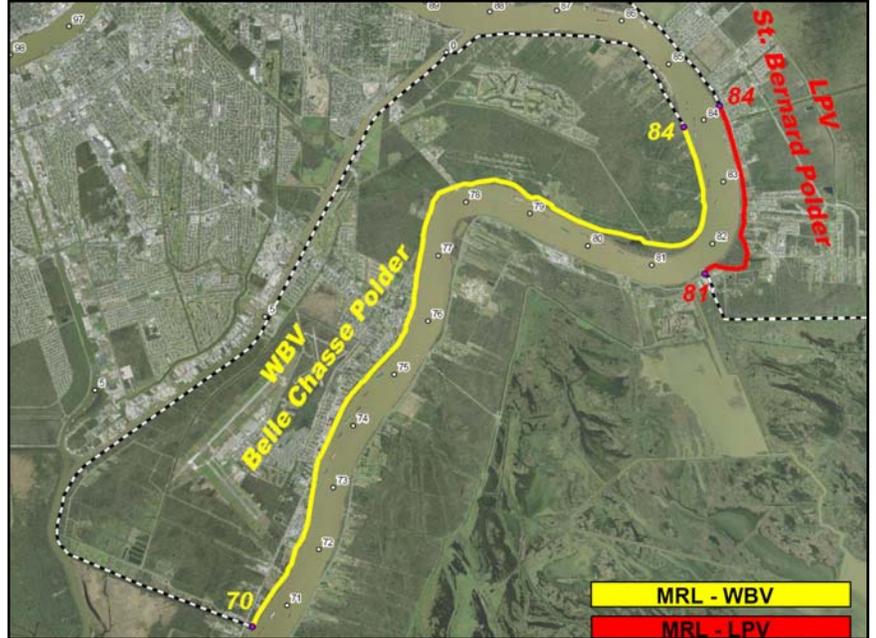


Figure 21. Proposed Work Area on MRL in Belle Chasse and St. Bernard Polders

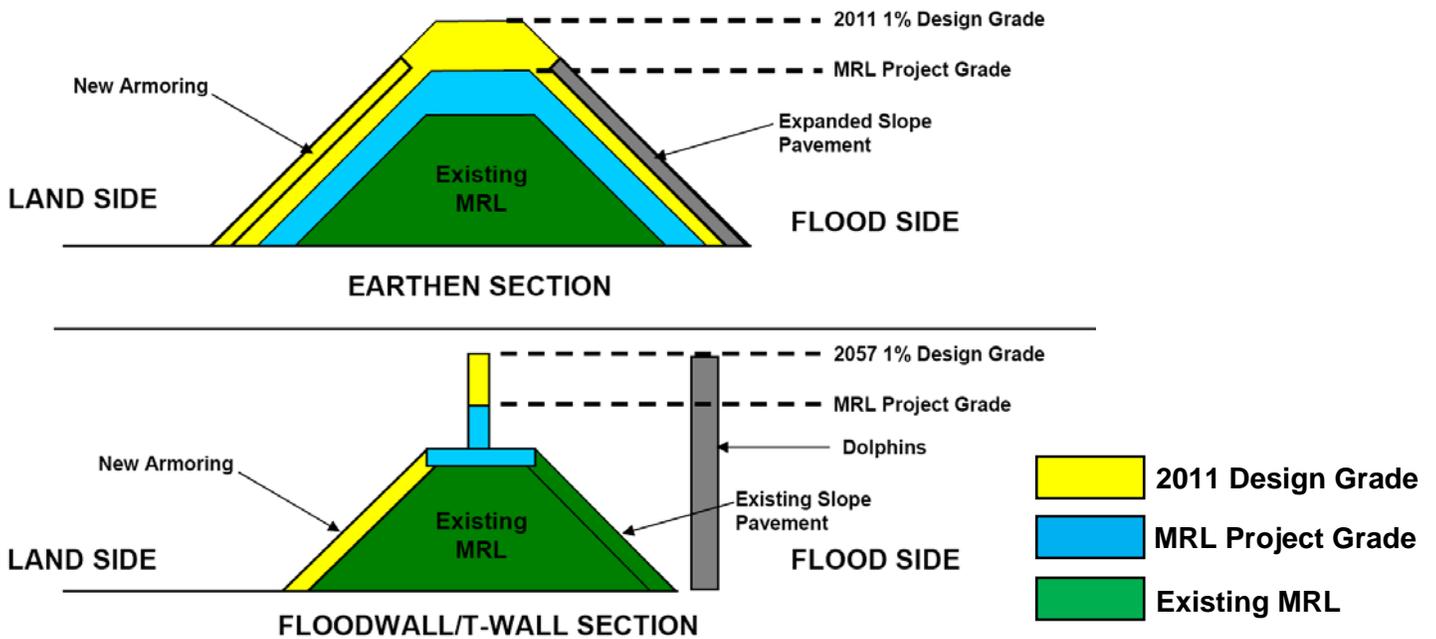


Figure 22. Potential MRL Design Considerations/Upsizing Requirements

Applying this new information means that improvements (upsized earthen or T-wall levees) are required to portions of the MRL that are co-located with the HSDRRS system:

- 14 miles of MRL on the west bank within the West Bank & Vicinity system, at the lower end of the Belle Chasse polder with a required increase in existing levee elevations of 3.5 feet at mile 70, diminishing to no increase needed at mile 84.
- 3 miles of MRL on the east bank within the Lake Pontchartrain & Vicinity (LPV) system at the lower end of the St. Bernard polder, with a required increase in existing levee elevations of about 0.5 feet.

The USACE will perform the necessary engineering and environmental analyses in the coming months to determine required designs. The USACE continues to be committed to provide a 100-year system for the Belle Chasse polder by June 2011 through a combination of engineered advanced measures and permanent measures.

**Table 10.
HSDRRS Impacts and Compensatory Mitigation to be Completed**

IER #	Parish		Non-wet BLH (acres)	Non-wet BLH AAHUs	Marsh (acres)	Marsh AAHUs	Swamp (acres)	Swamp AAHUs	Wetland BLH (acres)	Wetland BLH AAHUs	Water Bottoms (acres)
1	St. Charles	Protected Side	-	-	-	-	73.23	39.53	-	-	-
		Flood Side	-	-	-	-	38.48	29.73	-	-	
1 Supplemental	St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
2	Jefferson / St. Charles	Protected Side	-	-	17.00	9.00	-	-	-	-	-
		Flood Side	-	-	17.00	9.00	-	-	-	-	
3	Jefferson	Protected Side	-	-	-	-	-	-	-	-	26.40
		Flood Side	-	-	-	-	-	-	-	-	
4	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
5	Jefferson / Orleans	Protected Side	-	-	-	-	-	-	-	-	3.29
		Flood Side	-	-	-	-	-	-	-	-	
6	Orleans	Protected Side	-	-	-	-	-	-	-	-	6.90
		Flood Side	-	-	4.00	TBD	-	-	-	-	
7	Orleans	Protected Side	-	-	100.40	36.80	-	-	151.70	79.30	106.00
		Flood Side	-	-	70.00	37.20	-	-	30.00	11.90	
8	St. Bernard	Protected Side	-	-	-	-	-	-	-	-	0.30
		Flood Side	-	-	-	-	-	-	-	-	
9	St. Bernard / Plaquemines	Protected Side	8.3	3.84	1.3	1.1	-	-	-	-	0.30
		Flood Side	1.76	0.81	0.6	0.1	-	-	1.16	0.66	
10	St. Bernard	Protected Side	-	-	106.55	57.31	-	-	38.32	16.44	95.00
		Flood Side	-	-	323.04	209.94	-	-	35.31	15.22	
11 Borgne	Orleans / St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	122.00	24.33	-	-	15.00	2.59	
11 Pontchartrain	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
12	Jefferson / Plaquemines	Protected Side	-	-	-	-	-	-	251.70	177.30	-
		Flood Side	-	-	-	-	74.90	38.50	2.30	1.90	
13	Plaquemines	Protected Side	-	-	-	-	1.00	0.66	40.00	24.01	-
		Flood Side	-	-	20.00	-	-	-	4.00	2.23	
14	Jefferson	Protected Side	-	-	-	-	-	-	45.00	30.00	-
		Flood Side	-	-	-	-	29.75	17.02	45.50	18.58	
15	Jefferson	Protected Side	-	-	-	-	-	-	23.50	6.13	-
		Flood Side	-	-	-	-	-	-	3.60	1.35	
16	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	137.80	66.30	-	-	-	-	
17	Jefferson	Protected Side	-	-	-	-	-	-	5.50	2.69	-
		Flood Side	-	-	-	-	19.00	17.09	-	-	
Borrow 18	St. Bernard / Orleans / Jefferson / Plaquemines / St. Charles	Protected Side	379.30	152.32	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 19	Hancock County, MS / Iberville / New Orleans / Plaquemines / St. Bernard / Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 22	Jefferson / Plaquemines	Protected Side	244.69	118.54	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 23	Hancock County, MS / Plaquemines / St. Bernard / St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 25	Jefferson / Orleans / Plaquemines	Protected Side	933.00	284.00	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	

**Table 10.
HSDRRS Impacts and Compensatory Mitigation to be Completed**

IER #	Parish		Non-wet BLH (acres)	Non-wet BLH AAHUs	Marsh (acres)	Marsh AAHUs	Swamp (acres)	Swamp AAHUs	Wetland BLH (acres)	Wetland BLH AAHUs	Water Bottoms (acres)
Borrow 26	Jefferson / Plaquemines / St. John the Baptist / Hancock County, MS	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 28	Jefferson/Plaquemines/St. Bernard	Protected Side	19.94	8.45	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Borrow 29	Orleans/St. Tammany/St. John the Baptist	Protected Side	107.30	48.60	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	
Total		Protected Side	1692.53	615.75	225.25	104.21	74.23	40.19	555.72	335.87	-
		Flood Side	1.76	0.81	694.44	346.87	162.13	102.34	136.87	54.43	238.19
		Both	1694.29	616.56	919.69	451.08	236.16	142.53	692.59	390.30	238.19

- = Not applicable to the IER or the number impacted is 0.

AAHU = average annual habitat unit, BLH = bottomland hardwood, EFH = essential fish habitat, TBD = to be determined.

4.2.2 Habitat Restoration, Creation, and Stabilization Projects

4.2.2.1 Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Program Projects

The CEMVN and other Federal and state agencies participate in coastal restoration projects through the CWPPRA. These are specific prioritized restoration projects implemented coast-wide by LaDNR, 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, fresh water and sediment diversion projects, and modification or management of existing structures. Figure 23 indicates the locations of and table 11 lists and provides additional detail for CWPPRA projects near the IER # 9 project area.

One restoration project is the CFDC. The CFDC consists of a diversion structure containing five 15-ft square gated culverts and inflow and outflow channels that (as designed) can discharge freshwater and associated nutrients and sediment at the rate of 8,000 cubic ft per second from the Mississippi River to the PWA and the coastal bays and marshes in Breton Sound (USACE 1998b). Management of the CFDC is expected to prevent approximately 95 percent of the marsh loss predicted for the next 50 years within the Breton Sound (Louisiana Coastal Wetlands Conservation and Restoration Task Force [RTF] and Wetlands Conservation and Restoration Authority [WCRA] 1998 and 1999). Studies indicate that this project has already increased oyster harvests, largemouth bass catches, freshwater and brackish marsh, waterfowl usage, and alligator and muskrat nests (USACE 1998b).

The Caernarvon Diversion Outfall Management program, located south of Caernarvon in Plaquemines Parish, was completed in September 2002. The purpose of this project was to improve distribution of nutrient rich freshwater from the Mississippi River into the marsh interior via the CFDC and strategically placed control structures. Specific features of outfall management include flow-through culverts, armored plug closures, and spoil bank restoration.

A similar freshwater diversion project, the Lake Lery Hydrologic Restoration was completed in May 1997. The state of Louisiana partnered with the Lake Borgne Levee District to construct a pump station along the south-central edge of the St. Bernard Parish ridge for the purpose of collecting and discharging rainfall into the marsh north of Lake Lery. Freshwater input prevents saltwater intrusion and contributes to rebuilding the north shoreline of Lake Lery.

CWPPRA project PPL 19, Dedicated Sediment Delivery and Water Conveyance for Marsh Creation West of Big Mar, is a proposed marsh enhancement project in the Breton Sound Basin.

