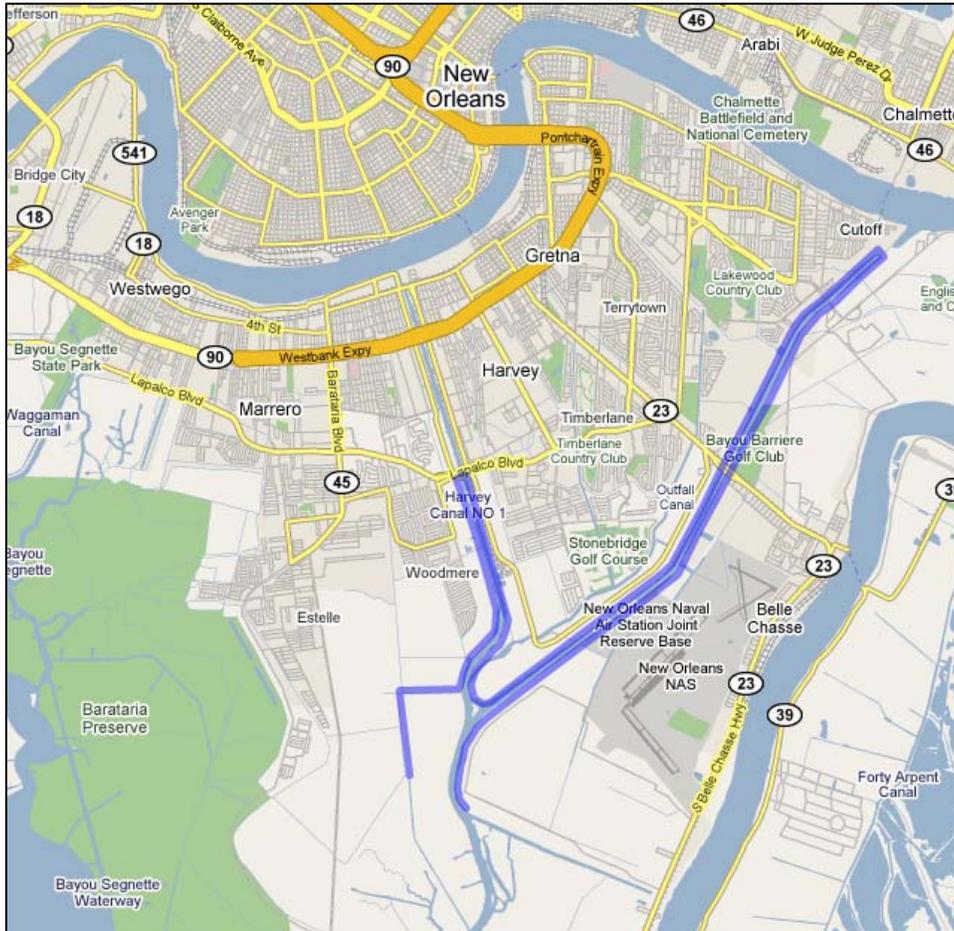


**DRAFT INDIVIDUAL ENVIRONMENTAL REPORT  
GIWW, HARVEY, AND ALGIERS LEVEES AND FLOODWALLS  
JEFFERSON, ORLEANS, AND PLAQUEMINES PARISHES,  
LOUISIANA**

**IER # 12**



**US Army Corps  
of Engineers®**

**January 2009**

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# CHAPTER 1 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report # 12 (IER # 12) to evaluate the potential impacts associated with the proposed construction and upgrades of levees, floodwalls, floodgates, and pumping station(s) to achieve the authorized 100-year level of risk reduction (level of risk reduction) for the this segment of the West Bank and Vicinity of the Mississippi River (WBV) Hurricane and Storm Damage Risk Reduction System (HSDRRS). The proposed action is located in Jefferson, Orleans, and Plaquemines Parishes in the state of Louisiana (figure 1).

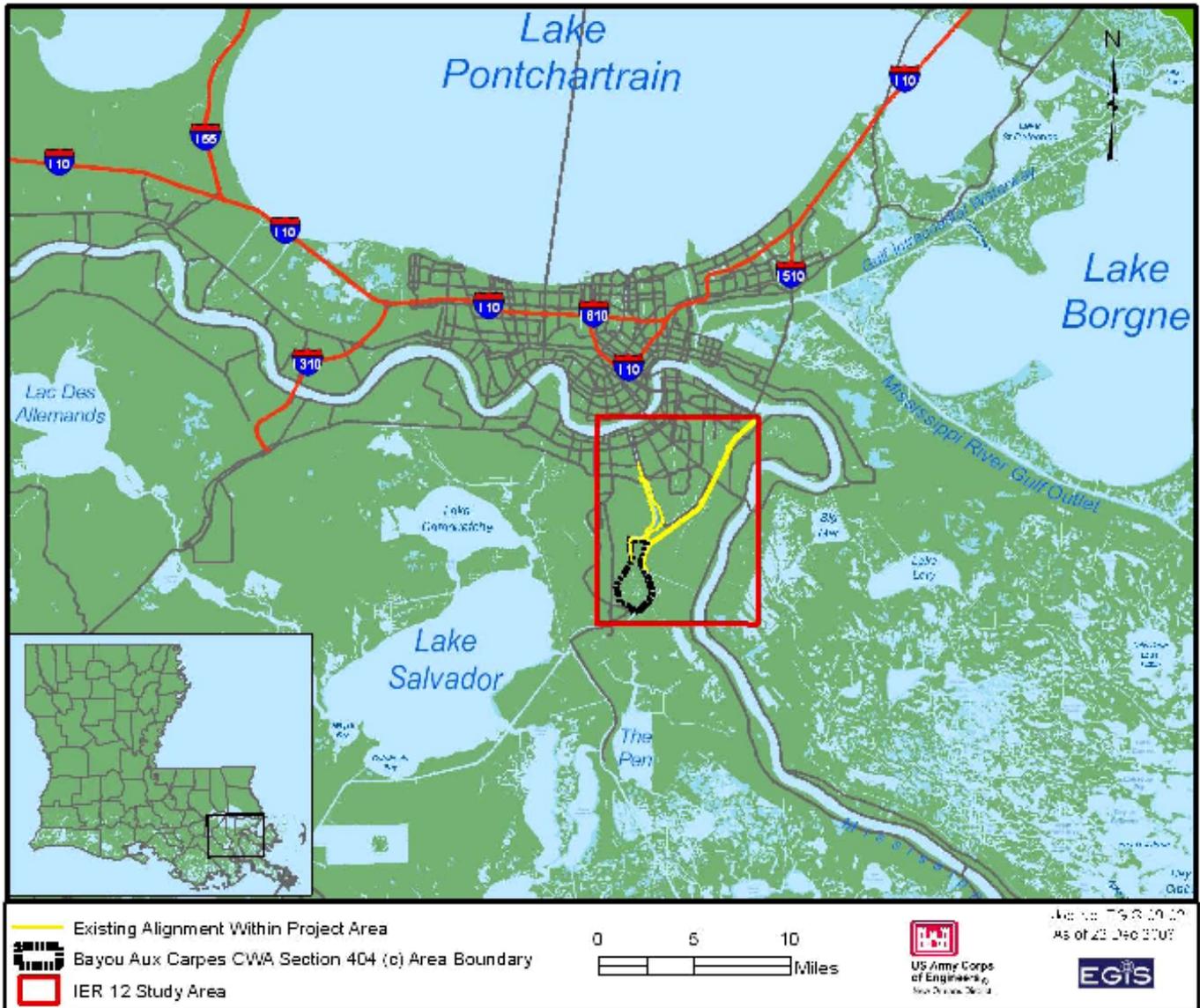
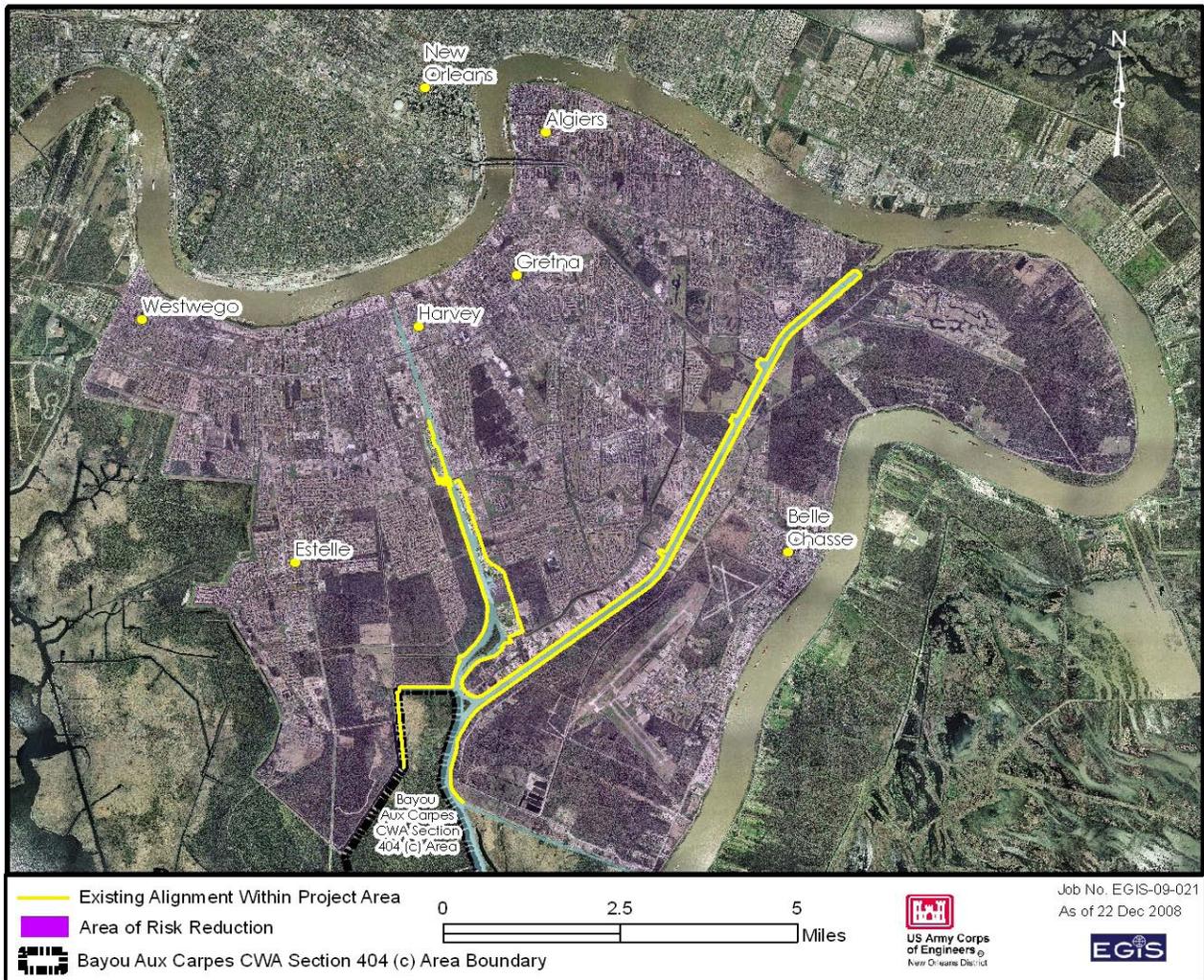


Figure 1. IER # 12 Study Area





**Figure 3. IER # 12 Project Area**

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

This draft IER # 12 has been distributed for a 30-day public review and comment period and is available at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov).

After the 30-day comment period for the IER, and public hearing, the CEMVN 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

CEMVN 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 would be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period, the CEMVN Commander would make a decision on the proposed action. The decision would be documented in an IER Decision Record.

At this time, the EPA is preparing to publish a Federal Register notice of the CEMVN Request for Modification of the Bayou aux Carpes CWA Section 404(c) Final Determination and announce the joint public hearing within the Federal Register. An EPA comment period for the public to be able to submit their concerns regarding the proposed Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination and impacts within Bayou aux Carpes CWA Section 404(c) area will run after this notice. The CEMVN/EPA public hearing will be held following both the CEMVN and EPA comment periods in 2009. The CEMVN letter to the EPA formally requesting a modification to the Bayou aux Carpes CWA 404 (c) Final Determination can be accessed at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) and in appendix K.

After the EPA public comment period for the 404(c) Final Determination Modification Request and the CEMVN/EPA public hearing, the EPA will review all comments received concerning the 404(c) Final Determination during the review period and make a determination if they rise to the level of being substantive in nature. If the EPA decides to modify the Bayou aux Carpes CWA Section 404 (c) Final Determination, a Federal Register notice will be published and the modification would be effective 30 days following that notice. After the EPA issues the Final Determination modification, the CEMVN Protection and Restoration Branch Chief will make a finding that the proposed action complies with the Section 404(b)(1) guidelines, pursuant to the CEMVN Section 404(b)(1) Evaluation, which will be released for public comment concurrent with this draft IER # 12.