4.2.2.2 Mississippi River Gulf Outlet Deep-Draft Deauthorization

The WRDA 07 provided for the de-authorization of the MRGO upon the submission of the USACE Chief's Report, Legislative EIS, and signed Decision Record to Congress. On 5 June 2008, the Assistant Secretary of the Army for Civil Works forwarded said Report, Legislative EIS and Decision Record to Congress. The Report recommended de-authorization 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 de-authorized. The channel has been closed and the closure structure is being turned over to the State of Louisiana.

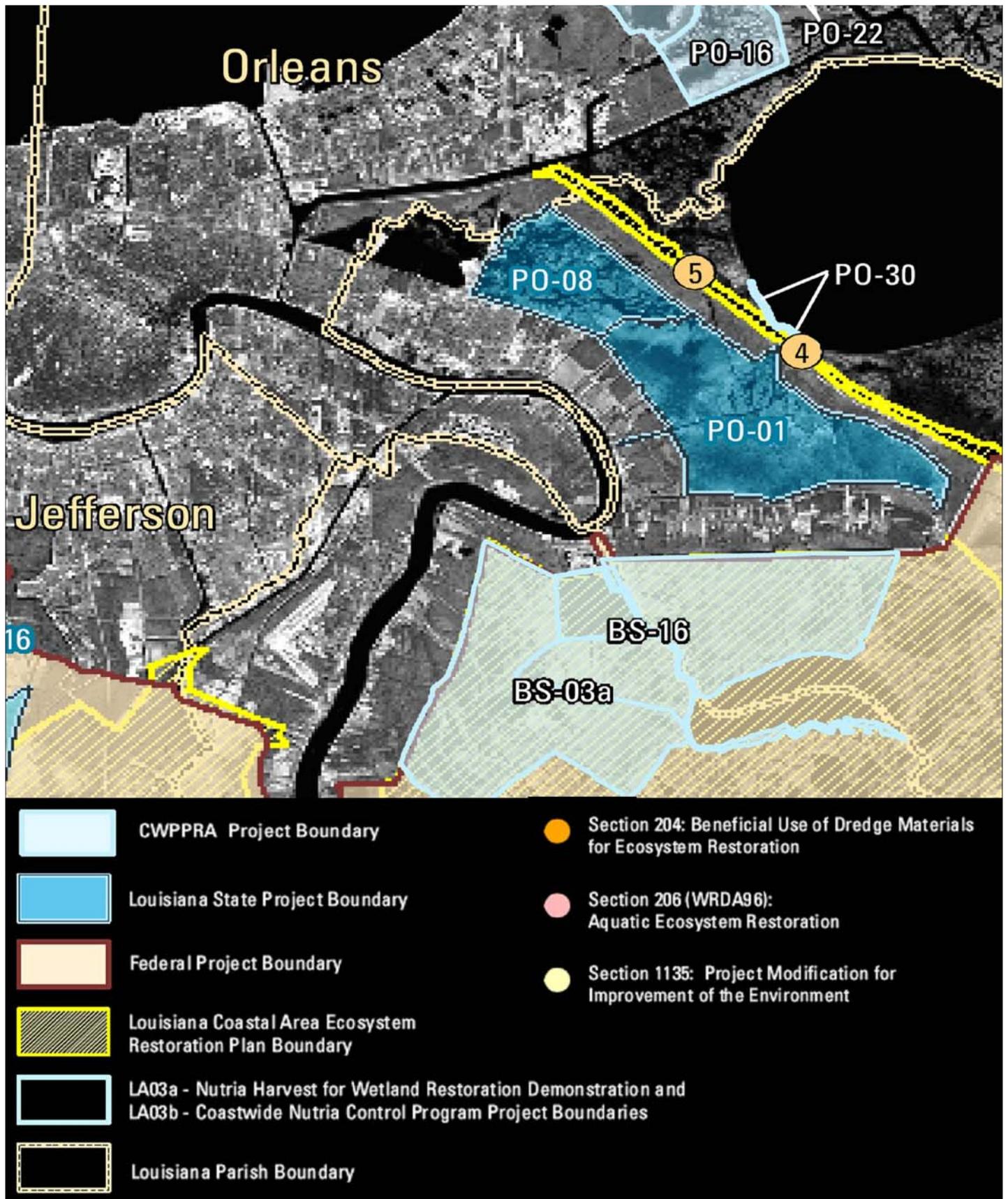


Figure 21. CWPPRA Restoration, Stabilization, and Creation Projects Near the IER # 9 Project Area

**Table 11.
Selected CWPPRA Projects Near the IER # 9 Project Area**

State Number	PPL	Agency	Project Name	Project Area	AAHU	Acres Created/Restored	Acres Protected	Total Net Acres	Construction Date	Status
BA-16	n/a	n/a	Bayou Segnette Shoreline Protection	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1994
BS-03a	2	NRCS	Caernarvon Diversion Outfall Management	15,556	504	802	0	802	6/1/2001	Complete
BS-16	17	USFWS	Caernarvon Outfall Management/Lake Lery SR	16,260	302	268	384	652	n/a	n/a
PO-01	n/a	n/a	Violet Siphon Freshwater Diversion	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1992
PO-02c	n/a	n/a	Bayou Chevee Shoreline Protection	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1994
PO-08	n/a	n/a	Central Wetlands Pump Outfall – Freshwater Diversion	n/a	n/a	n/a	n/a	n/a	n/a	Completed 1992
PO-16	1	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase I	3,800	520	1,050	500	1,550	6/1/1995	Completed May 1996
PO-18	2	USFWS	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase II	5,475	584	7850	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-30	10	EPA	Lake Borgne Shoreline Protection	192	61	0	165	165	8/1/2007	Construction
PO-32	12	USACE	Lake Borgne and MRGO Shoreline Protection	465	70	17	249	266	n/a	Engineering and Design
PO-34	16	USACE	Alligator Bend Marsh Restoration and Shoreline Protection	584	166	285	45	330	n/a	n/a
Summary Acres for all approved projects (including those not shown):				1,488,841		51,829	69,890	121,719		

Notes:

 = Projects within 5 miles of the IER # 9 Project Area

n/a = information not available

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 benefited 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 table includes acres of emergent marsh protected, created, and restored as a result of project implementation.

The de-authorization and construction of the plug in the MRGO and the impacts of such an action were disclosed in a final Legislative EIS. Habitat shifts caused by saline waters brought in by the MRGO might have caused the following changes in wetland types in the vicinity of the MRGO: the conversion of 3,350 acres of fresh/intermediate marsh and 8,000 acres of cypress swamp to brackish marsh and 19,170 acres of brackish marsh and swamp to saline marsh. Also, during the period 1964 to 1996, 5,324 acres of marsh were lost adjacent to the MRGO channel. The MRGO closure structure at La Loutre is expected to reduce salinity and erosion in those areas (USACE 2007b).

4.2.2.3 Coastal Impact Assistance Program (CIAP)

The Energy Policy Act of 2005 (PL 109-58) was signed into law by President Bush on 8 August 2005. Section 384 of the Act establishes the CIAP which authorizes funds to be distributed to Outer Continental Shelf oil and gas producing states to mitigate the impacts of Outer Continental Shelf 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 of Louisiana and each coastal parish for the 4 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. Table 12 provides information on CIAP projects near the IER # 9 project area.

Table 12.
Selected CIAP Projects within 5 miles of the IER # 9 Project Area

Project Name	Project Area (acres)
Lake Lery Lake Rim Reestablishment and Marsh Creation	Not specified
Violet Freshwater Diversion	49

4.2.2.4 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 LaDNR, 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) was passed. This bill provided for a new 16-member panel called the Coastal Protection and Restoration Authority, 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 Louisiana Coastal Protection and Restoration project, a project between the CEMVN and the Coastal Protection and Restoration Authority (Non-Federal sponsor), was established to identify risk reduction measures that can be integrated to form a system that will provide enhanced protection of coastal communities and infrastructure, as well as for restoration of coastal ecosystems. The project addresses the full range of flood control, coastal restoration, and hurricane and storm damage risk reduction measures available, including those needed to provide comprehensive Category 5-Hurricane risk reduction. The project study was performed and a technical document has been produced with recommendations related to enhanced hurricane protection and restoration of coastal ecosystems. The technical document is undergoing internal USACE review.

The LaDNR 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 LaDNR is involved in several major programs that are working to save Louisiana's coastal wetlands. These programs include the CWPPRA, Coast 2050, the 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 (USACE and State of Louisiana 2004) is 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 years 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. The study also 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. The 2007 WRDA authorized approximately \$1.9 billion for the USACE to carry out the LCA restoration program. The CEMVN has signed an agreement with the State of Louisiana to begin studies on the first six LCA projects, with study completion by December 2010.

Two components of the LCA Ecosystem Restoration Program "near-term plan" are located within the IER # 9 project vicinity. The Modification of Caernarvon Diversion project is located immediately west of the project area. It includes the modification of the CFDC to allow an increase in the freshwater introduction rate in order to increase wetland creation and restoration outputs for the structure. This change in operation of the CFDC will accommodate the wetland building function of the system by facilitating organic and sediment deposition, improving biological productivity, and preventing further deterioration of the marshes (USACE 2004). The second project, MRGO Ecosystem Restoration Plan, will address the comprehensive restoration and maintenance of estuarine habitat areas affected by the MRGO navigation channel. Potential features of the plan include wetland protection, restoration, and creation; shoreline protection;

barrier island restoration and protection; and freshwater, sediment, and nutrient introduction from the Mississippi River (USACE 2009).

4.2.3 Other Projects

The East Jefferson Levee District is placing more than 1,000 three-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 is planning on constructing 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 Bonnabel 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 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 proposed ramp height of 16.5 ft from the HSDRRS levee out onto the Causeway itself as well as additional roadway modifications. 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.

4.3 SUMMARY OF CUMULATIVE IMPACTS

The magnitude and significance of cumulative impacts were evaluated by comparing the existing environment with the expected impacts of the proposed action when combined with the impacts of other proximate actions. Projects that occur within the greater New Orleans area, within the Lake Pontchartrain Basin, and within the designated coastal zone for Louisiana were considered collectively (as appropriate) for the evaluation of cumulative impacts.

The majority of the HSDRRS projects are currently in the construction, planning and design stages, and impacts from these component projects will be addressed in separate IERs. Construction of levees, gates, floodwalls, and onshore breakwaters throughout the region could cause direct and indirect wetland (including open water) and upland habitat loss. Construction damage as part of the 100-year hurricane and storm damage risk reduction projects to quality wetland habitats would be fully mitigated through formal mitigation planning.

The primary hydrologic impact of the HSDRRS projects would be reduced storm surge inundation impacts for low-lying areas on the protected side of the HSDRRS. Depending on design and maintenance, 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 by-product of implementing wetland creation and shoreline protection projects within the Lake Pontchartrain Basin and Breton Sound Basin and closure of the MRGO.

The proposed actions are not anticipated to have any impacts on the presence of HTRW in the study area. 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.

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. 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 attainment status.

The proposed action would have cumulative beneficial impacts to socioeconomic resources in the New Orleans Metropolitan area. It is part of the ongoing Federal effort to reduce the threat to life, health, and property posed by flooding. The LPV project would be improved to provide additional hurricane, storm, and flood damage risk reduction, reducing the threat of inundation of infrastructure due to severe tropical storm events. The combined effects from construction of the multiple projects underway and rebuilding the HSDRRS in the area would reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally-driven flood events and, thereby, would encourage recovery. Improved hurricane, storm, and flood damage risk reduction would benefit all residents, regardless of income or race, increase confidence, reduce insurance rates, and allow for development and redevelopment of existing urban areas.

The proposed action would be unlikely to adversely impact fishery resources past the construction period of 21 months; therefore, it is unlikely to contribute to cumulative impacts to fishery resources beyond this time. The fisheries resources of the project vicinity were recently disrupted during Hurricanes Katrina, Rita, Gustav, and Ike, and for HSDRRS-related construction projects. Construction and restoration projects are currently in progress or planned within the scheduled construction time frame of the proposed action. These projects may affect water characteristics such as pH, dissolved oxygen, salinity, tidal exchange, and hydrology near the project area, which could result in cumulative impacts to fisheries. For example, the project area would be affected from the action to provide hurricane and storm damage risk reduction for the LPV Chalmette Loop project (IER # 10) through the loss of open water and emergent marsh habitats as well as changes in water characteristics during construction.

The aquatic habitat of the Caernarvon Canal in the project area has previously been disturbed by construction of the canal itself and subsequent industrial development along the shoreline, and by Hurricane Katrina. Construction of the proposed action would increase the impacts to the aquatic habitat by re-suspending sediment that has only had a short time to recover from the prior events. However, these impacts would only occur during the construction period. The long term impact of a loss of approximately 0.3 acre of open water habitat would be minimal based on the amount of similar available habitat that exists in the nearby canals and drainageways. In addition, any impacts to wetlands as result of the footprint of this project will be mitigated as part of a large scale mitigation project to produce a beneficial cumulative impact.

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.

5.0 SELECTION RATIONALE

The USACE has established the Alternatives Evaluation Process (AEP), a logical, systematic process for recommending a proposed action alternative. The AEP is being utilized throughout the HSDRRS to promote a consistent method of selecting a proposed action, across the system. The AEP for IER # 9 evaluated six alternatives, including the existing alignment, realignment to the immediate western side of EBI, and four alignments located primarily on the west side of the Caernarvon Canal with a flood control structure across the canal. Alternative 1 was chosen as the recommended plan during the AEP. Subsequently, a constructability review indicated that alternative 1 was not constructible due to its close proximity to EBI and several residences. Further investigations of alternative 1 confirmed that this alignment had significant real estate and technical concerns associated with it that would not allow construction to be completed on schedule. Based on additional investigation and evaluation by the project team, the proposed action was recommended as the project alignment for LPV 149.

The proposed action selected for IER # 9 would replace the current LPV 149 Caernarvon Floodwall, which includes two floodgates and levee tie-ins, with a new floodwall approximately 1,100 ft to the west. The proposed action would be located primarily on the west side of the Caernarvon Canal and include two new floodgates and levee tie-ins and a flood control structure across the canal, and connect to LPV 148 on the east side of the canal.

The proposed action was selected to balance the necessity for better reduction of risk to life and property from hurricane and storm related flooding with engineering costs, feasibility, and practicality as well as consideration of impacts to the natural and human environment. Most of the adverse resource impacts expected would be short-term, and occur only during construction. Some permanent impacts to wetlands and water bottoms could occur from construction of the proposed floodwall and flood control structure. These resource impacts were considered along with evaluation criteria that included risk and reliability, constructability, real estate requirements, Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R), schedule, and cost. Alternative 2, which is located on the east side of the Caernarvon Canal, has constructability and project schedule issues similar to those identified for alternative 1. Alternatives 3, 4, and 5, which cross the canal and continue on its west side similar to the proposed action, share some of the proposed action's advantages over alternative 1. However, alternatives 3, 4, and 5 have longer alignments than the proposed action and would be more costly and have greater impacts to the natural environment, in particular wetlands.

Alternative 1 was originally recommended as the preferred alignment based of its relatively low cost, limited impact on natural resources, and high reliability. However, further investigation demonstrated that the proposed action has distinct advantages over alternative 1 in regard to reduced uncertainty in the project schedule, human environmental impacts, and constructability, as discussed below.

Real estate requirements must be considered given the impact they can have on the speed by which HSDRRS can be provided to the project area. The number of properties to be acquired can influence the real estate acquisition schedule, and acquisition of properties containing improvements would most likely take more time and be more costly than acquiring vacant properties. The proposed action, whose alignment consists of vacant land, would require less time to acquire the necessary ROW than would alternative 1, whose alignment includes developed properties. Construction along the alternative 1 alignment would require the purchase of several residential homes and temporary relocation of remaining residents who live adjacent to the work area.

The EBI and SDEB manufacturing facilities are currently outside of the HSDRRS. The proposed action would enclose the EBI and SDEB manufacturing facilities, while under alternative 1 these facilities would remain outside of the HSDRRS. The proposed action could provide safe harbor for boats during a storm. The Caernarvon community has indicated that providing risk reduction for the upper reach of the canal and safe harbor is a priority for them. On the other hand, alternative 1 would require the taking of several homes and could negatively impact operations at EBI due to the adjacent pile-driving for construction of the T-wall.

Constructability issues were identified for alternative 1 during the evaluation process and subsequent constructability reviews. Alternative 1 would require obtaining additional ROW and re-aligning the existing floodwall, and the project area would have extremely restricted access. The work area would be within 30 ft of most of the homes along Deogracias Lane. Alternative 1 also poses a safety risk to homes adjacent to the alignment, as pile driving equipment would be required to work over the roofs of these homes. Also, pile driving in proximity to the adjacent homes and EBI could cause damage to structures and interfere with EBI operations (due to vibration). The proposed action does not include any developed land and would not have safety and vibration issues or maneuverability or access restrictions.

In summary, the need to acquire residential properties, the need to relocate adjacent residents, and the constricted work site associated with alternative 1 all result in considerable impact to the construction schedule. The proposed action was selected because it would reduce uncertainty in the project schedule while minimizing impact to the surrounding environment and meeting the social objectives and engineering constraints for the project area.

6.0 COORDINATION AND CONSULTATION

6.1 PUBLIC INVOLVEMENT

Extensive public involvement has been sought in preparing this IER. The project analyzed in this IER was publicly disclosed and described in the Federal Register on 13 March 2007 and on the website www.nolaenvironmental.gov. Scoping for this project was initiated on 12 March 2007 through placing advertisements/public notices in USA Today and the Times-Picayune. Nine public scoping meetings were held throughout the New Orleans Metropolitan area to explain the scope and process of the Alternative Arrangements for implementing NEPA between 27 March 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 was able to provide verbal comments during the meetings and written comments after each meeting in person, by mail, and via the www.nolaenvironmental.gov website.

Public meetings were held at Nunez Community College in Chalmette, Louisiana on 21 August 2007, the Lynn Oaks School in Braithwaite, Louisiana on 24 October 2007, 17 April 2008, and 11 March 2009; at NP Trist Middle School in Meraux, Louisiana on 17 January 2008; at CW Rowley Alternative School in Chalmette, Louisiana on 17 July 2008; and at the St. Bernard Parish Council Chambers on 11 May 2009. In these meetings, several public concerns were raised regarding flooding and tidal surge impacts on St. Bernard Parish from the MRGO, the IHNC, Lake Borgne, and Lake Pontchartrain near Seabrook. These concerns are discussed in section 1.5.

This draft IER will be distributed for a 30-day public review and comment period. A public meeting specific to the proposed action will be held if requested by a stakeholder during the review period. Any comments received during this public meeting will be considered part of official record. After the 30-day comment period, and public meeting if requested, the CEMVN

District Commander will review all comments received during the review period and make a determination if they rise to the level of being substantive in nature. If comments are not considered to be substantive, the District Commander will make a decision on the proposed action. This decision will be documented in an IER Decision Record. If a comment(s) is determined to be substantive in nature, an Addendum to the IER will be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period the District Commander will make a decision on the proposed action. The decision will be documented in an IER Decision Record.

6.2 AGENCY COORDINATION

Preparation of this IER has been coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in 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 USFWS and NMFS reviewed descriptions of the proposed action provided by CEMVN to determine if it would affect threatened or endangered species under their jurisdiction or designated critical habitat. The USFWS concurred with the CEMVN that the proposed action would be not likely to adversely affect threatened or endangered species under their jurisdiction (USFWS 2009b, provided in appendix D). The CEMVN also determined, as discussed previously in this IER, that the proposed action would have no effect on the threatened or endangered species under NMFS jurisdiction that potentially could occur in the region, the Gulf sturgeon. Consequently, written concurrence from NMFS was not required.

The LaDNR reviewed the proposed action for consistency with the Louisiana Coastal Resources Program (LaCRP). The proposed action was found to be consistent with the LaCRP, as per a letter dated 2 July 2009 (appendix D).

Water Quality Certification for the proposed action was received from LaDEQ on 21 September 2009 (appendix D).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the Louisiana SHPO and Native American tribes. Eleven federally recognized tribes that have an interest in the region were given the opportunity to review the proposed action. The SHPO concurred with the CEMVN "no historic properties affected" finding in a letter dated 7 December 2007, and the Mississippi Band of Choctaw Indians concurred with the effect

determination in an e-mail dated 29 November 2007. No other Native American tribes responded to the requests for comment.

The CEMVN received a draft programmatic Fish and Wildlife Coordination Act Report (CAR) from the USFWS on 26 November 2007. The USFWS' programmatic recommendations applicable to this project will 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: Alternatives 1 and 2 have the smallest impact on wetlands. However, investigation of project design demonstrated significant constructability issues associated with these alternatives. Although the proposed action would impact up to 5.2 more acres of wetlands and has a higher cost than alternatives 1 and 2, it has significant advantages over alternatives 1 and 2 including reduced uncertainty in the project schedule, human environmental impacts, and constructability. Also, within the proposed action alignment, a T-wall was selected instead of a levee in order to minimize impacts on wetlands within that alignment. Of those alternatives which impact wetlands, the proposed action impacts the least acreage of 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: A small amount of wetlands (0.6 acres) would be enclosed by the proposed action. However, these wetlands are currently isolated (they do not have hydrologic connections with adjacent wetlands) and the wetland area is small and of low quality (i.e., mowed) (USFWS 2009a, provided in appendix D). Although some of the alternative alignments evaluated for the Caernarvon Floodwall project would not enclose any wetlands, the proposed action was selected for the reasons described in CEMVN Response 1.

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. These issues are addressed in sections 3.2.4 and 3.2.5 of the IER.

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: This recommendation will be considered in the design of the project to the greatest extent practicable.

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

CEMVN Response 5: USACE Project Partnering Agreements do not 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 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, LaDWF, USEPA, and LaDNR. 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; Jack Bohannon (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR; Office of State Parks contact Mr. John Lavin at 1-888-677-1400; National Park Service (NPS) contact Superintendent David Luchsinger, (504) 589-3882, extension 137 (david_luchsinger@nps.gov), or Chief of Resource Management David Muth, (504) 589-3882, extension 128 (david_muth@nps.gov); and for the 404(c) area contact the previously mentioned NPS personnel and Ms. Barbara Keeler (214) 665-6698 with the USEPA.

CEMVN Response 7: 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 Fish and Wildlife Coordination Act for mitigation lands.

CEMVN Response 8: Concur.

Recommendation 9: If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements; a summary of some of those requirements is provided in appendix A (to the draft CAR). 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 reinstate 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: The proposed floodwall will be constructed primarily in an upland area. The only estuarine waterway that could be restricted is the Caernarvon Canal. However, this canal is not a major fish migration route and the proposed alignment crosses the canal near its northern terminus.

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: Acknowledged.

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, LaDWF, and LaDNR.

CEMVN Response 13: Acknowledged. The new gate would remain open except during storms. During a storm event, the gate would be closed to provide flood risk reduction.

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: The proposed floodgate would be sited within 1,800 ft of the terminus of a dead-end, industrialized canal. It is not expected to serve as an important passage area for aquatic species.

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: Acknowledged.

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: This recommendation will be considered in the design of the project to the greatest extent practicable.

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 ft per second. However, this may not necessarily be applicable to tidal passes or other similar major exchange points.

CEMVN Response 17: Acknowledged.

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 ft 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 ft 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: Concur.

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. Project does not include the utilization of multiple structures.

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: The closure gate would remain open except during major storm events.

Recommendation 23: The 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. Costs for operation, maintenance, repair, replacement, and rehabilitation will be the responsibility of the non-Federal sponsor.

Recommendation 25: Any proposed change in mitigation features or plans should be coordinated in advance with the USFWS, NMFS, LaDWF, USEPA, and LaDNR.

CEMVN Response 25: Mitigation for the impacts caused by this project will be coordinated through a mitigation IER. Any material changes to the mitigation plan in this IER would be coordinated in advance.

Recommendation 26: A report documenting the status of mitigation implementation and maintenance should be prepared every 3 years by the managing agency and provided to the CEMVN, USFWS, NMFS, USEPA, LaDNR, and LaDWF. That report should also describe future management activities, and identify any proposed changes to the existing management plan.

CEMVN Response 26: Concur.

A draft CAR for IER # 9 was provided by the USFWS on 18 August 2009 and a draft supplemental CAR was provided on 2 October 2009 (appendix D). The draft CAR and draft supplemental CAR concluded that the USFWS does not object to the construction of the proposed project provided that fish and wildlife conservation recommendations are implemented concurrently with project implementation. The USFWS project-specific recommendations for the IER # 9 proposed action are listed below. Each recommendation is followed by the CEMVN response.

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: See CEMVN Response to Programmatic Recommendation 1.

Recommendation 2: 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 2: This recommendation will be considered in the design of the project to the greatest extent practicable.

Recommendation 3: 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.

CEMVN Response 3: USACE Project Partnering Agreements 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 OMRR&R of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 4: 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 all the work addressed in those reports.