For more information on how the CEMVN District Commander's decision relates to the EPA modification determination see appendix K.

## **1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION**

Hurricane Katrina on 29 August 2005 caused major damage to Metropolitan New Orleans and to the Federal and non-Federal flood control and HSDRRS in southern Louisiana. Hurricane Rita made landfall on 24 September 2005, and added to local damages. The purpose of the proposed action is to enhance the WBV portion of the hurricane and storm damage risk reduction system to provide 100-year level of risk reduction. The proposed action would improve an important link in the comprehensive system of levees, floodwalls, floodgates and drainage structures protecting the WBV residential, commercial, and industrial establishment.

The proposed action results from a defined need to reduce flood risk and storm damages to residences, businesses, and other infrastructure from hurricanes (100-year tropical storm events) and other high water events. Such action is vital to the recovery and revitalization of metropolitan New Orleans. The completed HSDRRS would lower the risk of harm to citizens, and damage to infrastructure during a tropical storm event. The safety of the people in the region is the highest priority of the CEMVN.

The term "100-year level of risk reduction," as it is used throughout this document, refers to a level of protection that reduces the risk of hurricane surge and wave-driven flooding that the New Orleans metropolitan area has a 1 percent chance of experiencing in any given year.

The report “Elevations for Design of Hurricane Protection Levees and Structures Lake Pontchartrain, Louisiana and Vicinity Hurricane Protection Project and West Bank and Vicinity, Hurricane Protection Project” provides detailed documentation of the coastal and hydraulic engineering analysis performed to determine the 1 percent project design elevations for hurricane protection projects (USDOD 2007). The report has been prepared to provide levee and structure elevations so that the USACE could initiate detailed design and construction as described in the 4<sup>th</sup> Supplemental Appropriation, Public Law 109-234 of the One Hundred Ninth Congress:

*“...at least \$495,300,000 shall be used consistent with the cost-sharing provisions under which the projects were originally constructed to raise levee heights where necessary and otherwise enhance the existing Lake Pontchartrain and Vicinity project and the existing West Bank and Vicinity project to provide the levels of protection necessary to achieve the certification required for participation in the National Flood Insurance Program under the base flood elevations current at the time of this construction...”*

For more information on the existing flood protection system, the upgrades proposed, and details on risk and reliability visit [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) and read the posted literature.

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

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

The Westwego to Harvey Canal Hurricane Protection Project was authorized by the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662, Section 401(b)). The WRDA of 1996 modified the project and added the Lake Cataouatche Project and the East of Harvey Canal Project (P.L. 104-303, Section 101(a)(17) & P.L. 104-303, 101(b)(11)). The WRDA of 1999 combined the three projects into one project under the current name (P.L. 106-53, Section 328).

The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental - P.L. 109-148, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorized accelerated completion of the project and restoration of project features to design elevations at 100 percent Federal cost. The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - P.L. 109-234, Title II, Chapter 3, Construction, and Flood Control and Coastal Emergencies) authorizes construction of a 100-year level of risk reduction; the replacement or reinforcement of floodwalls; and the construction of levee armoring at critical locations.

Additional Supplemental Appropriations include the U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (5th Supplemental - P.L. 110-28, Title IV, Chapter 3, Flood Control and Coastal Emergencies, Section 4302) and the 6th Supplemental (P.L. 110-252, Title III, Chapter 3).

### 1.3 PRIOR REPORTS

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

- On 20 October 2008, the CEMVN signed a Decision Record on IER # 26 entitled “Pre-Approved Contractor Furnished Borrow Material # 3, Jefferson, Plaquemines, and St. John the Baptist Parishes, Louisiana, and Hancock County, Mississippi.” The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the GNOSDRRS.
- On 26 August 2008, the CEMVN signed a Decision Record on IER # 14, entitled “Westwego to Harvey, Levee Jefferson Parish, Louisiana.” The document was prepared to examine the potential environmental impacts associated with the proposed construction and maintenance of 100-year level of risk reduction along the WBV, Westwego to Harvey Levee project area.
- On 12 June 2008, the CEMVN signed a Decision Record on IER # 15, entitled “Lake Cataouatche Levee, Jefferson Parish, Louisiana.” The proposed action includes constructing a 100-year level of risk reduction in the project area.
- On 30 May 2008, the CEMVN signed a Decision Record on IER # 22 entitled “Government Furnished Borrow Material, Plaquemines and Jefferson Parishes, Louisiana.” The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.
- On 6 May 2008, the CEMVN signed a Decision Record on IER # 23 entitled “Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi.” The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.
- On 21 February 2008, the CEMVN signed a Decision Record on IER # 18 entitled “Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana.” The document was prepared to evaluate the potential impacts associated with the actions taken by the USACE as a result of excavating borrow areas for use in construction of the HSDRRS.
- On 14 February 2008, the CEMVN signed a Decision Record on IER # 19 entitled “Pre-Approved Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi.” The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors as a result of excavating borrow areas for use in construction of the HSDRRS.
- In July 2006, the CEMVN signed a Finding of No Significant Impact (FONSI) on an 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 23 August 2005, the CEMVN signed a FONSI on EA # 422 entitled “Mississippi River Levees – West Bank Gaps, Concrete Slope Pavement Borrow Area Designation, St. Charles and Jefferson Parishes, Louisiana.” The report investigates the impacts of obtaining borrow material from various areas in Louisiana.
- On 22 February 2005, the CEMVN signed a FONSI on EA # 306A entitled “West Bank Hurricane Protection Project – East of the Harvey Canal, Floodwall Realignment and Change in Method of Sector Gate.” The report discusses the impacts related to the relocation of a proposed floodwall moved because of the aforementioned sector gate, as authorized by the LPV Project.
- On 5 May 2003, the CEMVN signed a FONSI on EA # 337 entitled “Algiers Canal Alternative Borrow Site.”
- On 19 June 2003, the CEMVN signed a FONSI on EA # 373 entitled “Lake Cataouatche Levee Enlargement.” The report discusses the impacts related to improvements to a levee from Bayou Segnette State Park to Lake Cataouatche.
- On 16 May 2002, the CEMVN signed a FONSI on EA # 306 entitled “West Bank Hurricane Protection Project - Harvey Canal Sector Gate Site Relocation and Construction Method Change.” The report discusses the impacts related to the relocation of a proposed sector gate within the Harvey Canal, as authorized by the LPV Project.
- On 30 August 2000, the CEMVN signed a FONSI on EA # 320 entitled “West Bank Hurricane Protection Features.” The report evaluates the impacts associated with borrow sources and construction options to complete the Westwego to Harvey Canal Hurricane Protection Project.
- On 18 August 1998, the CEMVN signed a FONSI on EA # 258 entitled “Mississippi River Levee Maintenance - Plaquemines West Bank Second Lift, Fort Jackson Borrow Site.”
- The final EIS for the WBV, East of Harvey Canal, Hurricane Protection Project was completed in August 1994. A Record of Decision (ROD) was signed by the CEMVN in September 1998.
- The final EIS for the WBV, Lake Cataouatche, Hurricane Protection Project was completed. A ROD was signed by the CEMVN in September 1998.
- In December 1996, the USACE completed a post-authorization change study entitled, “Westwego to Harvey Canal, Louisiana Hurricane Protection Project Lake Cataouatche Area, EIS.” The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between Bayou Segnette and the St. Charles Parish line. A Standard Project Hurricane (SPH) level of risk reduction was recommended along the alignment followed by the existing non-Federal levee. The project was authorized by Section 101 (b) of the WRDA of 1996 (P.L. 104-303) subject to the completion of a final report of the Chief of Engineers, which was signed on 23 December 1996.
- On 12 January 1994, the CEMVN signed a FONSI on an EA # 198 entitled, “West Bank of the Mississippi River in the Vicinity of New Orleans, LA, Hurricane Protection Project, Westwego to Harvey Canal, Jefferson Parish, Louisiana, Proposed Alternate Borrow Sources and Construction Options.” The report evaluates the impacts associated with

borrow sources and construction options to complete the Westwego to Harvey Canal Hurricane Protection Levee.

- In August 1994, the CEMVN completed a feasibility report entitled “WBV (East of the Harvey Canal).” The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of metropolitan New Orleans from the Harvey Canal eastwards to the Mississippi River. The final report recommends that the existing West Bank Hurricane Project, Jefferson Parish, Louisiana, authorized by the WRDA of 1986 (P.L. 99-662), approved 17 November 1986, be modified to provide additional hurricane protection east of the Harvey Canal. The report also recommends that the level of risk reduction for the area east of the Algiers Canal deviate from the National Economic Development Plan’s level of risk reduction and provide protection for the SPH. The Division Engineer’s Notice was issued on 1 September 1994. The Chief of Engineer’s report was issued on 1 May 1995. Preconstruction, engineering, and design was initiated in late 1994 and is continuing. The WRDA of 1996 authorized the project.
- On 20 March 1992, the CEMVN signed a FONSI on EA # 165 entitled “Westwego to Harvey Canal Disposal Site.”
- On 3 June 1991, the CEMVN signed a FONSI on EA # 136 entitled “West Bank Additional Borrow Site between Hwy 45 and Estelle PS.”
- On 15 March 1990, the CEMVN signed a FONSI on EA # 121 entitled “West Bank Westwego to Harvey Changes to EIS.” The report addresses the impacts associated with the use of borrow material from Fort Jackson for LPV construction. The material was used for constructing the second life for the Plaquemines West Bank levee upgrade, as part of LPV construction.
- In December 1986, the USACE completed a Feasibility Report and EIS entitled, “West Bank of the Mississippi River in the Vicinity of New Orleans, La.” The report investigates the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between the Harvey Canal and Westwego, and down to the vicinity of Crown Point, Louisiana. The report recommends implementing a plan that would provide SPH level of risk reduction to an area on the west bank between Westwego and the Harvey Canal north of Crown Point. The project was authorized by the WRDA of 1986 (P.L. 99-662). Construction of the project was initiated in early 1991.
- On 16 October 1985, the Environmental Protection Agency (EPA) signed a Final Determination concerning the Bayou aux Carpes Site in Jefferson Parish pursuant to Section 404(c) of the Clean Water Act (CWA). The authority for this determination was given to the Administrator of the EPA under the CWA (33 USC, 1251 et seq).

#### **1.4 INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS**

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

The draft CED will be available for a 60-day public review period. The document will be posted on [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov), or can be requested by contacting the CEMVN. A notice of availability will be mailed/e-mailed to interested parties advising them of the availability of the draft CED for review. Additionally, a notice will be placed in national and local newspapers. Upon completion of the 60-day review period all comments will be compiled and appropriately addressed. Upon resolution of any comments received a final Comprehensive Environmental Document will be prepared, signed by the District Commander, and made available to any stakeholders requesting a copy. For more information on the alternative arrangements, NEPA document sequencing, and project construction sequencing visit [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov).

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 (chapter 5).

## **1.5 PUBLIC CONCERN**

This section presents a summary of the public concerns received regarding the proposed action. In addition, section 6.1 contains a list of the public involvement meetings that were held for the proposed project as well as the concerns expressed at those meetings and appendix B contains a public comment and response summary.

Comments at public meetings indicated concern over the current protection from hurricane-induced tidal surges during major storm events that might overtop levees near the proposed action. A key concern of local officials is to increase public confidence in the HSDRRS so that the physical and economic recovery of the area can proceed. Scheduling of construction for the 100-year level of risk reduction system was also a concern.

Concern has also been expressed for environmental impacts to the Bayou aux Carpes Clean Water Act (CWA) Section 404(c) area and the need to minimize adverse effects from project alternatives on hydrology and ecology. Generally, the public is concerned with the intangible values of this environmental resource (section 3.1.7) and would like impacts to it minimized as much as possible. Documentation of the rigorous procedure currently underway to assure that the impacts to such a valued resource are minimal, that those impacts are properly mitigated, and that there are project feature augmentations which would enhance the Bayou aux Carpes CWA Section 404(c) area can be found in appendix K.

Other concerns include possible vulnerability along Peters Road from Lapalco Boulevard to Hero Pump Station where flood damage reduction projects are not yet complete (currently under construction); taking residences and businesses at any location; providing interim protection until the entire levee system is brought up to 100-year level of risk reduction; coastal restoration and wetland preservation; and the adequacy of the planning model used to predict the levee improvements required.

People living along Walker Road and East Bayou Road in the area of a proposed pump station and road relocation, have expressed concerns of increased traffic, traffic congestion, road repairs, security of their private property during construction activities. A local business owner has also expressed concerns of impacts to his business due to the road relocation.

Borrow from local sources impacting potential future development, increasing mosquito populations, and public safety have also been expressed as concerns by the public in writing and during the public meetings.