CEMVN Response 4: 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; Jack Bohannon (985) 822-2000, Refuge Manager for the Bayou Sauvage NWR; Office of State Parks contact Mr. John Lavin at 1-888-677-1400; National Park Service (NPS) contact Superintendent David Luchsinger, (504) 589-3882, extension 137 (david_luchsinger@nps.gov), or Chief of Resource Management David Muth, (504) 589-3882, extension 128 (david_muth@nps.gov); and for the 404(c) area contact the previously mentioned NPS personnel and Ms. Barbara Keeler (214) 665-6698 with the USEPA.

Recommendation 5: 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 5: Concur.

Recommendation 6: The Corps shall fully compensate for any unavoidable losses of 5.31 AAHUs of bottomland hardwoods, and 1.2 AAHUs of fresh marsh caused by project features. Development and implementation of those mitigations plans should be done in concert with the Service and other resource agencies.

CEMVN Response 6: Concur. Mitigation for the impacts caused by this project will be coordinated through a mitigation IER. Any material changes to the mitigation plan in that IER would be coordinated in advance.

7.0 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. It is anticipated that approximately 13.1 acres of emergent freshwater wetland (freshwater marsh) and forested bottomland hardwood habitat would be required for construction of the new T-wall. This includes a loss of approximately 1.9 acres of freshwater marsh, 1.2 acres of wet bottomland hardwoods, and 10 acres of non-wet bottomland hardwoods. Also, approximately 0.3 acre of the Caernarvon Canal water bottom would be permanently occupied by the new control structure.

A 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.

These forthcoming mitigation IERs will implement any required mitigation as early as possible. All mitigation activities will be consistent with standards and policies established in appropriate

Federal and state laws, and USACE policies and regulations.

8.0 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; LaDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LaCRP; receipt of a Water Quality Certification from the State of Louisiana; public review of the Section 404(b)(1) Public Notice and signature of the Section 404(b)(1) Evaluation; coordination with the Louisiana SHPO; receipt and acceptance or resolution of all Fish and Wildlife Coordination Act recommendations; receipt and acceptance or resolution of all LaDEQ comments on the air quality impact analysis documented in the IER; and receipt and acceptance or resolution of all EFH recommendations. The USFWS has concurred that the proposed action would be not likely to adversely affect the endangered or threatened species under its jurisdiction (USFWS 2009b), and concurrence from NMFS is not required because the proposed action would have no effect on the endangered or threatened species under its jurisdiction.

9.0 CONCLUSIONS

9.1 INTERIM DECISION

The proposed action consists of construction of a new alignment mainly west of the Caernarvon Canal, including roller gates across LA Highway 39 and the railroad, a floodwall (T-wall) between the SDEB property and the CFDC, a flood control structure across the Caernarvon Canal, and a floodwall from the canal to the LPV 148 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 and Canals** – Loss of up to 5.2 acres of wetlands and 0.3 acres of aquatic habitat.
- **Fisheries** – Temporary impacts to fisheries during construction.
- **Essential Fish Habitat** – Temporary impacts to EFH in the vicinity of the project area during construction and up to 0.3 acre of canal water and bottom permanently lost by the new structure.
- **Wildlife** – Temporary displacement impacts to wildlife within the vicinity of the project area during construction.
- **Threatened and Endangered Species** – CEMVN determination of not likely to adversely affect the manatee or brown pelican (USFWS jurisdiction) and no effect on the Gulf sturgeon (NMFS jurisdiction). USFWS concurrence on 2 February 2009. NMFS concurrence not required.
- **Cultural Resources** – CEMVN determination of no impact to a cultural resource. Louisiana SHPO and Tribal concurrence on 7 December 2007 and 29 November 2007.
- **Recreational Resources** – Temporary construction-related impacts on fish habitat and boat launches would reduce recreational opportunities.
- **Aesthetic (Visual) Resources** – Localized and minor impacts.
- **Air Quality** – Temporary impacts during construction.

- **Noise** – Temporary impacts to receptors within 1,000 ft of the project area during construction.
- **Transportation** – Waterborne transportation and worker/truck traffic resulting from the project would temporarily impact traffic on local waterways and roads within the vicinity of the project area.
- **Socioeconomic Resources** – Beneficial impacts on population, land use, and employment due to heightened flood risk reduction in St. Bernard Parish and construction-generated employment. Closure of Caernarvon Canal during construction would temporarily interrupt waterborne commerce on upper reach of the canal.
- **Environmental Justice** – CEMVN determination of no disproportionate adverse impact on any low-income or minority populations.

9.2 PREPARED BY

The point of contact for this IER is Laura Lee Wilkinson, USACE, CEMVN-HPO. Table 13 lists the preparers of relevant sections of this report. Ms. Wilkinson can be reached at the U.S. Army Corps of Engineers, New Orleans District; Protection and Restoration Office, P.O. Box 60267; New Orleans, Louisiana 70160-0267.

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Appendix A

List of Acronyms and Definitions of Common Terms

AADT	annual average daily traffic
ACB	articulated concrete blocks
ADCIRC	Advanced Circulation
AEP	Alternatives Evaluation Process
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CAA	Clean Air Act of 1963
CED	Comprehensive Environmental Document
CEMVN	Corps of Engineers, Mississippi Valley Division, New Orleans District
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFDC	Caernarvon Freshwater Diversion Canal
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIAP	Coastal Impact Assistance Program
CO	carbon monoxide
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
CY	cubic yard
dB	decibel
dBA	A-weighted decibel
DNL	day-night average sound level
EA	Environmental Assessment
EBI	Elevating Boats, LLC
EIS	Environmental Impact Statement
EFH	Essential Fish Habitat
EJ	Environmental Justice
ER	Engineering Regulation
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute, Inc.
°F	Fahrenheit
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
ft	foot/feet
GIWW	Gulf Intracoastal Waterway
HPS	Hurricane Protection System
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HTRW	hazardous, toxic and radioactive waste
IER	Individual Environmental Report
IHNC	Inner Harbor Navigation Canal
III	Insurance Information Institute

LA	Louisiana
LaDOTD	Louisiana Department of Transportation and Development
LCA	Louisiana Coastal Area
LaCRP	Louisiana Coastal Resources Program
LaDEQ	Louisiana Department of Environmental Quality
LaDNR	Louisiana Department of Natural Resources
LaDOL	Louisiana Department of Labor
LaDWF	Louisiana Department of Wildlife and Fisheries
LaNHP	Louisiana Natural Heritage Program
LFT	linear feet
LOS	level-of-service
LaNHP	Louisiana Natural Heritage Program
LPHP	Lake Pontchartrain Hurricane Protection
LPV	Lake Pontchartrain and Vicinity
MRGO	Mississippi River Gulf Outlet
MRL	Mississippi River Levee
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHTSA	National Highway Transportation Safety Administration
NMFS	National Marine Fisheries Service
No.	Number
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOV	New Orleans to Venice
NPS	National Park Service
NWR	National Wildlife Refuge
O ₃	ozone
OMRR&R	Operations, Maintenance, Repair, Replacement, and Rehabilitation
PCB	polychlorinated biphenyls
PDT	Project Delivery Team
Pb	lead
PL	Public Law
PM ₁₀	particulate matter less than 10 microns in diameter
PM _{2.5}	particulate matter less than 2.5 microns in diameter
ppt	parts per thousand
PWA	Plaquemines Wetland Area
RCRA	Resource Conservation and Recovery Act
REC	recognized environmental condition
RECAP	Risk Evaluation/Corrective Action Program
ROW	right-of-way
RTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
SAV	submerged aquatic vegetation
SDEB	Shallow Draft Elevating Boats, Incorporated
SHPO	State Historic Preservation Officer
SIR	Supplemental Information Report

SMPS	St. Mary's pump station
SO ₂	sulfur dioxide
sq ft	square foot/feet
SWSE	starting water surface elevation
TRM	turf reinforcement mattress
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds
vpd	vehicles per day
WBV	West Bank and Vicinity
WCRA	Wetlands Conservation and Restoration Authority
WRDA	Water Resources Development Act

Appendix B
Public Comments

Appendix C

Members of Interagency Environmental Team

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Kirk Kilgen	Louisiana Department of Natural Resources
Tim Killeen	Louisiana Department of Natural Resources
Brian Lezina	Louisiana Dept. of Wildlife and Fisheries
Brian Marcks	Louisiana Department of Natural Resources
David Muth	U.S. National Park Service
Jamie Phillip	Louisiana Dept. of Environmental Quality
Manuel Ruiz	Louisiana Dept. of Wildlife and Fisheries
Angela Trahan	U.S. Fish and Wildlife Service
David Walther	U.S. Fish and Wildlife Service
Patrick Williams	NOAA National Marine Fisheries Service

Appendix D

Agency and Tribal Government Coordination Documentation



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

RECEIVED BY
USACE CEMVN
2 FEBRUARY 2009

Dear Colonel McCormick:

Please reference the December 31, 2008, letter from Mr. Gib Owen, Acting Chief of the Environmental Planning and Compliance Branch, requesting our concurrence with determinations regarding impacts to threatened or endangered species and their critical habitat made by U.S. Army Corps of Engineers' (Corps) for work proposed in Individual Environmental Reports (IER) 5-11 in Orleans, Jefferson, and St. Bernard Parishes. Those projects would involve improvements to levees, floodwalls, floodgates, and construction of new barriers, closure structures, navigable gates and/or permanent pump stations in the New Orleans East Bank, New Orleans East and Chalmette Loop sub basins. These improvements are necessary to provide 100-year level flood protection for the New Orleans Metropolitan area. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

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

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

Some or all of the proposed project features, including alternatives, of IERs 5, 6, 7, 8, and 11 (especially the dredging of access channels for IERs 6 and 7), could potentially impact the

TAKE PRIDE
IN AMERICA 

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

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

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at:

<http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. The construction of the proposed project features for IER 10, Reach LPV 148, may potentially impact the bald eagle. If the Corps determines that construction activities will be located at or closer than 660 feet from a nest tree, the Service recommends that the Corps conduct an on-line evaluation at: <http://www.fws.gov/southeast/es/baldeagle>. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. A copy of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact our office.

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

IERs 6, 7, 8, 9, and 10 are located where colonial nesting waterbirds may be present. LDWF currently maintains a database of these colonies locations. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work sites for the presence of undocumented nesting colonies during the nesting season (e.g. February through September depending on the species). If colonies exist, work should not be conducted within 1,000 feet of the colony during the nesting season.

Portions of IER 6 and 7 are located within or may require access through the Service's Bayou Sauvage National Wildlife Refuge. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

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

All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack 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,



JF 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

BOBBY JINDAL
GOVERNOR



SCOTT A. ANGELLE
SECRETARY

State of Louisiana
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF COASTAL RESTORATION AND MANAGEMENT

July 2, 2009

Laura Lee Wilkinson
Environmental Coordinator
Hurricane Protection Office
U. S. Army Corps of Engineers, New Orleans District
P. O. Box 60267
New Orleans, Louisiana 70160-0267

RE: **C20090245**, Coastal Zone Consistency
U. S. Army Corps of Engineers, New Orleans District
Direct Federal Action
IER #9 for the Caernarvon Floodwall segment of the Chalmette Loop, Lake Pontchartrain
and Vicinity 149, **St. Bernard and Plaquemines Parish, Louisiana**

Dear Ms. Wilkinson:

The above referenced project has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The project, as proposed in the application, is consistent with the LCRP, provided that the Corps of Engineers provides adequate and appropriate mitigation for any impacts to wetland function concurrent with the construction of the floodwall, as requested by LDWF in their comment letter of June 26, 2009. 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 "Gregory J. DuCote".

Gregory J. DuCote
Administrator
Interagency Affairs/Field Services Division

GJD/JDH/bgm

cc: Dave Butler, LDWF
William McCartney, St. Bernard Parish
Albertine Kimble, Plaquemines Parish
Ismail Mehri, OCPD
Frank Cole, CMD FC

BOBBY JINDAL
GOVERNOR



HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

SEP 21 2009

U.S. Army Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Attention: Lee Walker

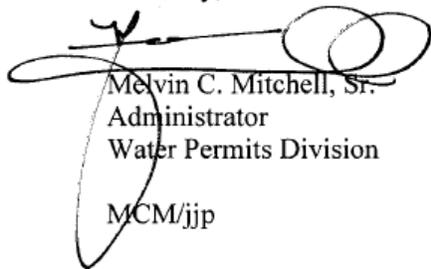
RE: Water Quality Certification (WQC 090708-02/AI 165754/CER 20090001)
Individual Environmental Report (IER) #9
Caernarvon Floodwall
Plaquemines & St. Bernard Parishes

Dear Ms. Walker:

The Department has reviewed your application for the construction of the Caernarvon Floodwall project (IER #9), in the vicinity of Braithwaite, 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,



Melvin C. Mitchell, Sr.
Administrator
Water Permits Division
MCM/jjp



United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
August 18, 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, Caernarvon Canal, New Orleans, Louisiana (IER 9, LPV Reach 149)." 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 Lake Pontchartrain and Vicinity (LPV) and the West Bank and Vicinity (WBV) Hurricane Protection Projects so those projects would provide 100-year hurricane protection (authorized as the Hurricane Storm Damage Risk Reduction System [HSDRRS]). 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. This report does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. This draft report has been provided to the Louisiana Department of Wildlife and Fisheries (LDWF) and the



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 northeast of the project area.

Most of the boundary of IER 9 project area overlays the existing LPV east bank levee system on the southern side of St. Bernard Parish (Figure 1) in southeast Louisiana. The northern boundary of the study area is the north bank of the Caernarvon Canal and the adjacent hurricane protection levee. That levee is part of the LPV Chalmette Loop levee and improvements to that levee are addressed in IER 10. North of that levee is the community of Caernarvon. The western project area boundary is the Mississippi River and its adjacent levee. The eastern portion of the project area where the proposed levee alignment traverses the Caernarvon Canal and its' adjacent spoil disposal bank is dominated by marshes and openwater. The southern boundary parallels the northern spoil disposal bank of the Caernarvon Freshwater Diversion Outfall Canal.

The project area is characterized by small communities, forested areas, marshes, and cleared land. Fresh marshes and early succesional stage bottomland hardwoods are found inside of and adjacent to the project area.

The existing spoil disposal banks for the Caernarvon Canal and the Caernarvon Freshwater Diversion Canal are bisected downstream by a pipeline canal spoil disposal bank, which creates a semi-impoundment of the project area. Tidal exchange and local rainfall run-off must pass over those spoil banks to leave the project area.



Figure 1. Lake Pontchartrain and Vicinity (LPV) Caernarvon Canal, IER 9 LPV Reach 149

The project primarily consists of the building of approximately 2,500 feet of floodwalls and a floodgate for navigation on the Caernarvon Canal and another floodgate but for vehicle traffic on Louisiana Highway 39. 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 # 10 - the Chalmette Loop Levee (LPV 145 -148).

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 existing spoil disposal banks, the local and Federal levee systems, and the Caernarvon Freshwater Diversion Structure, 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, however, local input of freshwater and sediments from the Caernarvon Freshwater Diversion is offsetting those factors. 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.

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 the areas that are predominantly non-tidal wetlands (i.e., those located behind the spoil disposal banks) 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 reach, floodwall, floodgate, and associated structures would remain at or be brought to their previously 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

Seven alternatives to the proposed action were considered in detail for the Caernarvon floodwall. These primary alternatives are: alternative 1 - modification or replacement of existing flood gates and construction of a levee with a T-wall cap; alternative 2 - realignment of the Caernarvon floodwall to the immediate western side of the Elevated Boats, Incorporated (EBI) property; alternative 3 - realignment of the Caernarvon floodwall to the western side of the Caernarvon Canal; alternative 4 - realignment of the Caernarvon floodwall to the western side of the Shallow Draft Elevating Boats, Incorporated (SDEB) property (zigzag configuration); alternative 5 - realignment of the Caernarvon floodwall to the eastern side of the Caernarvon freshwater diversion canal; alternative 6 - realignment of the Caernarvon floodwall to the western side of the SDEB property (running diagonal to the Caernarvon Canal); and alternative 7 - realignment of Caernarvon floodwall to the western side of the SDEB property (north of the EBI sea plane

hangar).

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 9 project area would provide 100-year level of protection for St. Bernard Parish by primarily constructing T-wall on top of the existing levee, however, rebuilding and/or modifying earthen levees and floodwalls and adding new floodgates are also part of the proposed plan.

Realignment of Caernarvon Floodwall to the West of the Shallow Draft Elevating Boats, Incorporated Property

The proposed action consists of constructing a new alignment mainly to the west of the Caernarvon Canal to replace the existing Caernarvon Floodwall complex on the east side of the canal. As shown in Figure 1, the new alignment would include, beginning at its northern end, the following components: a tie-in to the Mississippi River levee system; overhead trolley and roller gates across Louisiana (LA) Highway 39 and the Norfolk Southern railroad; a floodwall (T-wall) at a height of +24 ft North American Vertical Datum of 1988 (NAVD88) along the east bank of the Caernarvon freshwater Diversion canal (to the west of the SDEB property and the Caernarvon Boat Launch), turning southeast and then east to the Caernarvon Canal; a sector gate across the Caernarvon Canal south of the EBI sea plane hangar; a continuation of the floodwall from the Caernarvon Canal east to the existing HSDRRS Chalmette Loop levee (LPV 148); and a tie-in to the levee system. The existing closures across LA Highway 39 and the railroad would be demolished. The existing levee and floodwalls would be left in place in order to provide a buffer between the EBI facility and the adjacent residences.

Figure 1 indicates the location of the proposed right-of-way (permanent easement), and the staging areas and temporary construction area (temporary easement) that would be required to complete the proposed action for LPV 149. Staging areas in LPV 149 would be approximately 1.5 acres and the temporary construction easement would be approximately 12 acres. The permanent easement would be approximately 7 acres.

Construction of the proposed action is anticipated to begin in the fall 2010 and the construction activities are expected to last for approximately 21 months. A significant amount of construction equipment would be required to conduct the work, including, but not limited to, generators, barges, boats, cranes, dump trucks, bull dozers, excavators, rollers, pile hammers, graders, tractors, front end loaders, welding machines, and water trucks. Table 1 provides the estimated quantities of some of the construction materials required for completion of the proposed action.

Two staging areas would be established for this project (Figure 1). Access would be along project alignment right-of-way as well as existing roadways or levee alignment right-of-way.

Table 1. Estimated Construction Material Quantities Required to Complete the Proposed Action

Material	Units	Quantity
Borrow Material	cubic yard (CY)	5,090
Embankment Fill	CY	5,090
Clay Fill	CY	35,500
Shell Fill	CY	4,700
Sand Fill (compacted)	CY	350
Sand Fill (wet)	CY	46,000
Deep Soil Mixing	CY	24,380
Top Soil	CY	697
Graveling Surfacing	CY	700
6" Aggregate	CY	140
Concrete Form Work	square feet (sq ft)	113,795
Structural Concrete	CY	10,160
Sheet Piling	TON	1,184
Expansion Joint	linear feet (LFT)	4,365
Rebar	TON	610
H-Piling	LFT	158,963
Pipe Piling	LFT	4,032
Silt Fencing	LFT	200
Cofferdam Compression Ring	TON	900
Treated Wood Timber Pile	LFT	64,080
Timber Rail	LFT	31,600
Timber Mat	Each	10
Steel Pipe Rail	LFT	1,540
Flood Gates (railroad and highway)	TON	19
Flood Gate (sector gate)	TON	295
Gate Operating Machinery	Each	3
Precast Control House	Each	1

Armoring of Levees and Floodwalls

Armoring would be incorporated as an additional feature to protect against erosion and scour on the protected, flood, or both sides of critical portions of floodwalls (T-walls) and levees. These critical areas include: transition points (where levees and floodwalls transition into any hardened feature such as gates, 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 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 construction of a new floodwall; however, some work (approximately 400 linear feet of floodwall) would occur within the existing levee ROW. Although most construction will occur in cleared non-wet areas, 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. 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 within the impacted areas are expected to remain relatively stable with some decline from development. Because of the proximity to the Caernarvon Freshwater Diversion, subsidence and erosion are not expected to affect the project area. Implementation of the proposed project would result in the loss of 0.76 acres and 1.38 acres of wetland bottomland hardwoods and marsh, respectively. Total project impacts of marsh and bottomland hardwoods (wet and non-wet) are 7.7 acres. All impacts would result from work within the proposed ROW; therefore, most impacts were linear in nature. All impacts were determined from geographic information system (GIS) files produced by the Corps. A total of 1.4 acres of fresh marsh would be impacted resulting in the loss of 0.61 Average Annual Habitat Units (AAHUs). Approximately 0.9 acres (0.15 AAHUs) of fresh marsh would temporarily be lost while 0.5 acres (0.46AAHUs) would be permanently lost. Impacts to bottomland hardwoods would result in the loss of 6.3 acres and 1.87 AAHUs, however, 4.5 acres (0.79 AAHUs) of that total would be only temporarily impacted.

Table2: Impacts (wet and non-wet) of IER 109 (LPV Caernarvon Canal) 100-year Level Protection

Habitat Type	Impacted (acres)	Permanent (P) Temporary(T)	AAHUs lost	Acres by Habitat Type	AAHUs by Habitat Type
Fresh Marsh	0.9	T	0.15	1.4	0.61
Fresh Marsh	0.5	P	0.46		
Bottomland Hardwoods	4.5	T	0.79	6.3	1.8
Bottomland Hardwoods	1.8	P	1.08		
Total	7.7		2.48	7.7	2.4

IER 9 proposed floodwalls would separate wetlands (which are predominantly marsh and young bottomland hardwoods) 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). However, the relatively small total acreage enclosed by the T-wall and the opening at the canal would help to minimize the impact of fragmentation and isolation.

No Federally listed threatened or endangered species presently occur within the proposed 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 marsh 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.

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 and other project features and through the 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. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.
3. 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.
4. 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.
5. 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.
6. The Corps shall fully compensate for any unavoidable losses of 1.87 AAHUs of bottomland hardwoods, and 0.61 AAHUs of fresh marsh caused by project features. Development and implementation of those mitigation 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,



 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

Appendix A: Habitat Impact Analysis

Individual Environmental Report (IER) Lake Pontchartrain and Vicinity (LPV) Orleans
East Bank, Caernarvon Canal, Louisiana (IER 9).

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 and non-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. Explanations of the assumptions affecting HSI values for each target year is available for review at the Service's Lafayette, Louisiana, Field Office and are summarized below. Additional information regarding the methodology and assessment are presented in Appendix A.

The HAM quantifies project effects on fish and wildlife in terms of habitat units. Habitat units are the product of a habitat suitability index (HSI) and the acreage of available habitat at a given target year. The HSI is derived from a mathematical model developed specifically for each wetland type; that model incorporates ecological variables important in characterizing fish and wildlife habitats. The HAM model for bottomland hardwoods consists of seven variables: tree species composition, stand maturity, understory/midstory percentage, hydrology, size of contiguous forested area, suitability and traversability of surrounding land uses, and disturbance. The HAM model for swamp consists of six variables: stand structure, stand maturity, hydrology, size of contiguous forested area, suitability and traversability of surrounding habitat, and disturbance. An HSI is calculated by measuring habitat variable data from each sample site and mathematically combining them to obtain a value between 0.0 and 1.0, with 0.0 representing no habitat value and 1.0 representing optimum habitat value.

Evaluation of project-related impacts on marsh habitats was conducted using the WVA methodology. The WVA provides a quantitative estimate of project-related impacts to fish and wildlife resources. Although the WVA does not include every environmental or behavioral variable that could limit populations below its habitat potential, the approach is widely acknowledged to provide a cost-effective and acceptable means of assessing restoration measures in coastal wetland communities.

The WVA models for fresh/intermediate marshes consist of six variables: 1) percent of wetland covered by emergent vegetation; 2) percent open water dominated by submerged aquatic vegetation (SAV); 3) degree of marsh edge and interspersions; 4) percent of open water less than or equal to 1.5 feet deep; 5) salinity; and, 6) aquatic organism access. By incorporating variables for

SAV and shallow, open water into the marsh model, impacts to those habitat components are combined with impacts to emergent marshes. Because emergent marsh is of higher overall fish and wildlife value than SAV, and because SAV is of higher value than shallow open waters, those latter components receive proportionally less weight when combined into one AAHU value.

Habitat units fluctuate in response to changes in habitat quality (HSI) and/or quantity (acres); those changes are predicted for various target years over the project life (i.e., 50 years), for future without-project and future with-project scenarios. Target years (TY) were selected for this analysis to capture the effects of important biological events. In determining future with-project conditions, all project-related direct (construction) impacts were assumed to occur in TY-1. Values for model variables were obtained from site visits to the area, previous wetland assessments in similar habitats, communication with personnel knowledgeable about the study area and similar habitats, and review of aerial photographs and reports documenting fish and wildlife habitat conditions in the study area and similar habitats. For all the habitat assessment models, the products of the resulting HSI values and acreage estimates were then summed and annualized for each habitat type to determine the average annual habitat units (AAHUs) available. The net change (increase or decrease) in AAHUs under future with-project conditions, compared to future without-project conditions, provides a quantitative comparison of anticipated project impact/benefits.