## 1.6 DATA GAPS AND UNCERTAINTIES

At the time of submission of this report, engineering evaluations have not been completed for all of the proposed actions and alternatives. Final selection and engineering details (e.g., placement of features) of the proposed action could vary based on the final engineering report. Substantial changes to the proposed action resulting in further impact to the natural or human environment would be addressed in a supplemental IER if needed.

The following data gaps exist at this time:

- The CEMVN has not identified the sources of levee material (i.e. borrow areas) to be used in levee construction. Several approved sources exist in the WBV area as detailed in IERs 18, 19, 22, 23, and 26. Additionally, other borrow sources are currently being investigated by the CEMVN. The CEMVN intends to select a borrow source prior to contract award that minimizes environmental impacts, provides the best technical solution, and is cost effective.
- The design report on which this analysis is based is in process. Thus, this analysis has been performed prior to formal design and is based on concept level design and reasonable assumptions regarding the proposed action. While the alternatives identified are in the preliminary design phases, their basic function and footprint for construction should be substantially the same as presented. The estimated environmental impacts have been assessed to create an envelope of effects within which design could proceed without compromising the integrity of this assessment.
- Environmental surveys are currently being conducted within the Bayou aux Carpes CWA Section 404(c) area to retrieve baseline condition data, e.g., water and soil quality and nutrient levels, for the various habitats that would be impacted by the proposed project and the proposed project feature augmentations within the 404c area. Therefore, the environmental surveys are discussed in this document; however, data and results of the surveys are not included. For more information see appendix K.
- Future plans to monitor the Bayou aux Carpes CWA Section 404(c) area for various parameters (e.g., water and soil quality and nutrient levels) are discussed in this IER; however, the final data from those proposed monitoring programs are not available at this time and are not discussed in this document.
- Comprehensive project costs have not been determined because of uncertainties as to final design and other data gaps.
- Cumulative impact data is not complete in this report. A draft Comprehensive Environmental Document (CED) will be prepared which will include documented cumulative impacts on a system-wide basis. Cumulative impacts analysis would be prepared for all of the IERs affecting the WBV. Currently these include six IERs for levee/floodwall improvements, two for borrow areas, and two for mitigation pools (chapters 4 and 5).
- Complete impacts on transportation remain unknown. Large quantities of construction materials would be delivered to the project area, as well as to other ongoing 100-year level of risk reduction projects in the Greater New Orleans area. Consequently, air quality impacts due to transportation are also unknown. All applicable new data will be reviewed as it becomes available, and the CEMVN is currently completing a transportation analysis to quantify these impacts. The CEMVN intends to provide this analysis in the CED.

- Mitigation planning of impacts is not complete in this report. Mitigation IERs will be prepared that will include mitigation of impacts on a system-wide basis for all IERs in the Metropolitan New Orleans area including IER # 12 (chapters 5 and 7).
- The exact start and end dates of construction for the project study area are approximate at the time of development of this report.

## **CHAPTER 2 ALTERNATIVES**

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

NEPA requires that in analyzing alternatives to a proposed action a Federal agency considers an alternative of “No Action.” Likewise, Section 73 of the WRDA of 1974 (PL 93-251) requires Federal agencies to give consideration to non-structural measures to reduce or prevent flood damage. The CEMVN Project Delivery Team (PDT) considered a no action alternative and non-structural measures in this IER, which are discussed in sections 2.4.1 and 2.5.2, respectively.

In addition to these mandated alternatives, a range of reasonable alternatives was formulated through input by the CEMVN PDT, Value Engineering Team, engineering and design consultants, Federal and state resource agencies, local government, and the public.

The “action” alternatives are comprised of varying alternative alignments. The CEMVN investigated all possible alternative alignments to provide the most reliable, time sensitive and cost effective solution with the least adverse environmental impacts within the IER # 12 project area. Once a full range of alternatives was established, a preliminary screening was conducted to identify alternatives which would proceed through further analysis.

The PDT evaluated the alternatives against many criteria such as engineering effectiveness, economic efficiency, and environmental and social acceptability, before recommending the most feasible (per engineering), least environmentally damaging alternative to accomplish the risk reduction system improvements. The main PDT objective was to maximize system reliability and minimize impacts to highly valued environmental resources such as the Bayou aux Carpes CWA Section 404(c) area and the human population, while also keeping in mind schedule and cost. Two significant parameters related to minimizing environmental impacts were the utilization of existing right-of-way (ROW) and innovative design as much as practicable. By incorporating these parameters into the design in the early stages, environmental consequences would be avoided and/or minimized to the greatest extent practicable. The selection of the proposed action alternative is the result of a collaborative planning effort with the EPA and other Federal and state resource agencies, members of the public and CEMVN.

### **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 risk reduction in raising the HSDRRS to the 100-year level of risk reduction, each segment of the system has its own range of alternatives. This approach allows individual 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 alternative descriptions also state how each alternative would tie into other, adjacent IER projects to insure awareness of the HSDRRS as a whole.

Alternatives. Five project alternatives were considered. These alternatives are described in sections 2.3 and 2.4:

- (1) No Action Alternative
- (2) Gulf Intracoastal Waterway (GIWW) West Closure Complex (WCC), (*proposed action*)
- (3) Southern Closure Option (GIWW A)
- (4) Algiers Gate (AG)
- (5) Parallel Protection (PP)

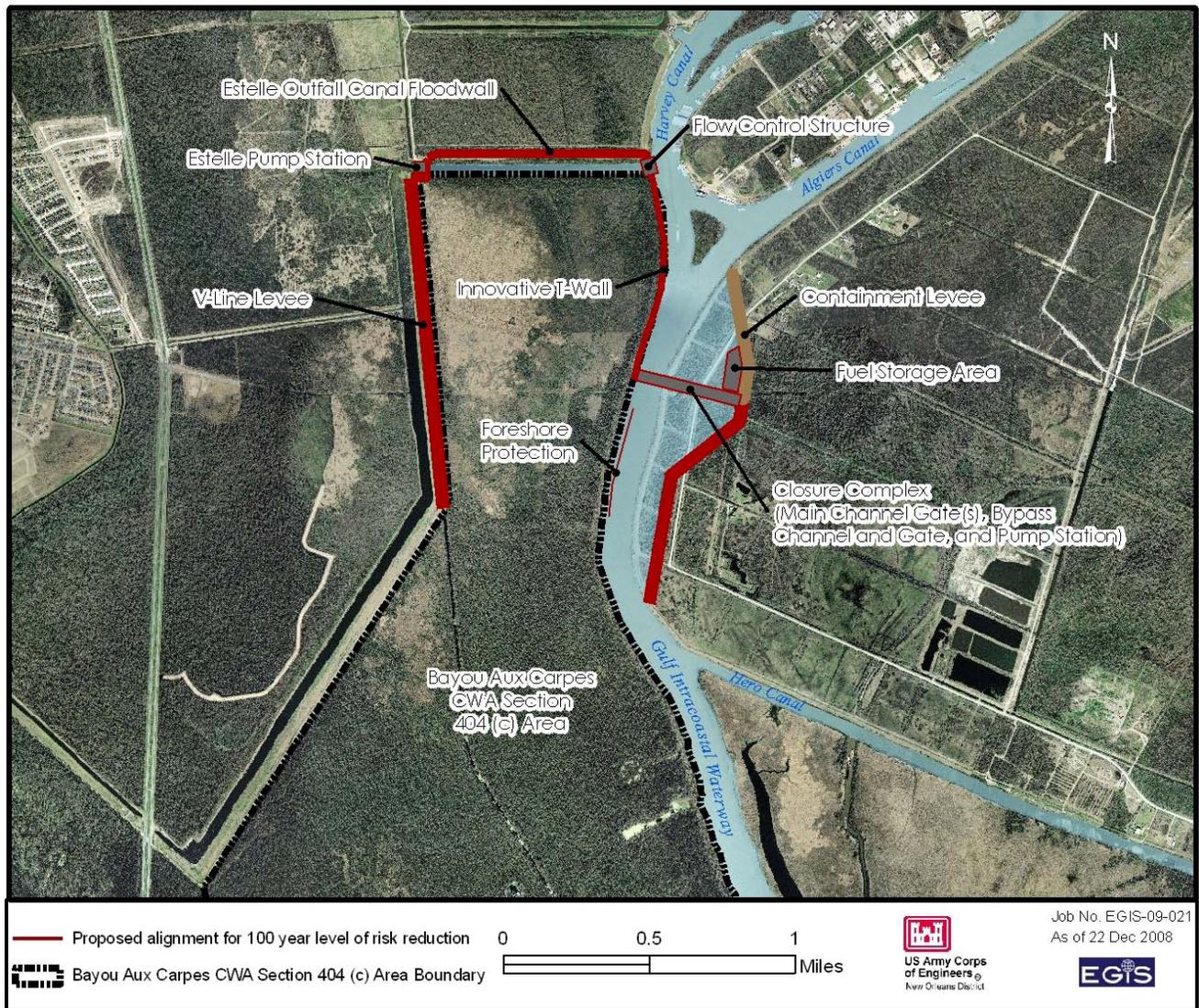
The discussions of levees, floodwalls, gates and alignments associated with these alternatives are excerpted from these reports: (1) GIWW Navigable Closure Structure Alternatives, (2) Sector Gate South Detailed Alternative Study Report, (3) WBV 14e.2 Engineering Alternative Report, and (4) WBV 14g.2 Engineering Alternative Report.

All elevations are with reference to North American Vertical Datum of 1988, 2004.65 (NAVD88) datum. NAVD88 uses one base monument located at Father's Point, Quebec Canada as Mean Sea Level (MSL). All other bench marks in North America are referenced to that one base monument for NAVD88 elevations. The NAVD88 datum is now the standard datum used by the surveying community. All references to project feature elevations or El. (height) are design elevations for a specific level of risk reduction (i.e. previously authorized, 100-year, etc.).

Borrow material for IER # 12 is expected to come from the greater New Orleans area by one of three processes; Government furnished, Contractor Furnished, or a Supply Contract. Environmental compliance of potential borrow areas is being covered under a series of borrow IERs. The amount of borrow material needed ranges from 1 million cubic yards to 4.5 million cubic yards depending upon the alternative. All borrow material is coming from non-wetland sites at this time. The public would be fully informed of any proposed changes to the current borrow standards, and public comments would be solicited prior to changing to those current standards.

### **2.3 PROPOSED ACTION: GULF INTRACOASTAL WATERWAY (GIWW) WEST CLOSURE COMPLEX (WCC)**

The proposed action, WCC alternative proposes to alter the original system alignment and construct a streamlined surge barrier (figure 4a). The alternative would consist of constructing approximately 3 miles of levee and floodwall that would reduce the primary line of defense by 38 percent. By removing 25 miles of existing parallel protection from the primary line of defense, this more streamlined surge barrier reduces the number of potential failure points in the system, increases quality control and the certainty of subsurface conditions during construction, and minimizes human impacts since the footprint of the existing levees system would not be widened to 100-year level of risk reduction. Funding for the construction of the proposed action has been obtained via supplemental appropriations (see [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov)).



**Figure 4a. Proposed Action Alignment for 100-Year Level of Risk Reduction**

Construction of this proposed action would not only provide the most system reliability and risk reduction for this segment of WBV, but would bring into protection those industrial areas along the Harvey Canal that are currently outside of the risk reduction system. In addition, the existing protection would become a secondary line of protection during a storm event.