In the future without project scenario, fish and wildlife and their habitats within the project area are expected to remain relatively stable with some decline from development, subsidence, and erosion. All impacts would result from work within the existing right-of-way (ROW) therefore; most impacts were linear in nature. In addition, the future without-project habitats should remain because without further improvements to the hurricane protection features no addition impacts were anticipated. Most impacts were determined from geographic information system (GIS) shape files produced by the Corps of Engineers, New Orleans District (Corps).

Bottomland hardwoods within the ROW were identified in 1998 Digital Orthophoto Quarter Quadrangle aerial photographs (DOQQ) and then re-examined in the 2004, 2005, 2006, and 2007 DOQQs to determine if those areas survived previous hurricanes and levee refurbishment. Shape files were made for only those areas that appeared to persist through-out all of the DOQQs. Data for the HAM/WVA analysis of impacts was collected from the IER 9 project area. Locations of those collection sites are available from the Corps or the Service.

Impacts to bottomland hardwood were quantified by acreage and habitat quality (i.e., average annual habitat unit or AAHUs) and are presented in Table 1. Implementation of the proposed project would result in the loss of 7.7 acres of bottomland hardwoods and marsh. (Table 1). A total of 1.4 acres of fresh marsh would be lost resulting in the loss of 0.61 AAHUs. Impacts to bottomland hardwoods would result in a total of approximately 6.3 acres lost and 1.87 AAHUs lost.

Table 1: Impacts (wet and non-wet) of IER 9 (LPV Chalmette Loop) 100-year Level Protection

Habitat Type	Impacted (acres)	Permanent (P) Temporary(T)	AAHUs lost	Acres by Habitat Type	AAHUs by Habitat Type
Fresh Marsh	0.9	T	0.15	1.4	0.61
Fresh Marsh	0.5	P	0.46		
Bottomland Hardwoods	4.5	T	0.79	6.3	1.8
Bottomland Hardwoods	1.8	P	1.08		
Total	7.7		2.48	7.7	2.4

Table 2: Wetland Impacts of IER 9 (LPV Chalmette Loop) 100-year Level Protection

Habitat Type	Impacted (acres)	Permanent (P) Temporary(T)	AAHUs lost	Acres by Habitat Type	AAHUs by Habitat Type
Fresh Marsh	0.9	T	0.15	1.4	0.61
Fresh Marsh	0.5	P	0.46		
Bottomland Hardwoods	0.6	T	0.11	0.76	0.2
Bottomland Hardwoods	0.16	P	0.09		
Total	2.16		0.81	2.16	0.81

Table 2: Non-wet Bottomland Hardwood Impacts of IER 9 (LPV Chalmette Loop) 100-year Level Protection

Habitat Type	Impacted (acres)	Permanent (P) Temporary(T)	AAHUs lost
Bottomland Hardwoods	3.9	T	0.69
Bottomland Hardwoods	1.64	P	0.94
Total	5.54		1.63

HAM and WVA spreadsheets displaying variable values are included in the following section.

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: IER 9 Temporary impacts

Project Area: 1

Fresh..... 1

Condition: Future Without Project

Intermediate..

Variable		TY 0		TY 1		TY 4	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	50	0.55	50	0.55
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	% 100	0.40	% 100	0.40
V4	%OW <= 1.5ft	100	0.60	100	0.60	100	0.60
V5	Salinity (ppt) fresh intermediate	0	1.00	0	1.00	0	1.00
V6	Access Value fresh intermediate	0.00	0.30	0.00	0.30	0.00	0.30
Emergent Marsh HSI		= 0.54		EM HSI = 0.54		EM HSI = 0.54	
Open Water HSI		= 0.25		OW HSI = 0.25		OW HSI = 0.25	

Project:
FWOP

Variable		TY 50		Value	SI	Value	SI
		Value	SI				
V1	% Emergent	50	0.55				
V2	% Aquatic	0	0.10				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	%		%	
V4	%OW <= 1.5ft	100	0.60				
V5	Salinity (ppt) fresh intermediate	0	1.00				
V6	Access Value fresh intermediate	0.00	0.30				
EM HSI		= 0.54		EM HSI =		EM HSI =	
OW HSI		= 0.25		OW HSI =		OW HSI =	

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project:

Project Area: 0.9

Fresh..... 1

Condition: Future With Project

Intermediate.

Variable		TY 0		TY 1		TY 4	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	0	0.10	25	0.33
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	% 100	0.10	% 100	0.20
V4	%OW <= 1.5ft	100	0.60	0	0.10	0	0.10
V5	Salinity (ppt) fresh intermediate	0	1.00	0	1.00	0	1.00
V6	Access Value fresh intermediate	0.00	0.30	0.00	0.30	0.00	0.30
Emergent Marsh HSI		= 0.54		EM HSI = 0.22		EM HSI = 0.38	
Open Water HSI		= 0.25		OW HSI = 0.19		OW HSI = 0.20	

Project:

FWP

Variable		TY 50		Value	SI	Value	SI
		Value	SI				
V1	% Emergent	50	0.55				
V2	% Aquatic	0	0.10				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	%		%	
V4	%OW <= 1.5ft	100	0.60				
V5	Salinity (ppt) fresh intermediate	0	1.00				
V6	Access Value fresh intermediate	0.00	0.30				
EM HSI =		0.54		EM HSI =		EM HSI =	
OW HSI =		0.25		OW HSI =		OW HSI =	

Project:
FWP

Variable		Value		SI		Value		SI	
V1	% Emergent								
V2	% Aquatic								
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5		%		%		%		
V4	%OW <= 1.5ft								
V5	Salinity (ppt) fresh intermediate								
V6	Access Value fresh intermediate								
		EM HSI =		EM HSI =		EM HSI =			
		OW HSI =		OW HSI =		OW HSI =			

AAHU CALCULATION - EMERGENT MARSH

Project:

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	0.9	0.54	0.49	
1	0.9	0.54	0.49	0.49
4	0.9	0.54	0.49	1.46
50	0.9	0.54	0.49	22.45
			AAHUs =	1.22

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	0.9	0.54	0.49	
1	0.9	0.22	0.19	0.34
4	0.9	0.38	0.34	0.81
50	0.9	0.54	0.49	19.15
			AAHUs	1.01

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	1.01
B. Future Without Project Emergent Marsh AAHUs	=	1.22

Revised 10/7/2008

8/18/2009

Net Change (FWP - FWOP) = -0.21

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: IER 9 Permanent impacts

Project Area: 1

Fresh..... 1

Condition: Future Without Project

Intermediate..

Variable		TY 0		TY 1		TY 4	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	50	0.55	50	0.55
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	% 100	0.40	% 100	0.40
V4	%OW <= 1.5ft	100	0.60	100	0.60	100	0.60
V5	Salinity (ppt) fresh intermediate	0	1.00	0	1.00	0	1.00
V6	Access Value fresh intermediate	0.00	0.30	0.00	0.30	0.00	0.30
Emergent Marsh HSI =		0.54		EM HSI =	0.54	EM HSI =	0.54
Open Water HSI =		0.25		OW HSI =	0.25	OW HSI =	0.25

Project:
FWOP

Variable		TY 50		Value	SI	Value	SI
		Value	SI				
V1	% Emergent	50	0.55				
V2	% Aquatic	0	0.10				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	%		%	
V4	%OW <= 1.5ft	100	0.60				
V5	Salinity (ppt) fresh intermediate	0	1.00				
V6	Access Value fresh intermediate	0.00	0.30				
EM HSI =		0.54		EM HSI =		EM HSI =	
OW HSI =		0.25		OW HSI =		OW HSI =	

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project:

Project Area: 0.5

Fresh..... 1

Condition: Future With Project

Intermediate.

Variable		TY 0		TY 1		TY 4	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.40	% 100	0.10	% 100	0.10
V4	%OW <= 1.5ft	100	0.60	0	0.10	0	0.10
V5	Salinity (ppt) fresh intermediate	0	1.00	0	1.00	0	1.00
V6	Access Value fresh intermediate	0.00	0.30	0.00	0.30	0.00	0.30
Emergent Marsh HSI		=	0.54	EM HSI =	0.22	EM HSI =	0.22
Open Water HSI		=	0.25	OW HSI =	0.19	OW HSI =	0.19

Project:

FWP

Variable		TY 50		Value	SI	Value	SI
		Value	SI				
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	% 100	0.10	%		%	
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt) fresh intermediate	0	1.00				
V6	Access Value fresh intermediate	0.00	0.30				
EM HSI =		0.22		EM HSI =		EM HSI =	
OW HSI =		0.19		OW HSI =		OW HSI =	

Project:
FWP

Variable							
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	%		%		%	
V4	%OW <= 1.5ft						
V5	Salinity (ppt) fresh intermediate						
V6	Access Value fresh intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

AAHU CALCULATION - EMERGENT MARSH

Project:

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	0.5	0.54	0.27	
1	0.5	0.54	0.27	0.27
4	0.5	0.54	0.27	0.81
50	0.5	0.54	0.27	12.47
			AAHUs =	0.68

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	0.5	0.54	0.27	
1	0.5	0.00	0.00	0.14
3	0.5	0.00	0.00	0.00
50	0.5	0.00	0.00	0.00
			AAHUs	0.01

NET CHANGE IN AAHUs DUE TO PROJECT			
A. Future With Project Emergent Marsh AAHUs	=		0.01
B. Future Without Project Emergent Marsh AAHUs	=		0.68

Revised 10/7/2018

8/18/2009

Net Change (FWP - FWOP) = -0.67

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project..... IER 9 Temporary

Acres: 4.5

Condition: Future With Project

Variable		TY 0		TY 1		TY 11	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 3	0.60	Class 3		Class 2	0.40
V2	Maturity (input age or dbh, not both)	Age dbh 9.52	0.20	Age 0.000000001 dbh	0.00	Age 8 dbh	0.07
V3	Understory / Midstory	Understory % 34.7 Midstory % 66.7	0.92	Understory % 0 Midstory % 0		Understory % 15 Midstory % 75	0.65
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50
V5	Forest Size	Class 4	0.80	Class 1		Class 4	0.80
V6	Surrounding Land Use	Values % Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	0.55	Values % 32 57 11	0.55	Values % 32 57 11	0.55
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class 1 Class 2	0.26	Class 1 Class 2	0.26
		HSI = 0.44		HSI = 0.00		HSI = 0.28	

Project..... IER 9 Temporary
FWP

Variable		TY 50		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 3	0.60	Class		Class	
V2	Maturity (input age or dbh, not both)	Age dbh 47	0.94	Age dbh		Age dbh	
V3	Understory / Midstory	Understory % 20 Midstory % 20	0.85	Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Class 2	0.50	Class		Class	
V5	Forest Size	Class 4	0.80	Class		Class	
V6	Surrounding Land Use	Values % Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	0.55	Values % 32 57 11		Values % 32 57 11	
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class Class		Class Class	
		HSI = 0.66		HSI =		HSI =	

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project..... IER 9 Temporary

Acres: 4.5

Condition: Future Without Project

Variable		TY 0		TY 1		TY 11	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 3	0.60	Class 3	0.60	Class 3	0.60
V2	Maturity (input age or dbh, not both)	Age dbh 9.52	0.20	Age dbh 9.28	0.19	Age dbh 10.37	0.26
V3	Understory / Midstory	Understory % 34.7 Midstory % 66.7	0.92	Understory % 35 Midstory % 67	0.92	Understory % 33 Midstory % 40	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80
V6	Surrounding Land Use	Values % 32 57 11	0.55	Values % 32 57 11	0.55	Values % 32 57 11	0.55
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class 1 Class 2	0.26	Class 1 Class 2	0.26
		HSI = 0.44		HSI = 0.43		HSI = 0.48	

Project..... IER 9 Temporary
FWP

Variable		TY 50		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 4	0.80	Class		Class	
V2	Maturity (input age or dbh, not both)	Age dbh 20	1.00	Age dbh		Age dbh	
V3	Understory / Midstory	Understory % 30 Midstory % 30	1.00	Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Class 2	0.50	Class		Class	
V5	Forest Size	Class 4	0.80	Class		Class	
V6	Surrounding Land Use	Values % 32 57 11	0.55	Values %		Values %	
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class Class		Class Class	
		HSI = 0.74		HSI =		HSI =	

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project..... IER 9 Permanent

Acres: 1.8

Condition: Future With Project

Variable		TY 0		TY 1		TY 11	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 3	0.60	Class 1		Class 1	
V2	Maturity (input age or dbh, not both)	Age dbh 9.52	0.20	Age 0.000000001 dbh	0.00	Age 0.000000001 dbh	0.00
V3	Understory / Midstory	Understory % 34.7 Midstory % 66.7	0.92	Understory % 0 Midstory % 0		Understory % 0 Midstory % 0	
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50
V5	Forest Size	Class 4	0.80	Class 1		Class 4	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	32	0.55	32	0.55	32	0.55
	Abandoned Ag Pasture / Hay	57		57		57	
	Active Ag Development	11		11		11	
V7	Disturbance	Class 1	0.26	Class 1	0.26	Class 1	0.26
	Type	Class 2		Class 2		Class 2	
	Distance						
		HSI = 0.44		HSI = 0.00		HSI = 0.00	

Project..... IER 9 Permanent
FWP

Variable		TY 50		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 1		Class		Class	
V2	Maturity (input age or dbh, not both)	Age 0.000000001 dbh	0.00	Age dbh		Age dbh	
V3	Understory / Midstory	Understory % 0 Midstory % 0		Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Class 2	0.50	Class		Class	
V5	Forest Size	Class 4		Class		Class	
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	32	0.55				
	Abandoned Ag Pasture / Hay	57					
	Active Ag Development	11					
V7	Disturbance	Class 1	0.26	Class		Class	
	Type	Class 2		Class		Class	
	Distance						
		HSI = 0.00		HSI =		HSI =	

COMMUNITY HABITAT SUITABILITY MODEL

Bottomland Hardwoods

Project..... IER 9 Permanent

Acres: 1.8

Condition: Future Without Project

Variable		TY 0		TY 1		TY 11	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 3	0.60	Class 3	0.60	Class 3	0.60
V2	Maturity (input age or dbh, not both)	Age dbh 9.52	0.20	Age dbh 9.28	0.19	Age dbh 10.37	0.26
V3	Understory / Midstory	Understory % 34.7 Midstory % 66.7	0.92	Understory % 35 Midstory % 67	0.92	Understory % 33 Midstory % 40	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80
V6	Surrounding Land Use	Values % Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	0.55	Values % 32 57 11	0.55	Values % 32 57 11	0.55
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class 1 Class 2	0.26	Class 1 Class 2	0.26
		HSI =	0.44	HSI =	0.43	HSI =	0.48

Project..... IER 9 Permanent
FWP

Variable		TY 50		TY		TY	
		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Species Assoc.	Class 4	0.80	Class		Class	
V2	Maturity (input age or dbh, not both)	Age dbh 20	1.00	Age dbh		Age dbh	
V3	Understory / Midstory	Understory % 27 Midstory % 33	0.96	Understory % Midstory %		Understory % Midstory %	
V4	Hydrology	Class 2	0.50	Class		Class	
V5	Forest Size	Class 4	0.80	Class		Class	
V6	Surrounding Land Use	Values % Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	0.55	Values % 32 57 11		Values % 32 57 11	
V7	Disturbance Type Distance	Class 1 Class 2	0.26	Class 1 Class 2		Class 1 Class 2	
		HSI =	0.74	HSI =		HSI =	

USDA **NRCS** Natural Resources Conservation Service



Boutte Field Office



Date:

9/10/09

To:

Laura Wilkinson

Fax No.:

504-862-2897

Subject:

IER # 9.

Pages:

3, including this cover sheet.

Comments:

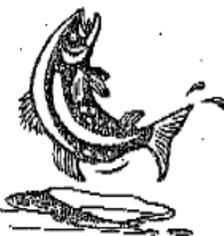
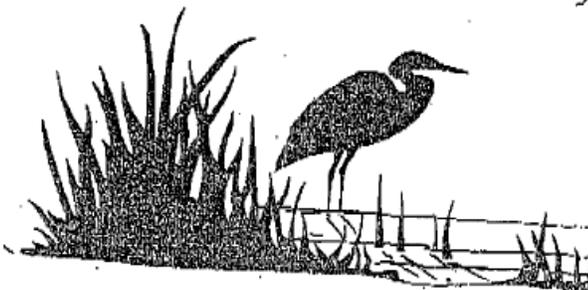
Michael Truscclair, District Conservationist

14246 U.S. Hwy. 90

Boutte, LA 70039

Phone: 985-758-2162 ext. 3

Fax: 985-758-7734



U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I (To be completed by Federal Agency)		Date Of Land Evaluation Request 9/9/09			
Name Of Project Individual Environmental Report (IER) #9		Federal Agency Involved USACE CEMVN			
Proposed Land Use Flood Control Structures (Floodwalls & Gates)		County And State St. Bernard Parish, Louisiana			
PART II (To be completed by NRCS)		Date Request Received By NRCS			
Does the site contain prime, unique, statewide or local important farmland? (If no, the FPPA does not apply - do not complete additional parts of this form).		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Acres Irrigated	Average Farm Size
Major Crop(s) Soybeans		Farmable Land In Govt. Jurisdiction Acres: 19,734 % 6%		Amount Of Farmland As Defined In FPPA Acres: 19,734 % 6	
Name Of Land Evaluation System Used St. Bernard Parish		Name Of Local Site Assessment System none		Date Land Evaluation Returned By NRCS 9/10/09	
PART III (To be completed by Federal Agency)		Alternative Site Rating			
		Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly		10.0			
B. Total Acres To Be Converted Indirectly		0.0			
C. Total Acres In Site		10.0	0.0	0.0	0.0
PART IV (To be completed by NRCS) Land Evaluation Information					
A. Total Acres Prime And Unique Farmland		4			
B. Total Acres Statewide And Local Important Farmland		0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		.0002			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value		100			
PART V (To be completed by NRCS) Land Evaluation Criterion					
Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)		88	0	0	0
PART VI (To be completed by Federal Agency)					
Site Assessment Criteria (These criteria are explained in 7 CFR 658.5(b))		Maximum Points			
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS		160	0	0	0
PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)		100	0	0	0
Total Site Assessment (From Part VI above or a local site assessment)		160	0	0	0
TOTAL POINTS (Total of above 2 lines)		260	0	0	0
Site Selected:		Date Of Selection		Was A Local Site Assessment Used?	
Reason For Selection:				Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

(See instructions on reverse side)

This form was electronically produced by National Production Services Staff

Form AD-1006 (10-83)

BOBBY JINDAL
GOVERNOR



HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

SEP 21 2009

U.S. Army Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Attention: Lee Walker

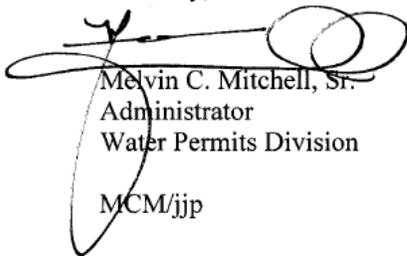
RE: Water Quality Certification (WQC 090708-02/AI 165754/CER 20090001)
Individual Environmental Report (IER) #9
Caernarvon Floodwall
Plaquemines & St. Bernard Parishes

Dear Ms. Walker:

The Department has reviewed your application for the construction of the Caernarvon Floodwall project (IER #9), in the vicinity of Braithwaite, 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,



Melvin C. Mitchell, Sr.
Administrator
Water Permits Division
MCM/jjp



United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
October 2, 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, Caernarvon Canal, New Orleans, Louisiana (IER 9, LPV Reach 149)." 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 draft supplemental report contains an analysis of the impacts on fish and wildlife resources that would result from changes to the previously proposed plan to implement the 100-year hurricane protection project for that area, and provides recommendations to minimize and/or mitigate project impacts on those resources.

The Corps has recently modified the IER 9 project. The U.S. Fish and Wildlife Service (Service) provided recommendations on the previously proposed IER 9 project to the Corps in our August 18, 2009, draft Fish and Wildlife Coordination Act Report and our November 26, 2007, draft Fish and Wildlife Coordination Act Report that addresses the hurricane protection improvements authorized in Supplemental 4. This report supplements those reports and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and when finalized will constitute the report of the Secretary of the Interior as required by Section 2(b) of that Act. This draft supplemental 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.

The project area is characterized by small communities, forested areas, marshes, and cleared land. Fresh marshes and early successional stage bottomland hardwoods are found inside of and adjacent to the project area. Additional information about the study area and a discussion of the significant fish and wildlife resources (including habitats) that occur within that study area are contained in our August 2008 report (available at: http://www.fws.gov/filedownloads/ftp_gis/R4/Louisiana_ES/Walther/IER%202/). For brevity, that information and discussion is incorporated by reference herein.

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The project primarily consists of the building of approximately 2,500 feet of floodwalls and a floodgate for navigation on the Caernarvon Canal and another floodgate but for vehicle traffic on Louisiana Highway 39. 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), and IER 10 - the Chalmette Loop Levee (LPV 145 - 148). Modifications to the previous plan in IER 9 were proposed in order to provide sufficient staging areas for construction and to accommodate local sponsor's requests.

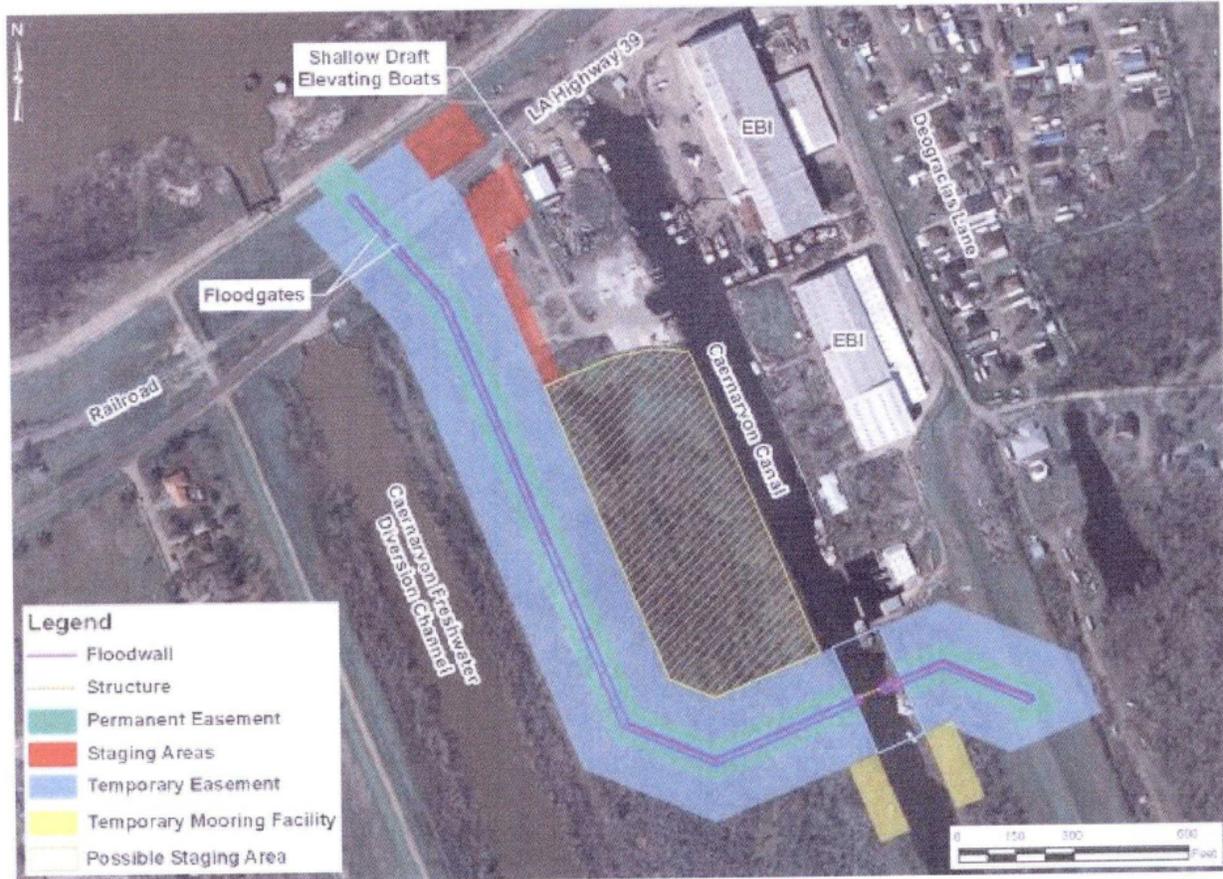


Figure 1. Previous proposed plan for the Lake Pontchartrain and Vicinity (LPV) Caernarvon Canal, IER 9 LPV Reach 149 (figure provided by U.S. Army Corps of Engineers)



Figure 2. Current proposed plan for the Lake Pontchartrain and Vicinity (LPV) Caernarvon Canal, IER 9 LPV Reach 149 (figure provided by U.S. Army Corps of Engineers)

Figure 2 displays the revised proposed project including the location of new staging areas, removal of the existing floodgate, and additional access roads. The area entitled Possible Staging Area on Figure 1 was not included in the previous impact analysis.