The proposed action for IER # 12 would raise and/or construct levees, floodwalls, and other structures to meet the 100-year level of risk reduction for the Harvey -Westwego, Gretna – Algiers, and Belle Chasse IPET polders. Typical earthen materials used for levee construction consist of low organic clays, fertilizer, seed, mulch, and water, reinforced high strength geotextile fabric if required, low strength geotextile filter fabric for silt fences, plastic or steel hog wire for safety fences, steel or wood posts for silt and safety fences, crushed stone for surfacing and riprap for wave erosion prevention. The new levee and floodwall designs in IER # 12 would require approximately 3,125,000 cubic yards of earthen material and 310,000 tons of

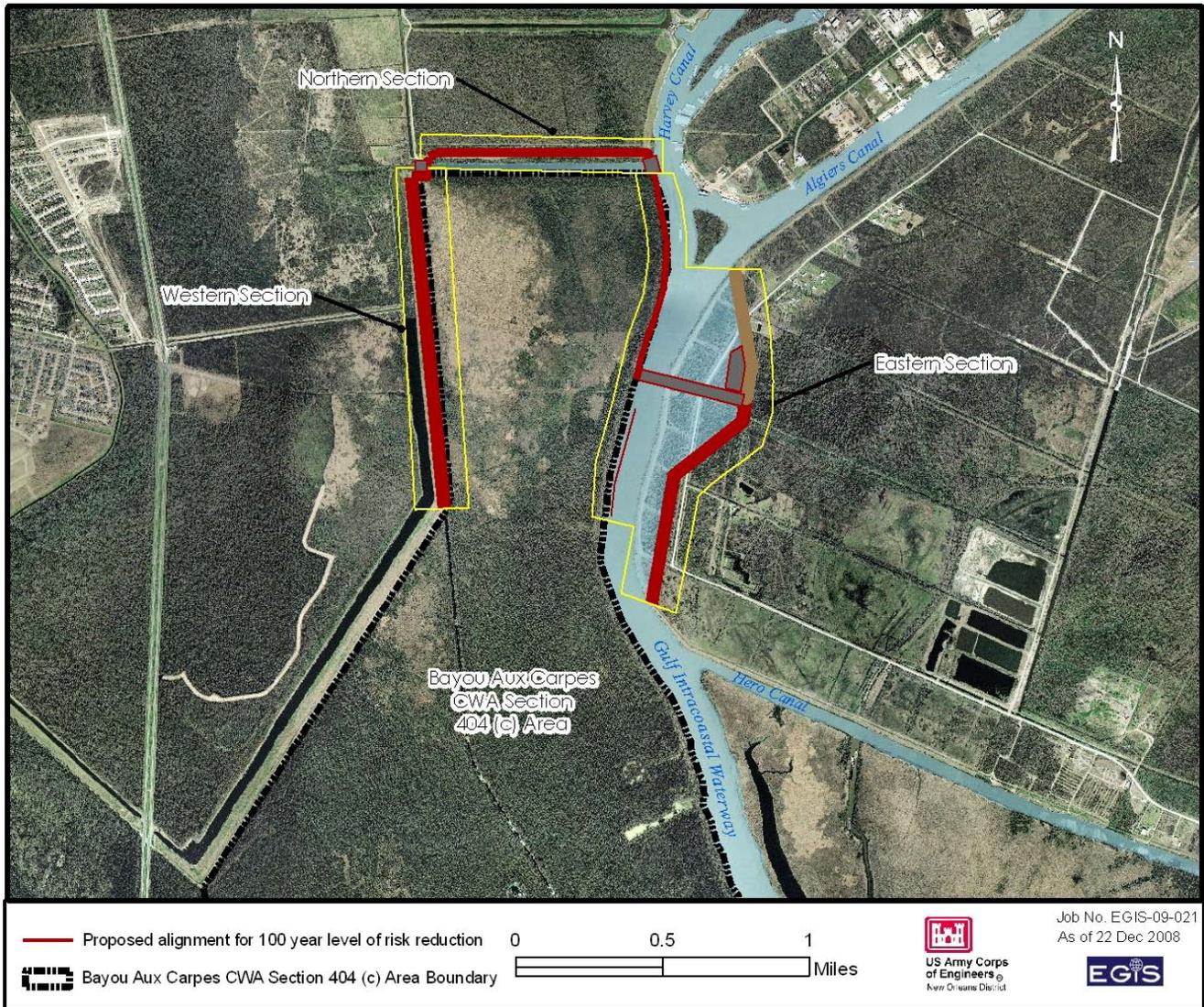
stone to construct (these quantities may change based on a revised alignment and hydraulic physical modeling which may require more stone).

The proposed action also includes providing a 100-year level of risk reduction fronting protection for pump stations and backflow prevention. Existing pump stations in the detention basin behind the surge barrier would receive fronting protection (El. 8.5 ft, less than 100-year level of risk reduction) and backflow prevention. During Hurricanes Katrina and Rita many low lying areas experienced flooding, which appears to have come partially from backflows that occurred at several east and west bank pumping stations. Backflows occur when pumps are off and high water levels on the discharge side force flow through the pumps and into the interior canals. If the discharge stage is above the highest invert of the discharge pipe or tube, but below the top elevation, free flowing backflows can occur. If the stages rise above the top elevation of the discharge pipe, siphonic backflows can occur. Backflow preventative measures for these pump stations within the existing alignment would reduce the risk of free flowing water from the Algiers and Harvey canals through the pump station discharge pipes into adjacent neighborhoods and infrastructure.

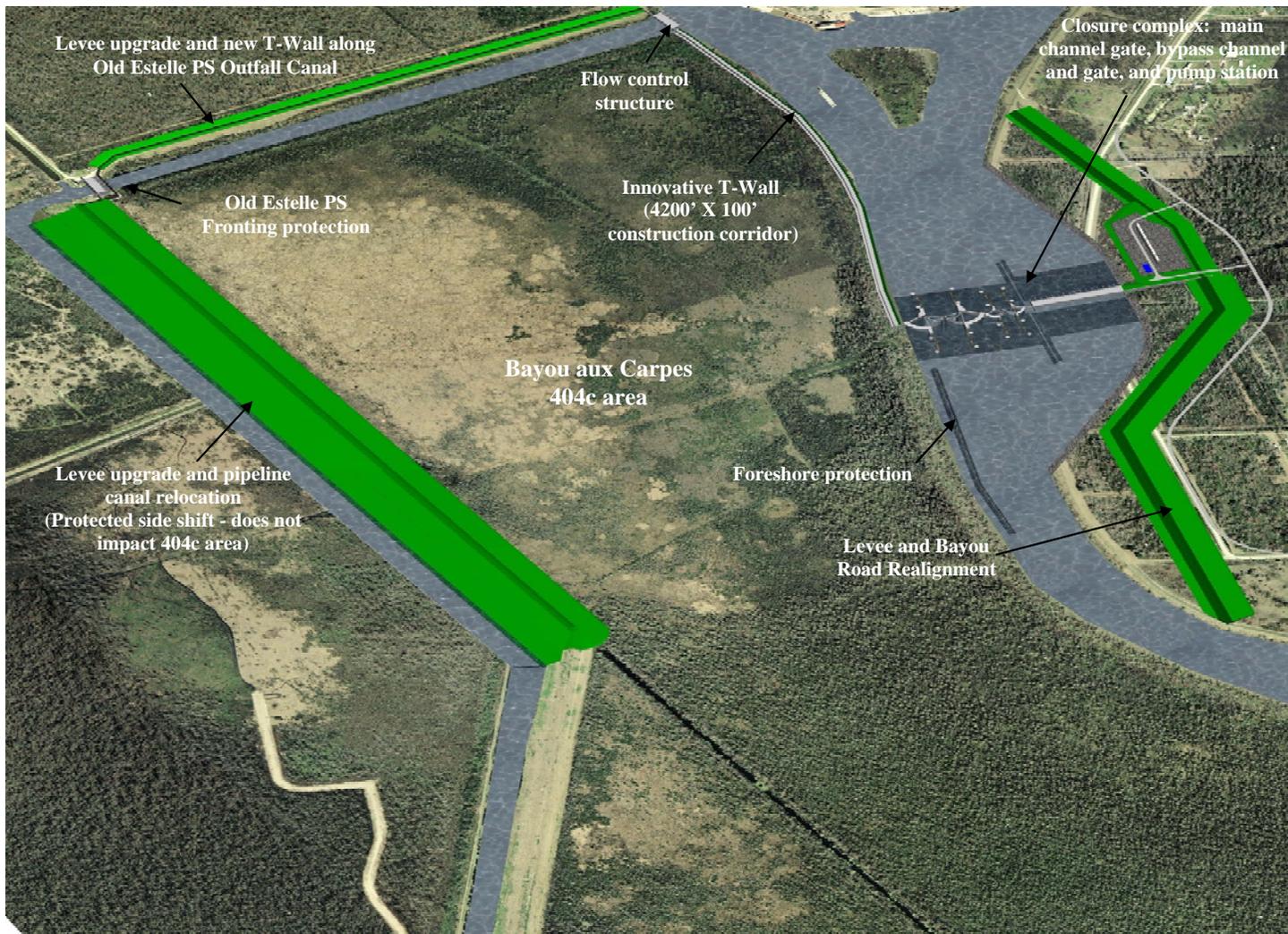
Figures of the proposed action alternative alignment are included which show the location of the pump station and navigation gates in conceptual configurations. These alignments are presented to present potential innovations. Impacts for both configurations are the same.

For clarity, the proposed action is described from west to east and the entire alignment has been divided into “western”, “northern”, and “eastern” sections (figure 4b). Proposed action components within each section are illustrated using conceptual models (figures 4c-4e).

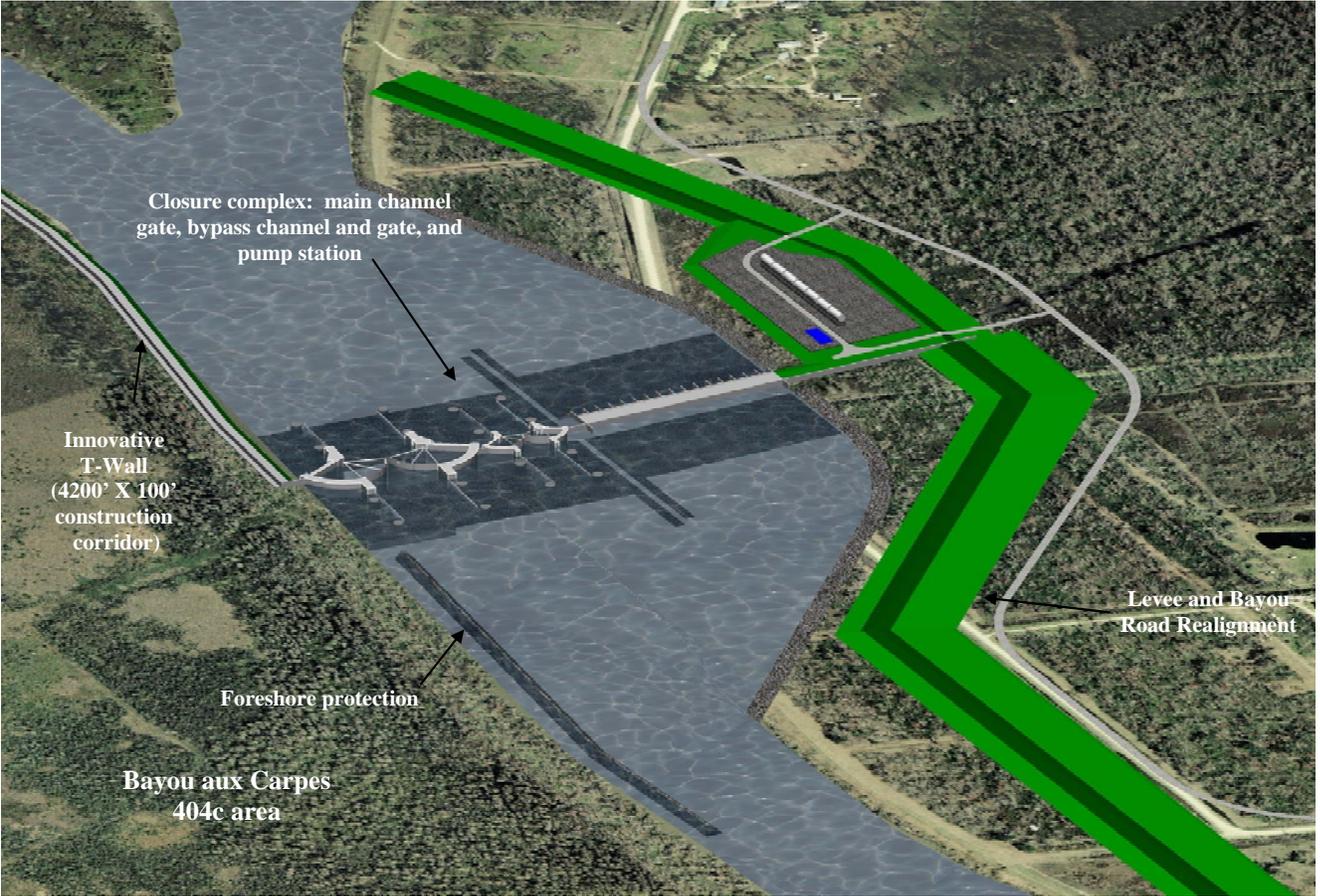
The western section of this alignment extends north from approximately 6000 ft northeast of the V-line levee intersection with Highway 45 in Jefferson Parish to Old Estelle Pump Station (PS) (figure 4b). This section includes a 200 ft wide by 15 ft deep interior drainage canal on the protected side and the Bayou aux Carpes CWA Section 404(c) area on the flood side. The proposed action for this section consists of an earthen levee enlargement with a protected side shift, partially outside of existing ROW. The centerline of the new levee would be shifted 58 ft to the protected side of the centerline of the existing levee. This 5900 ft earthen levee stretch would be raised to 100-year level of risk reduction, with a design elevation of approximately El. 14 ft (table 1). An additional 125 ft of permanent ROW into a Bottomland Hardwood (BLH) area would be required along the V-line levee to the Old Estelle PS. The proposed action would require the relocation of the existing drainage canal 200 ft to the protected side. The additional ROW required to upgrade the levee and relocate the drainage canal would be 17 acres (table 1). The levee would tie into the fronting protection at Old Estelle PS.