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 bottomland hardwoods and the WVA was used to assess impacts to marsh. An explanation of the those models, their methodologies and assumptions affecting impact analysis are available for review at the Service's Lafayette, Louisiana, Field Office.

IER 9 project impacts, prior to the proposed modification would have impacted approximately 1.4 acres (0.61 Average Annual Habitat Units[AAHUs]) of fresh marsh and 6.3 acres (1.8 AAHUs) of bottomland hardwoods. As a result of the proposed modifications an additional 0.5 acres of marsh and an additional 5 acres of bottomland hardwoods would be impacted. In total an additional of 5.5 additional acres would be impacted. Total project impacts of marsh and bottomland hardwoods (wet and non-wet) are 13.1 acres and 6.5 AAHUs (Table 1). Most impacts

were determined from geographic information system (GIS) files produced by the Corps; however the Service constructed GIS files as needed for the impact analysis.

Table 1: Impacts (wet and non-wet) of IER 109 (LPV Caernarvon Canal) 100-year Level Protection

Habitat Type	Impacted (acres)*	Permanent (P) or Temporary(T) Impact	Wetland Impacted (I) Enclosed (E)	AAHUs lost	Acres by Habitat Type	AAHUs by Habitat Type
Fresh Marsh	0.6	T	I	0.1	1.9	1.2
Fresh Marsh	0.6	P	I	0.46		
Fresh Marsh	0.7	T	I/E	0.64		
Bottomland Hardwoods	8.3	T	I (non-wet)	3.84	11.22	5.31
Bottomland Hardwoods	1.1	T	I	0.63		
Bottomland Hardwoods	1.76	P	I (non-wet)	0.81		
Bottomland Hardwoods	0.06	P	I	.03		
Total					13.12	6.5

*Does not include 0.57 acres of un-impacted enclosed wetlands.

For the entire project a total of 1.9 acres of fresh marsh would be impacted resulting in the loss of 1.2 AAHUs. Of that acreage, approximately 0.6 acres (0.46 AAHUs) of fresh marsh would be lost due to the levee and the permanently maintained right-of-way. An additional 0.7 acres (0.1 AAHUs) would be temporarily impacted but are not likely to recover from their use as a staging area (anticipated clear and filling), thus those impacts were treated as permanent impacts. The remaining 0.6 acres (0.1 AAHUs) located on the floodside of the levee would be temporarily impacted and are expected to recover over the project life.

Impacts to bottomland hardwoods would result in the loss of 11.22 acres and 5.31 AAHUs, however, 10 acres (4.65 AAHUs) of that total would be impacts to non-wet bottomland hardwoods. Of the 1.16 acres (0.66 AAHUs) of wet bottomland hardwoods that would be impacted, approximately 0.06 (0.03) acres would be permanently impacted, however, the other 1.1 acres (0.63 AAHUs) of temporary impacts were treated as permanent impacts because that area is not likely to recover from its use as a staging area (anticipated clear and filling). Approximately 8.3 acres (3.84 AAHUs) of non-wet bottomland hardwoods were treated as permanent impacts for the same reasons above and because adjacent areas cleared since approximately 2001 have been maintained by mowing. The remaining 1.1 acres (0.63 AAHUs) of bottomland hardwoods would be temporarily impacted and are expected to begin recovering following construction, however, because of the presence of exotic tree species the habitat quality of the recovering site is expected to be reduced.

Approximately 0.57 acres of fresh, non-tidal marsh would be enclosed within IER 9. Approximately 0.1 acres of this area is adjacent to State Highway 39 while the remaining 0.47 acres is located in a mowed area between the proposed levee and the Caernarvon Canal. Because this wetland is currently isolated from any tidal influence it can become dry during droughts. Most of the southern part of this area was cleared between 1998 and 2001 (as determined by Service interpretation of satellite photographs) and has probably been maintained by mowing as evidenced by the lack of scrub-shrub vegetation, which is found along the edge of the adjacent bottomland hardwoods. The Service in our 2007 draft report recommended that any wetlands enclosed within a flood protection feature should have either a non-development easement purchased on those wetlands or should have hydrologic connections with adjacent wetlands maintained. As previously mentioned these are isolated wetlands therefore the second part of our recommendation is not applicable. The purpose of the first part of that recommendation is to reduce the likelihood of large wetland areas from being enclosed within a flood protection project and having those areas subjected to development pressures that would have otherwise not existed. This wetland area is small and is of low-quality (i.e., mowed); therefore, the Service does not support the first part of our previous recommendation but only in regard to these wetlands. The small acreage beside the state highway is most likely associated with road construction and drainage and is not considered to be threatened by any development that may occur behind the protection levee. While the 0.47 acres could be lost sooner to development because of proposed levee alignment the Service does not believe that purchase of a non-development easement on that area is a practical solution. However, development of that wetland would require a permit from the Corps Wetland Regulatory Program and that program would determine mitigation needs at that time.

No Federally listed threatened or endangered species presently occur within the proposed 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.

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). Considering the high value of bottomland hardwoods and marsh for fish and wildlife and the relative scarcity of that habitat type, the mitigation goal for those wetlands is no net loss of in-kind habitat value.

The Service does not object to the proposed modifications to IER 9 provided compensation for 6.5 AAHUs is achieved to replace the project-related loss. The Service believes that the recommendations (presented below and adjusted to reflect project modifications) provided in our August 2008, FWCA Report continue to remain valid.

SERVICE POSITION AND RECOMMENDATIONS

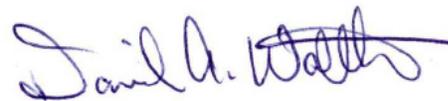
The Service does not object to providing improved hurricane protection to the Greater New

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. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.
3. 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.
4. 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.
5. 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.
6. The Corps shall fully compensate for any unavoidable losses of 5.31 AAHUs of bottomland hardwoods, and 1.2 AAHUs of fresh marsh caused by project features. Development and implementation of those mitigation 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,



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
OCPR, Baton Rouge, LA

Appendix E
Air Quality Analysis

**Table E-1.
Non-road Construction Equipment Emissions Calculation Information**

Equipment Type/Activity	Num. of Units	HP	Hrs/day	Days/yr	Load Factors (percent)	Emission Factor (grams/hp-hour)					
						VOC	NO ₂	CO	PM ₁₀	PM _{2.5}	SO ₂
Water Trucks	1	489	6	240	57	0.18	3.89	2.18	0.22	0.21	0.12
Diesel Powered Tug Boat	2	4,268	6	240	40	0.20	8.16	1.56	0.21	0.21	0.18
Gas Powered Work Boat	1	5,046	6	240	40	0.19	3.31	0.86	0.22	0.22	0.34
Diesel Powered Dump Trucks	2	489	6	240	57	0.18	3.89	2.18	0.22	0.21	0.12
Diesel Powered Flatbed Trucks	2	489	6	240	57	0.18	3.89	2.18	0.22	0.21	0.12
Diesel Powered Compaction Rollers	1	99	6	240	59	0.38	4.65	1.65	0.34	0.33	0.12
Diesel Powered Pile Driver	2	209	6	240	43	0.54	6.52	2.02	0.40	0.38	0.11
Diesel Powered Cement & Mortar Mixers	5	11	6	240	43	1.28	6.84	4.17	0.74	0.72	0.13
Diesel Powered Cranes	3	194	6	240	43	0.33	4.69	0.94	0.21	0.20	0.11
Diesel Powered Graders	1	172	6	240	59	0.31	4.13	1.27	0.26	0.25	0.12
Diesel Powered Tractors/Loaders/Backhoes	2	77	6	240	21	1.68	6.77	7.91	1.23	1.19	0.15
Diesel Powered Bull Dozers	2	356	6	240	59	0.26	4.74	1.96	0.25	0.25	0.12
Diesel Powered Front Loaders	1	158	6	240	59	0.34	4.44	1.40	0.28	0.27	0.12
Diesel Powered Generator Set	2	22	6	240	43	1.03	5.74	3.37	0.62	0.60	0.13

Sources:

Non-road Engine and Vehicle Emission Study – Report (USEPA 1991) for non-road vehicle horsepower values.

Median Life, Annual Activity, and Load Factor Values for Non-road Engine Emissions Modeling (USEPA 2004) for non-road vehicle load factors.

USEPA generated NON-ROAD Model Worksheet (2008) for non-road vehicle emission factors.

Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (USEPA 2000) for marine vessel horsepower, load factor, and emission factor values.

**Table E-2.
Non-Road Construction Equipment Emissions**

Equipment Type/Activity	Emission Rate (tons/yr)					
	VOC	NO_x	CO	PM₁₀	PM_{2.5}	SO₂
Water Trucks	0.08	1.72	0.96	0.10	0.09	0.05
Diesel Powered Tug Boat	1.06	44.20	8.46	1.12	1.12	0.99
Gas Powered Work Boat	0.60	10.60	2.75	0.69	0.69	1.07
Diesel Powered Dump Truck	0.16	3.44	1.93	0.19	0.19	0.10
Diesel Powered Flatbed Trucks	0.16	3.44	1.93	0.19	0.19	0.10
Diesel Powered Compaction Rollers	0.04	0.43	0.15	0.03	0.03	0.01
Diesel Powered Pile Driver	0.15	1.86	0.57	0.11	0.11	0.03
Diesel Powered Cement & Mortar mixers	0.05	0.26	0.16	0.03	0.03	0.00
Diesel Powered Cranes	0.13	1.86	0.37	0.08	0.08	0.05
Diesel Powered Graders	0.05	0.66	0.21	0.04	0.04	0.02
Diesel Powered Tractors/Loaders/Backhoes	0.09	0.35	0.41	0.06	0.06	0.01
Diesel Powered Bull Dozers	0.18	3.16	1.31	0.17	0.16	0.08
Diesel Powered Front Loaders	0.05	0.66	0.21	0.04	0.04	0.02
Diesel Powered Generator Set	0.03	0.17	0.10	0.02	0.02	0.00
Total Non-road Equipment	2.8	72.8	19.5	2.9	2.9	2.5

**Table E-3.
Commuter Vehicle and Heavy Duty Truck Delivery Emissions**

Pollutant	Emission Factors (lbs/hr)		Assumptions					Results by Pollutant		
	Cars	Trucks	One Way Trip Distance (mi)	Speed (mph)	Day/Yr	Number of Cars	Number of Trucks	Total Emissions Cars (tons/yr)	Total Emissions trucks (tons/yr)	Total Emissions (tons/yr)
VOC	0.045	0.025	60	25	240	15	20	0.1	0.1	0.2
NO _x	0.038	0.322	60	25	240	15	20	0.1	0.9	1.0
CO	0.465	0.111	60	25	240	15	20	1.0	0.3	1.3
PM ₁₀	0.0014	0.012	60	25	240	15	20	0.0	0.0	0.0
PM _{2.5}	0.0006	0.009	60	25	240	15	20	0.0	0.0	0.0
SO ₂	0.0004	0.013	60	25	240	15	20	0.0	0.0	0.0

Source:
National default vehicle emission factors derived from USEPA Mobile6.2 emission factor model.

**Table E-4.
Fugitive Dust Emissions**

Construction Site	Emission Factor (tons/acre/month)		Total Construction Area	Project Duration (Months)	Annual Emissions (tons/yr)	
	PM ₁₀	PM _{2.5}			PM ₁₀	PM _{2.5}
Fugitive Dust Emissions	0.11	0.022	12.2	12	1.3	0.3

Source:
Fugitive Dust Construction Area Source Category Calculation Methodology Sheet (MARAMA December 2004) for construction area fugitive dust emission factors. PM_{2.5} emission factor is 20 percent of PM₁₀.

**Table E-5.
Proposed Action Construction Emissions for Criteria Pollutants (tons per year)**

Emission Source	VOC	NO_x	CO	PM₁₀	PM_{2.5}	SO₂
Non-Road Construction Equipment	2.8	72.8	19.5	2.9	2.9	2.5
Commuter Vehicle and Heavy Duty Truck Delivery	0.2	1.0	1.3	0.0	0.0	0.0
Construction Site Fugitive Dust	NA	NA	NA	1.3	0.3	NA
Total Emissions	3.0	73.8	20.8	4.2	3.2	2.5