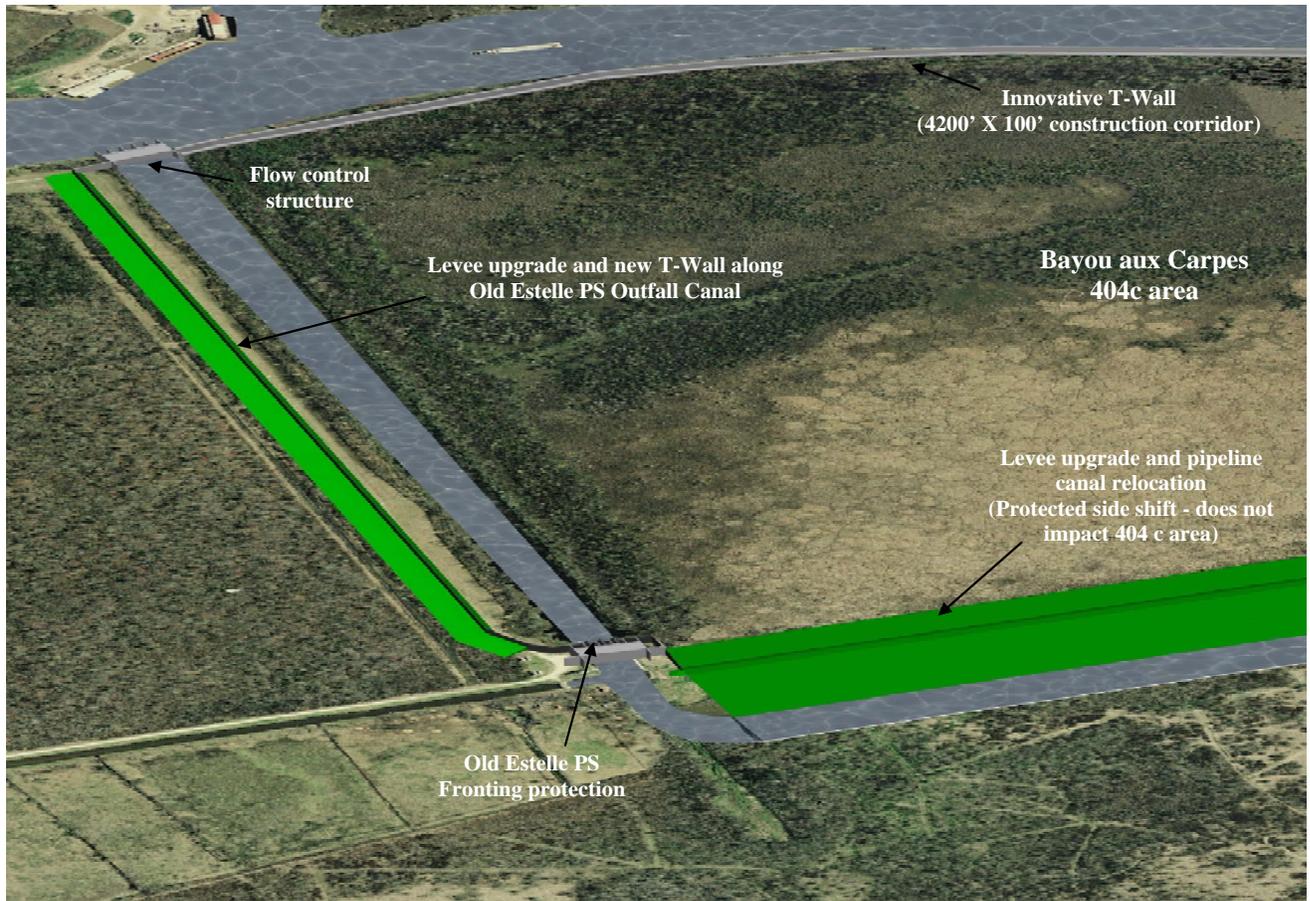
**Figure 4b. Proposed Action Alignment Divided into Sections**



**Figure 4c. Proposed Action (Conceptual Model)**



**Figure 4d. Proposed Action Close up of the Closure Complex (Conceptual Model)**



**Figure 4e. Proposed Action Close up of the Old Estelle Pump Station and Outfall Canal (Conceptual Model)**

**Table 1. Proposed Action Components**

	<b>New ROW Impacts (acres)</b>	<b>Design Elevation (ft)</b>	<b>Length* (ft)</b>	<b>Description</b>
Western Levee	17	14	5900	V-line levee upgrade and Canal Relocation
Northern Floodwall	1	14	N/A	Old Estelle PS Improvements
	0	14 - 16	3700	Estelle Outfall Canal Floodwall and Flow Control Structure
Eastern Floodwall	9.6**	16	4200	Innovative T-Wall within Bayou aux Carpes CWA Section 404(c) Area
	N/A	TBD	TBD	Project Feature Augmentations
Closure Complex and Levee and Road Realignment	240	16	N/A	Main Channel Gate (150 ft – 300 ft)
		16	N/A	Bypass Channel Gate (75 ft – 150 ft)
		16	N/A	20,000 cfs Pump Station
		14	4000 - 5000	Levee and Road Realignment East of the GIWW
		0	4	2000
Pipeline Relocation	1	N/A	N/A	Via Directional Drilling to Avoid Impacts to the Bayou aux Carpes CWA 404 (c) Area
Detention Basin Improvements	6	8.5	1900	Harvey Canal West Bank Levees
	32	8.5	13700	Harvey Canal West Bank Levees
	18	8.5	N/A	Belle Chasse Tunnel
	13	8.5	8700	Algiers Lock to Belle Chasse Hwy (West)
	9	8.5	6330	Hero Cutoff to Belle Chasse Hwy (East)
<b>Total</b>	<b>387</b>	<b>N/A</b>	<b>51,430</b>	<b>N/A</b>

*\*Approximations, \*\* USFWS calculated 9.8 acres of impacts. The final acreage number will be determined during the final design phase and CEMVN intends to minimize impacted area to greatest extent practicable.*

All of the construction work would occur on the protected side of the levee and would not impact the Bayou aux Carpes CWA Section 404(c) area. Construction of the western section would be expected to take 2 years.

The levee work may require geotextile fabric and/or deep soil mixing to strengthen the levee foundation. The deep soil mixing method involves the blending of a binder such as lime, cement, and slag into the soil through a hollow stem auger and mixing tool arrangement to produce round “columns” of treated soil. Applications for this method include stability and support, seepage cutoff, and seismic retrofit. This method has proven to be a viable method to effectively improve the competency of soils in Southeast Louisiana (Woodward 2007). Strengthening of the foundation can also be achieved by installing geotextile fabric in the foundation of the levee.

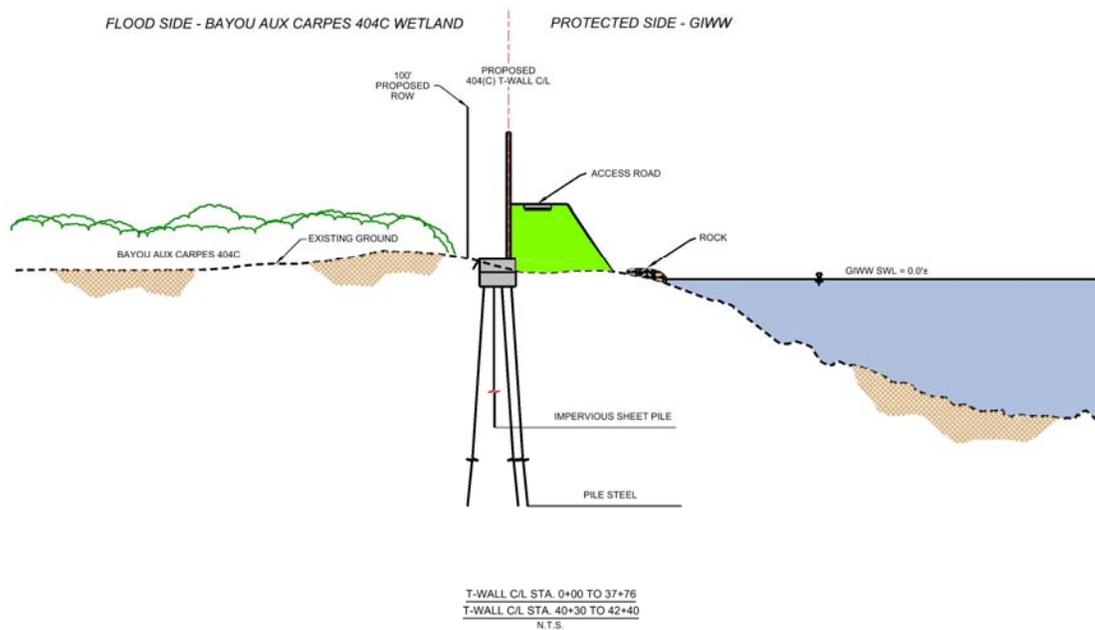
The northern section of this alignment extends east from Old Estelle PS to the Harvey Canal (figure 4b). This section includes BLH habitat on the protected side and the Old Estelle Pump Station Outfall Canal on the flood side. Fronting protection would be built to the 100-year level

of risk reduction at the Old Estelle PS and would tie into the levee on each side of the pump station (table 1). A T-wall would be constructed within existing ROW on the protected side of the existing earthen levee that runs along the northern bank of Old Estelle Outfall Canal. The T-wall would have a design elevation of El. 14 to El.16 ft and would be 3,700 ft in length (table 1). This T-wall would tie into a new flow control structure at the intersection of the Old Estelle Outfall Canal and the Harvey Canal. The flow control structure would be constructed at El. 16ft, and would cross the Old Estelle Outfall Canal and tie into the eastern section of this alignment (the Bayou aux Carpes CWA Section 404(c) T-wall). This flow control structure would be required to control the discharge from the Old Estelle pumping station into the GIWW.

A benefit of this flow control structure would be the potential to augment the Bayou aux Carpes CWA Section 404(c) wetland area by actively managing the freshwater discharge from the Old Estelle PS. The USACE in cooperation with the EPA, the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), and other Federal and state resource agencies is conducting studies that are investigating the engineered gapping of the south bank of the Old Estelle Outfall Canal. These gaps in the outfall canal would allow freshwater from the pumping station to be directed into the Bayou aux Carpes CWA Section 404(c) area if determined to be beneficial to the wetland. The freshwater would be directed to the GIWW if it was determined not to be beneficial. Studies are ongoing to optimize the use of this feature to provide maximum benefit to the Bayou aux Carpes CWA Section 404(c) wetlands.

All of the construction work would occur on the protected side of the levee and would not impact the Bayou aux Carpes CWA Section 404(c) area. Construction of the northern section would be expected to take 2 years.

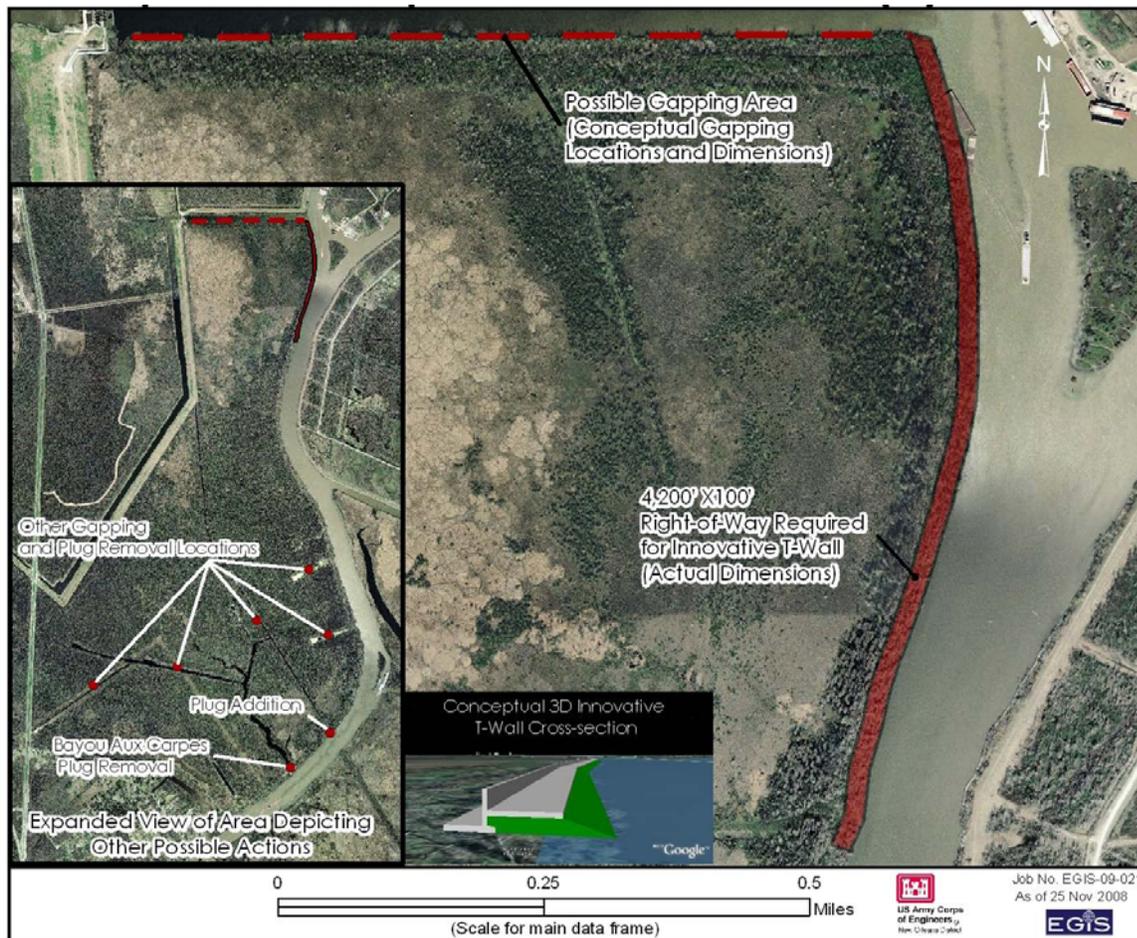
The eastern section of this alignment extends south from the flow control structure within the Old Estelle Outfall Canal, along the western bank of the GIWW within the Bayou aux Carpes CWA Section 404(c) area, crosses the GIWW and ends just north of Hero Canal (figure 4b). This section includes the GIWW channel and a BLH habitat on the GIWW east bank on the protected side of the existing HSDRRS, and a portion of the Bayou aux Carpes CWA Section 404(c) area on the flood side (figures 4c-4e). A T-wall constructed north to south along the western bank of the GIWW within the Bayou aux Carpes CWA Section 404(c) area would tie into the flow control structure at the end of the Old Estelle Outfall Canal and at the southern end of the wall would tie into the closure complex and pump station complex that crosses the GIWW. This T-wall would be constructed so that an approximately 100 ft by 4,200 ft, 9.6 acre, corridor of the Bayou aux Carpes CWA Section 404(c) area would be impacted by the construction of the floodwall (table 1, diagram 1, figure 5). Obtaining the approximately 9.6 acres of new ROW to construct the innovative T-wall within the Bayou aux Carpes CWA Section 404(c) area would be contingent upon the EPA granting a modification to the Bayou aux Carpes CWA Section 404(c) Final Determination. The CEMVN submitted a formal request to modify the Bayou aux Carpes Final Determination on 4 November 2008 (see section 6.3 for coordination information and appendix K for modification letter). The CEMVN has calculated that the 100 ft by 4,200 ft corridor is 9.6 acres, which is different than the most recent USFWS calculation. The CEMVN calculation is used consistently in this IER # 12 as the correct number of acres impacted in the Bayou aux Carpes CWA Section 404(c) area.



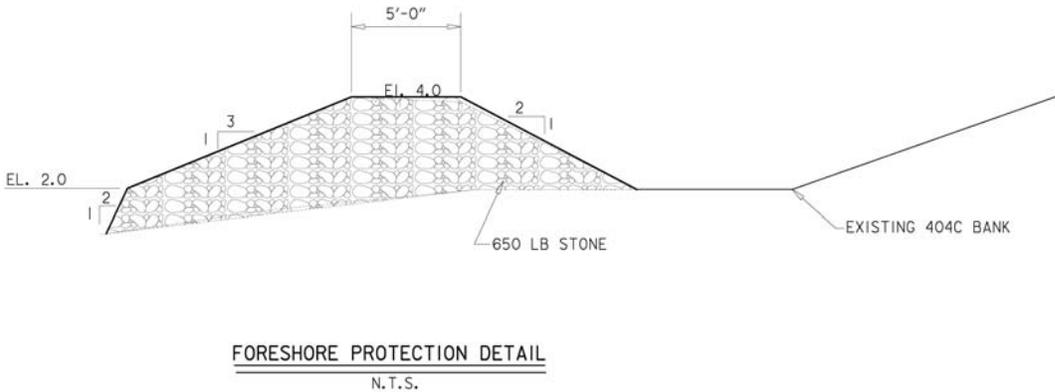
*Diagram 1*

In order to minimize impacts to these unique wetlands and confine construction impacts within that corridor, an innovative T-wall design would be used (diagram 1). This innovative T-wall design was needed to minimize the footprint of the structure in the Bayou aux Carpes CWA Section 404(c) area. In addition, because the GIWW is a Federally maintained navigation channel, a protective berm would be constructed on the protected side of the floodwall, the GIWW channel side. This berm would protect the wall from barge impacts, provide concrete scour protection, and serve as a maintenance access road.

Because of necessary channel dredging and pile driving activities, the Enterprise Pipeline would be relocated. In order to avoid impacts to the Bayou aux Carpes CWA Section 404(c) area the existing pipeline would be relocated utilizing modern directional drilling technologies that would pass under the 404c area. The pipeline relocation would not only avoid direct impacts to the 404c area (1 acre of wetlands), but would also minimize future impacts since the new more modern design would require less intrusive operations and maintenance than the existing pipeline.



In the GIWW adjacent to the Bayou aux Carpes CWA Section 404(c) area, 2,000 linear feet (LF) of foreshore dike protection using 650 lb stone would be constructed to prevent impacts (i.e., scouring, bank erosion, etc.) from occurring within the 404c area due to the discharge from the 20,000 cfs pump station (figure 4a, 4c, and 4d; diagram 2). This foreshore dike protection would be constructed within the GIWW adjacent to but not within the Bayou aux Carpes CWA Section 404(c) area. Foreshore protection would not be expected to alter existing hydrologic conditions within the Bayou aux Carpes CWA Section 404(c) area.



*Diagram 2*

The gate(s) and pump station described in the eastern section are referred to throughout this report as the “closure complex”, which is a component of the proposed action referred to as the “GIWW West Closure Complex” or WCC. Features of the closure complex that would cross the GIWW would include a primary 150-ft to 300-ft navigation gate and a secondary 75-ft to 150-ft gate built to a design elevation of 16 ft (table 1). The closure complex would tie into a floodwall to the west and flood protection levee to the east (figure 4a). The design of the closure complex is being done in collaboration with representatives from the navigation industry and the US Coast Guard to ensure that the safest and most reliable system would be constructed. One of the primary design criteria of these gates is that the structure is large enough to meet the current flow rates in the channel. It would also be necessary to construct a permanent bypass channel. A 20,000 cfs pump station would be constructed, and would provide positive backflow prevention.

A new levee would be constructed further eastward on what is currently the protected side (figure 4c and 4d). The levee work may require geotextile fabric and/or deep soil mixing to strengthen the levee foundation. Bayou Road would be realigned to provide access around the new levee on the protected side.

Four million cubic yards of material would be removed during construction of the eastern floodwall, closure complex, levee, and road realignment. After being evaluated for suitability this material would be used as borrow for this IER # 12 project. The material not used for borrow will be disposed of in the Walker Road borrow sites. The overburden material (i.e. roots, stumps, tress, etc.) would be mulched and used on site or hauled away to a landfill. Any road material (i.e. rock and earthen material) would be used to construct the new road.

The construction of this closure complex, levee, and road realignment would require a total of 240 acres of additional ROW to implement the construction work (table 1). Construction of the eastern section would be expected to take 4 years. 100-year level of risk reduction interim surge protection will be in place by June 2011. The interim protection would provide a storm surge barrier at the appropriate design elevation.

## Bayou aux Carpes CWA Section 404(c) Area

Due to the proposed action's impacts to the Bayou aux Carpes CWA Section 404(c) area, interagency collaboration, especially with the EPA, began early in the planning process and has continued during the development of IER # 12.. The CEMVN agrees to support adaptive management efforts and to ensure that project feature augmentations would minimize adverse impacts within the 404c area. The CEMVN has and would continue to employ measures to reduce the impacts to the Bayou aux Carpes CWA Section 404(c) area. Listed below are those efforts to minimize impacts to the 404c area:

- The WCC alternative: The first measure employed was the derivation of the WCC alternative in which a structure would be built along the boundary of the Bayou aux Carpes CWA Section 404(c) area. Based on a system reliability study, the CEMVN had initially proposed the GIWW A alternative, which would construct a gate structure through the Bayou aux Carpes CWA Section 404(c) area. However, after collaborating with the EPA, National Park Service staff, and other Federal and state resource agencies, the WCC alternative, which would provide comparable system reliability to the GIWW A alternative, was derived to minimize adverse direct and indirect impacts to the Bayou aux Carpes CWA Section 404(c) area. Thus, the WCC alternative, which would maintain system reliability while minimizing adverse environmental impacts, was analyzed by the USACE and brought forward as the proposed action. The WCC alternative would limit adverse impacts to the 404(c) area by building a structure with a narrow footprint (T-wall and earthen berm) along a portion of the Bayou aux Carpes CWA Section 404(c) area that was previously disturbed and would avoid impounding the northern third of the Bayou aux Carpes CWA Section 404(c) area, largely a flotant marsh (see section 2.4.2)
- Innovative techniques to build a floodwall along a navigable waterway: The structure proposed in the Bayou aux Carpes CWA Section 404(c) area would be constructed as a floodwall in lieu of an earthen levee in order to ensure that the least environmentally damaging alternative is in place within this section. A floodwall can be built on a much smaller footprint than an earthen levee. Because the GIWW is a Federally maintained navigation channel, a protective berm would be constructed on the protected side of the floodwall, the GIWW channel side. This berm would protect the wall from barge impacts and serve as a maintenance access road. The USACE recognizes that there are certain risks associated with placing a floodwall along a navigable waterway. Consequently, to minimize the footprint of this surge barrier component within the Bayou aux Carpes CWA Section 404(c) area, the USACE investigated innovative techniques to design and build a structure with the narrowest footprint possible.
- Construction via water based equipment: The floodwall would be constructed within the current 100 ft right-of-way. No additional construction easements would be required for wall construction. Every effort would be made during the design phase to minimize the size of this corridor to the greatest extent practicable.
- GIWW Gate location: The USACE endeavored to locate the gate on the GIWW as far north as practical to further reduce impacts (figure 4c). This resulted in the 4,200 ft by 100 ft corridor for the floodwall. However, it is understood that the GIWW is a Federal navigation channel with heavy commercial barge traffic which requires that design of this structure be such that safety of users of the system be a paramount design consideration.

- Project feature augmentations: The USACE proposes that it is feasible to complete augmentations to minimize adverse impacts that could potentially occur because of the construction of the WCC alternative within a 4,200 ft by 100 ft corridor along the eastern boundary of the Bayou aux Carpes CWA Section 404(c) area (figure 5). Studies are underway in cooperation with the EPA, NPS, and other resource agencies to determine the best and safest alternatives for augmenting the 404(c) area to avoid or minimize hydrological impacts that could result if the proposed action is constructed. Once the studies are complete, the CEMVN, in conjunction with the resources agencies, would determine which features would be constructed. The appropriate features would be constructed as soon as this determination is made and design is completed. See chapters 5 and 7 for more information on the implementation and operation of project feature augmentations.
- Flow control structure: If fresh water input into the 404(c) area via dredged material bank gapping along the southern bank of the Old Estelle Outfall Canal is determined to be beneficial, this flow control structure would be operated in a manner to provide the highest and best use of the outflow. In the event that freshwater input would result in adverse impacts, the structure would be operated to allow water to flow directly into the GIWW. This structure would augment the Bayou aux Carpes CWA Section 404(c) wetland area by permitting the active management of the freshwater discharge from the Old Estelle PS.
- Relocation of the Enterprise Pipeline: The pipeline relocation would be conducted in a manner to avoid impacts to the Bayou aux Carpes CWA Section 404(c) area. The existing pipeline would be relocated utilizing modern directional drilling technologies that would pass under the 404(c) area. Directional drilling would not only avoid direct impacts to the 404(c) area, but would minimize future impacts since the newer, more modern design would require less intrusive operations and maintenance than the existing pipeline. Directional drilling of the pipeline would avoid impacts to 1 acre of BLH in the 404(c) area.
- Foreshore protection within GIWW: Within the channel on the western side of the GIWW, adjacent to but not within the Bayou aux Carpes CWA Section 404(c) area, foreshore protection would be constructed to prevent any further impacts that could result from operation of the pump station (i.e., scouring, banks erosion, etc.) within the 404(c) area due to the discharge from the 20,000 cfs pump station (figure 4c).

Agreements between the CEMVN and cooperating Federal and state resource agencies pertinent to the proposed action are:

- Include project feature augmentations that would enhance the hydrology of the Bayou aux Carpes CWA Section 404(c) area, thus offsetting any potential impacts due to the construction of the HSDRRS. The benefits of these augmentations would be determined as part of the ongoing studies;
- Develop an assessment report (chapter 7) that addresses potential hydrological and ecological impacts to the Bayou aux Carpes CWA Section 404(c) area as a result of the HSDRRS;
- Collect baseline data within the Bayou aux Carpes CWA Section 404(c) area and surrounding water bodies to inform the impact assessment;
- Develop a long-term monitoring plan (chapter 7); and

- Develop a mitigation plan that specifies on-site mitigation for the 9.6 acres that would be impacted, which would be conducted within the Bayou aux Carpes CWA Section 404(c) area or the National Park Service (NPS) Jean Lafitte National Historical Park and Preserve (JLNHPP) (chapter 7). This mitigation plan will also be discussed in the mitigation IER.

The proposed project feature augmentations developed in collaboration with the EPA and other resource agencies, including, in order of priority:

1. Gapping the existing earthen bank along the southern side of the Old Estelle Outfall Canal to provide regulated sheet flow into the Bayou aux Carpes CWA Section 404(c) area;
2. Modifying the existing earthen bank along the Southern Natural Gas Pipeline Canal to provide hydrological exchange between the northern and southern sections of the Bayou aux Carpes CWA Section 404(c) area;
3. Modifying the shell plug at Bayou aux Carpes to provide hydrological exchange between the GIWW and the Bayou aux Carpes CWA Section 404(c) area;
4. Closing the Southern Natural Gas Pipeline Canal to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area;
5. Gapping or grading down drill hole access canal banks to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area; and
6. Gapping or grading down oil well access roads to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area.

These project feature augmentations and plans are being evaluated for effectiveness and feasibility (constructability, relation to project construction, and resource availability) in partnership with the EPA, the NPS, and other resource agencies. Final determination of which project feature augmentations to implement would be determined in collaboration with the Interagency team after an analysis of benefits and impacts is completed (See section 7 for further details regarding the mitigation and monitoring plans for impacts to the Bayou aux Carpes CWA Section 404(c) area.

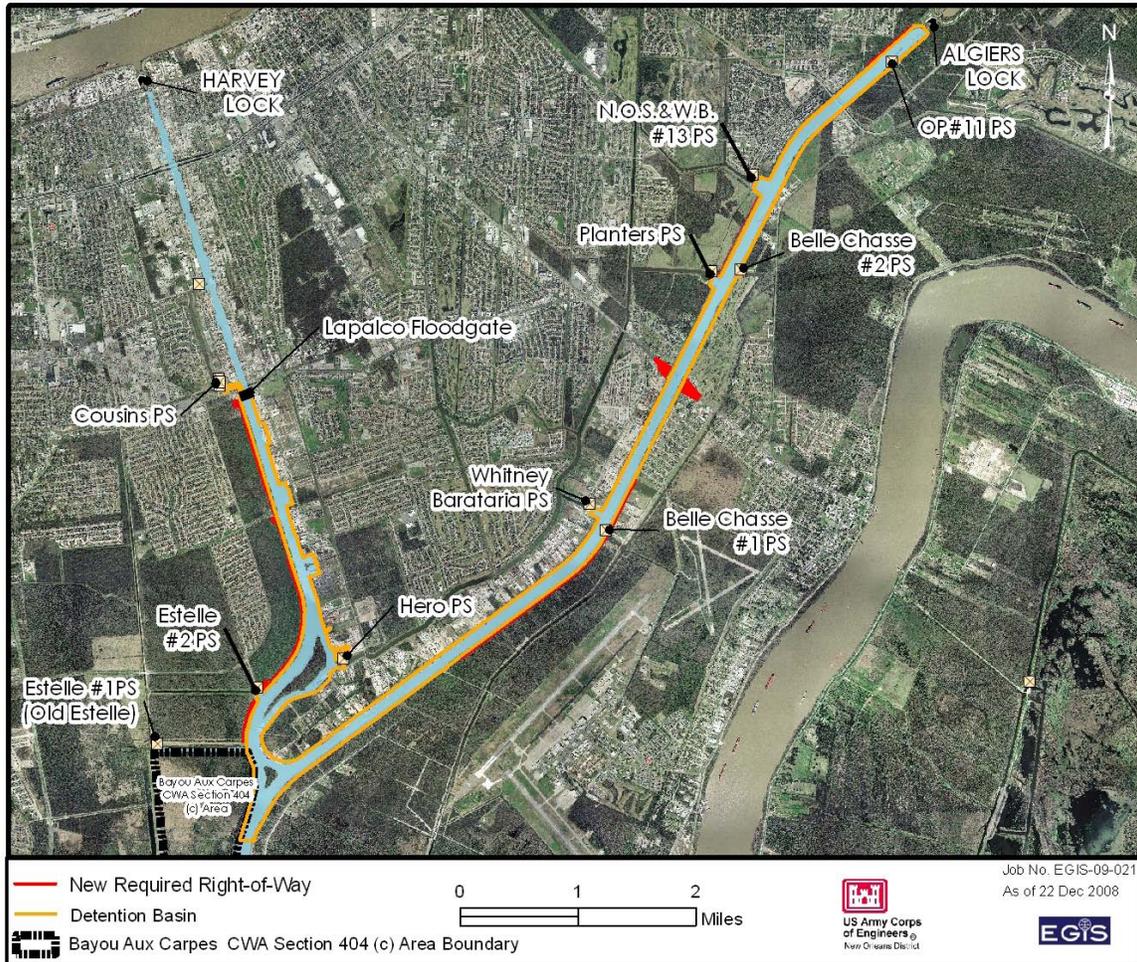
#### Detention Basin Improvements

The WCC would cause water to be impounded in the Harvey and Algiers Canals, when closed during a storm event, creating a detention basin. The proposed action would provide 100-year level of risk reduction south of the confluence of the Algiers and Harvey Canals in lieu of parallel protection along the Harvey and Algiers Canals. Currently, there are over 25 miles of levees, floodwalls, gate structures, and 9 pump stations along the Harvey and Algiers Canals. Improvements to these levees and floodwalls are required to meet Federal factors of safety, as outlined in USACE standards.

USACE standards can be found at [www.mvn.usace.army.mil/eng/hurrdesign.asp](http://www.mvn.usace.army.mil/eng/hurrdesign.asp)

The proposed action includes the use of Harvey and Algiers Canal as a detention basin. This would involve a combination of improvements and dredging activities along the Harvey Canal and Algiers Canal. Improvements would consist of building fronting protection and providing positive backflow prevention at pump stations, capping or replacing floodwalls, and upgrading levees along the detention basin. Construction would occur within the existing ROW unless noted (figure 6). In

IER # 12, work inside the existing ROW, which has been analyzed in a Final NEPA document, is considered part of the existing conditions (sections 1.2 and 1.3). Work that involves going outside the existing ROW is considered part of the proposed action for this IER.



**Figure 6. Detention Basin**

Based on the results of hydraulic models for the GIWW WCC, a detention basin still water level of maximum elevation 4 ft in Harvey Canal and 5.8 ft in Algiers Canal would provide protection along these canals. Dredging of the Algiers Canal would be required from the Belle Chasse Tunnel South to the Hero Cutoff. A top of protection design elevation of 8.5 ft in compliance with HSDDRS standards in the retention basin would still require work along the Harvey and Algiers Canals. However, the work would be considerably less than what would be required if the retention basin stage were increased to the 100-year level of risk reduction. All work would be performed within existing ROW unless otherwise noted. The following projects would be affected (contract numbers are provided in parentheses where applicable):

Harvey Canal West Bank Levees (14g.2, 14a.2): The existing I-Wall sections along the west bank of the Harvey Canal would need to be capped and a berm would be added to provide barge impact protection. The existing levee alignments would be raised to design El. 8.5 ft via a 35 ft

protected side shift earthen levee enlargement. An additional 38 acres of new ROW would be required on the protected side (table 1, figure 6).

Cousins PS Fronting Protection & Outfall Canal to Lapalco (38/39): The existing fronting wall and Cousins 3 discharge tubes would be checked for lower elevation. The Cousins 2 discharge tube invert is at El 4.23 so fronting protection would need to be provided. A portion of I-Wall along the Outfall Canal would be replaced. This work was analyzed in a previous EIS.

Cousins Outfall South of Lapalco and Harvey Sector Gate (46.2): The existing sector gate at Lapalco Boulevard meets the detention basin design elevation requirements. The only portion of this reach that would require work would be a tie-back wall on the Southeast side of the Cousins culverts, which would be replaced with a T-Wall. This work was analyzed in a previous EIS.

Harvey Canal Floodwalls (3a, 3b): The flood protection along this reach is currently being constructed and will consist of floodwalls built to design El. 14.0. Because the walls are exposed on a navigation channel, impact barriers consisting of steel pipe piles would need to be added to protect against barge impact. This work was analyzed in a previous EIS.

Hero Cutoff to Belle Chasse Hwy West (6a.2): A 10,000 LF stretch of levee would require re-shaping, thus providing a small berm within the existing ROW. This work was analyzed in a previous EIS.

Floodgates along Hero Cutoff to Belle Chasse Hwy West (4.2, 5.2, 6.2): Ramp(s) and four gates would be constructed. This work was analyzed in a previous EIS.

Belle Chasse Tunnel: A T-Wall around the tunnel would be constructed along with five vehicular gates (three on the East and two on the West) and two railroad gates (one on each side). The additional ROW required to construct the new floodwall on either side of the Algiers Canal would be approximately 18 acres (table 1; figure 6).

Algiers Lock to Belle Chasse Hwy (West) (47.2): Minor reshaping would be required as a small, protected side berm would be required along nearly 20,000 LF. An additional 65 ft of permanent ROW would be required along a 8,700 LF stretch of levee to construct a protected side berm. The additional ROW required adding the necessary stability berm would be 13 acres (table 1).

Algiers Lock to Belle Chasse Hwy (East) (48.2): A 3,500 LF stretch of levee would require minor reshaping as a small, protected side berm would be required. This work was analyzed in a previous EIS.

Hero Cutoff to Belle Chasse Hwy (East) (49.2): An additional 65 ft of permanent ROW into a BLH area would be required along a 6,300 LF stretch of levee to construct a protected side berm. The additional ROW required to add the necessary stability berm would be 9.4 acres (table 1, figure 6). Due to houses adjacent to the existing ROW, a reinforced levee would need to be constructed for 2,700 LF.

Planters PS (07): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

Sewage & Water Board PS 13 (08): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

Belle Chasse PS 1 (10): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

Belle Chasse PS 2 (11): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

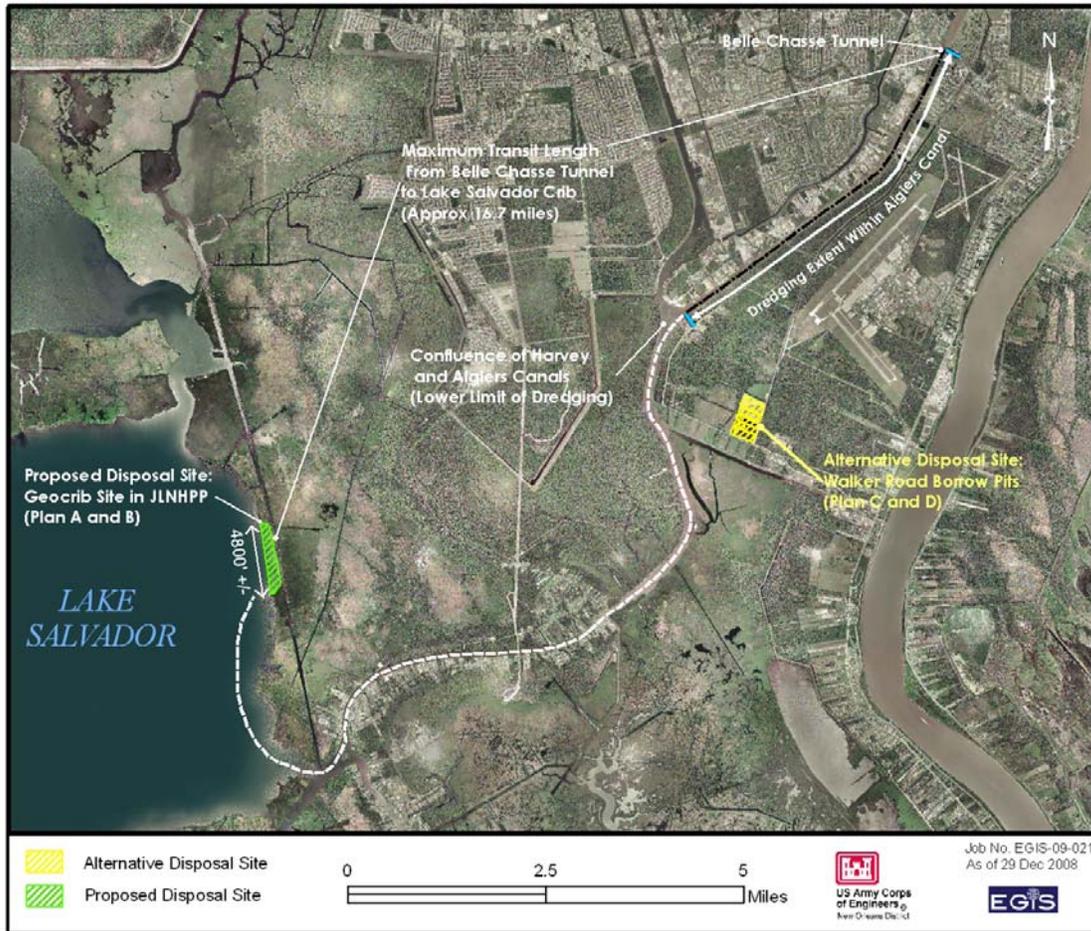
Sewage & Water Board PS 11 (13): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

New Estelle PS (23): Fronting protection would be constructed to the lower detention basin elevation and backflow prevention would be provided. This work was analyzed in a previous EIS.

Whitney Barataria PS (44): No backflow suppression would be needed. The existing fronting wall would be checked with the new criteria for the lower detention elevation. The existing sheet pile I-Wall tie-ins would be replaced with L-Walls or T-walls.

Algiers Canal: Approximately 700,000 cubic yards would be excavated from the Algiers Canal. The frequency of maintenance dredging would exceed 25 years. A dredge and disposal plan can be found in its entirety in appendix L. Disposal sites for future maintenance dredging would be determined in compliance with the Louisiana Coastal Resource Plan in place at the time when there is a need for dredging. The proposed action is for the dredge material to be utilized in a marsh restoration project in the Jean Lafitte National Historical Park and Preserve (JLNHPP) (figure 7). Material would be barged to the site from the Algiers Canal (see appendix L and section 7). The plan is still being coordinated with resource agencies and will be finalized once the full costs and benefits of the plans can be determined. Disposal options are being investigated as described below in case costs, logistics of the disposal plan, or contaminants are found to be an issue. The CEMVN has notified the appropriate resource agencies as to which course of action is preferred. The resource agencies will continue to be involved as cost estimates and the results of any further sediment tests become available.

## Algiers Canal Dredging Extent and Beneficial Use Areas



**Figure 7. Algiers Canal Dredging Extent and Locations for Beneficial Use of Dredged Material**

Disposal options are consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program, which requires that dredged material be used beneficially when practicable. Two alternatives have been discussed with the Interagency Team. The preferred alternative is the disposal of the material into the JLNHPP Lake Salvador “Geocrib,” and the alternative use of the material is placement of the material in the Walker Road borrow sites (appendix L). The alternative of placement of dredged material in the Walker Road borrow sites would be done only as a convenience to the government if the preferred option is not practicable. The placement of dredged material in the Walker Road borrow sites would not be considered backfilling of those sites. If dredged material is placed in the Walker Road borrow sites, the quantity of the material would be insufficient to refill those sites. Disposal of the material in either location would be considered a project feature. The first option of placing the dredged material into the JLNHPP Lake Salvador Geocrib is preferred because it is a beneficial use site and the wetlands created with this material would be counted as mitigation for the HSDRRS projects.

Provided the material is determined to not be contaminated, the material could be excavated via either:

- a) hydraulic cutter head dredge and transported as a slurry to a disposal site(s) via pipeline, or
- b) via mechanical dredge (i.e. barge mounted dragline or backhoe) and placed in barges and transported to site, and either removed from the barges via a hydraulic pump and transported to the site via pipeline, or offloaded from barges, placed within trucks, and hauled to disposal site where it would then be mechanically offloaded into the disposal site.

The following alternative plans would be considered for accomplishment of this task:

- a) Preferred Option - Material from the Algiers Canal to be excavated by barge-mounted dragline/backhoe and transported via barge from Algiers Canal down the GIWW, Bayou Barataria and Lake Salvador, and placed within the Geocrib site in JLNHPP. Retention dikes would be constructed as necessary in order to retain the dredged material and prevent effluent sedimentation from occurring outside of the site. Prior to disposal, a before disposal survey of the disposal site, as well as the water bodies adjacent to the disposal site, would be performed. This is a 16 mile transport option (figure 7).
- b) Hydraulic cutter head dredging, with material excavated from the canal transported via barge from Algiers Canal down the GIWW, Bayou Barataria, and Lake Salvador, and placed within the Geocrib site in JLNHPP. Retention dikes would have to be constructed as necessary in order to retain the dredged slurry and prevent effluent sedimentation from occurring outside of the site. A silt screen/turbidity curtain may be installed to trap and prevent any sediment that might exit the site and fall out into the adjacent water bodies. Prior to disposal, a before disposal survey of the disposal site, as well as the water bodies adjacent to the disposal site, would be performed. This is a 16 mile transport option.
- c) Material from the Algiers Canal to be excavated by hydraulic cutter head dredge and transported via pipeline within Algiers and Hero Canals and placed within the Walker Road borrow sites adjacent to Hero Canal (appendix L). Retention dikes would be constructed around the pit(s) as necessary in order to retain the dredged slurry to the pit(s) and prevent effluent sedimentation from occurring outside of the pit(s). A marsh buggy dragline/backhoe would be used for construction of the retention dikes with borrow for retention dikes to come from within the pit(s) themselves. Waste water would be drained from the pit(s) via spill box weirs that would be constructed within the retention dikes paralleling Bayou Barrier canal. The spill box weirs would be controlled and monitored to assure that retention of the material is maximized and to prevent effluent sedimentation from occurring within Bayou Barrier. A silt screen/turbidity curtain would be installed in Bayou Barriere just north of the spill box to trap and prevent any sediment that might exit the weir and fall out into the canal/bayou. Prior to disposal, a before disposal survey of the canal would be performed and the bayou restored to pre-disposal conditions if needed. This is a 7.5 mile transport option.
- d) Material from the Algiers Canal to be excavated by barge-mounted dragline/backhoe and transported via barge and placed within the Walker Road borrow sites adjacent to the Hero Canal. The material could either be offloaded onto trucks and hauled to the Walker Road borrow sites, or removed from barge via hydraulic pump and transported via pipeline pumped to the Walker Road borrow sites. Retention dikes would be constructed around the pit(s) as necessary in order to retain the dredged material to the pit(s) and prevent effluent sedimentation from occurring outside of the pit(s). A marsh buggy dragline/backhoe would be used for construction of the retention dikes with borrow for retention dikes to come from within the pit(s) themselves. Waste water would be drained from the pit(s) via spill box weirs that would be constructed within the retention dikes

paralleling Bayou Barrier canal. The spill box weirs would be controlled and monitored to assure that retention of the material is maximized and to prevent effluent sedimentation from occurring within Bayou Barrier. A silt screen/turbidity curtain would be installed in Bayou Barriere just north of the spill box to trap and prevent any sediment that might exit the weir and fall out into the canal/bayou. A before disposal survey of the canal would be performed and the bayou would be restored to that pre-disposal condition if needed. This is a 7.5 mile transport option.

- e) If the material is found to be classified as contaminated then the material would be mechanically dredge (i.e. barge-mounted dragline or backhoe) and the excavated material would be placed in sealed barges and transported to a disposal site for contaminated material. Initial tests conducted by the USACE do not indicate that the material is contaminated, but additional testing is underway. This is a 77 mile transport option to the Type I landfill in Venice, LA.

The WCC alternative would provide 100-year level of risk reduction based upon improvements, enhancements, and construction in concert with tie-ins to improvements to the Hero Canal Levee (IER # 13) and the V-line Levee (IER # 14) (figure 2).

### **2.3.1.5 Other Necessary Actions**

#### Armoring

Armoring may be required at a number of locations throughout the HSDRRS. These locations may include: transition points (where levees transition into any hardened features such as other levees, floodwalls, and pump stations), floodwall protected side slopes, pipeline crossings, and earthen levees that are exposed to excessive wave overtopping during a 500-year hurricane event. For the proposed action, nearly all of these armoring areas would occur along the GIWW. However, the specific locations have not yet been determined. Armoring types vary, but the following are the most common, from the most resistant, downward:

- ACB – Articulated concrete blocks.
- ACB/TRM – Articulated concrete blocks/Turf reinforced mattress: the hydraulic parameters and physical conditions are such that small modifications could allow a reduction to TRM.
- TRM – Turf reinforced mattress.
- TRM/Grass - The hydraulic parameters and physical conditions are such that small modifications could allow a reduction to grass.
- Well maintained grass cover.

#### Utility Relocations

As needed, utilities would be relocated to cross the project area in accordance with existing standards. Disruptions of service would be kept to a minimum. Relocations would be conducted in order to avoid impacts to the wetland areas, and the Enterprise Pipeline would be directionally drilled underneath the 404c area to avoid impacts to that significant resource.

## Operation and Maintenance

In addition to initial construction activity, the proposed action would include all of the routine maintenance activities required to keep this element of the HSDRRS at full operational capability. This would include pump station and navigation maintenance, mowing, re-paving, repairs to the structures, in-kind replacement, etc., to be provided by either the non-Federal sponsor or the USACE if Congressionally authorized.

Operation and Maintenance (O&M) of the HSDRRS would have minimal impact on the significant resources in the area. Levees would be periodically mowed and herbicides might be used (on a very limited basis) around control structures. The floodwalls and levees would be annually inspected by the CEMVN (quarterly by the local authority) and repaired, as needed, to bring them up to design standards. This would include adding subsequent lifts of earthen material to levees in order to address subsidence and sea level rise. The Algiers Canal would be maintenance dredged approximately every 25 years in order to maintain the detention basin still water level. The dredge material would be disposed of in a manner consistent to the maximum extent practicable with the Louisiana Coastal Resources Program. The closure complex would be maintained, and tested as needed. Modifications to the banks and shell plug in the Bayou aux Carpes CWA Section 404(c) area would not be expected to require O&M. O&M activities would be conducted within the established ROW and within previously disturbed areas. Temporary and localized maintenance-related effects (e.g., noise, air emissions, increased traffic, temporary erosion and sedimentation, etc.) might occur during O&M work.

## Temporary Flood Protection Contractually Required During Construction

As part of the construction process, temporary flood protection would be required whenever existing floodwall or levee is removed until the replacement floodwall or levee is sufficiently completed to withstand floodwaters. Sufficiently completed is defined as the time when the concrete in the replacement floodwall reaches a compressive strength of 4,000 psi and all earthwork for the floodwall/levee replacement has been completed. Typically, the contractor would provide temporary protection or a cofferdam that would in no way affect the stability of the existing flood protection or flood protection being constructed. The contractor would maintain all temporary flood control, including maintaining and operating drainage facilities. During the required time, the contractor would provide, maintain, and operate pumps of adequate capacities, for the removal of the water that could accumulate in excavations within the areas protected by the temporary flood protection, during construction. The discharge from the pumps would be into the flood side. The contractor would remove all temporary flood control structures and incidental features when no longer required. All material used in providing temporary flood control structures, and any debris generated during their removal, would become the property of the contractor and would be removed from the job site prior to completion.

Prior to beginning work, the contractor would submit for approval his proposed plan to accomplish the specified temporary flood protection. The submittal would be in accordance with Section 01330, "Submittal Procedures" and would include, but not necessarily be limited to the following:

- Design and layout of temporary flood protection works,
- Methods and duration of maintenance of temporary flood protection,
- Methods, sequence, equipment, and materials to be used for draining of excavations for floodwall demolition and floodwall replacement, and
- Method and sequence of removal, including disposal of materials.

These measures provide assurance that protection would be maintained during the construction process even in the event of significant flooding.

**Table 2. Construction Materials Needed to Complete the Proposed Action\***

	<b>Cut (cy)</b>	<b>Fill (cy)</b>	<b>Stone (tons)</b>	<b>Sheetpile (lf)</b>	<b>Concrete (cy)</b>
<b>Western Levee</b>	363,660	484,300	0	0	0
<b>Old Estelle PS</b>	5,201	19,600	1,080	30,258	5,201
<b>Northern Floodwall</b>	772	39,786	0	163,800	7,847
<b>Eastern Floodwall, Closure Complex, Levee, and Road Realignment</b>	4,000,000	1,325,187	300,000	550,000	140,000
<b>Detention Basin</b>	274,974	1,255,734	9,714	889,764	89,380
<b>Algiers Dredging</b>	700,000	0	0	0	0
<b>TOTAL</b>	<b>5,344,607**</b>	<b>3,124,607</b>	<b>310,794</b>	<b>1,633,822</b>	<b>242,428</b>

*\*Estimated, \*\*Will be evaluated for borrow suitability*

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

Four alternatives to the proposed action were considered in detail. These alternatives were no action, southern closure option (GIWW A), Algiers gate (AG), and parallel protection (PP).

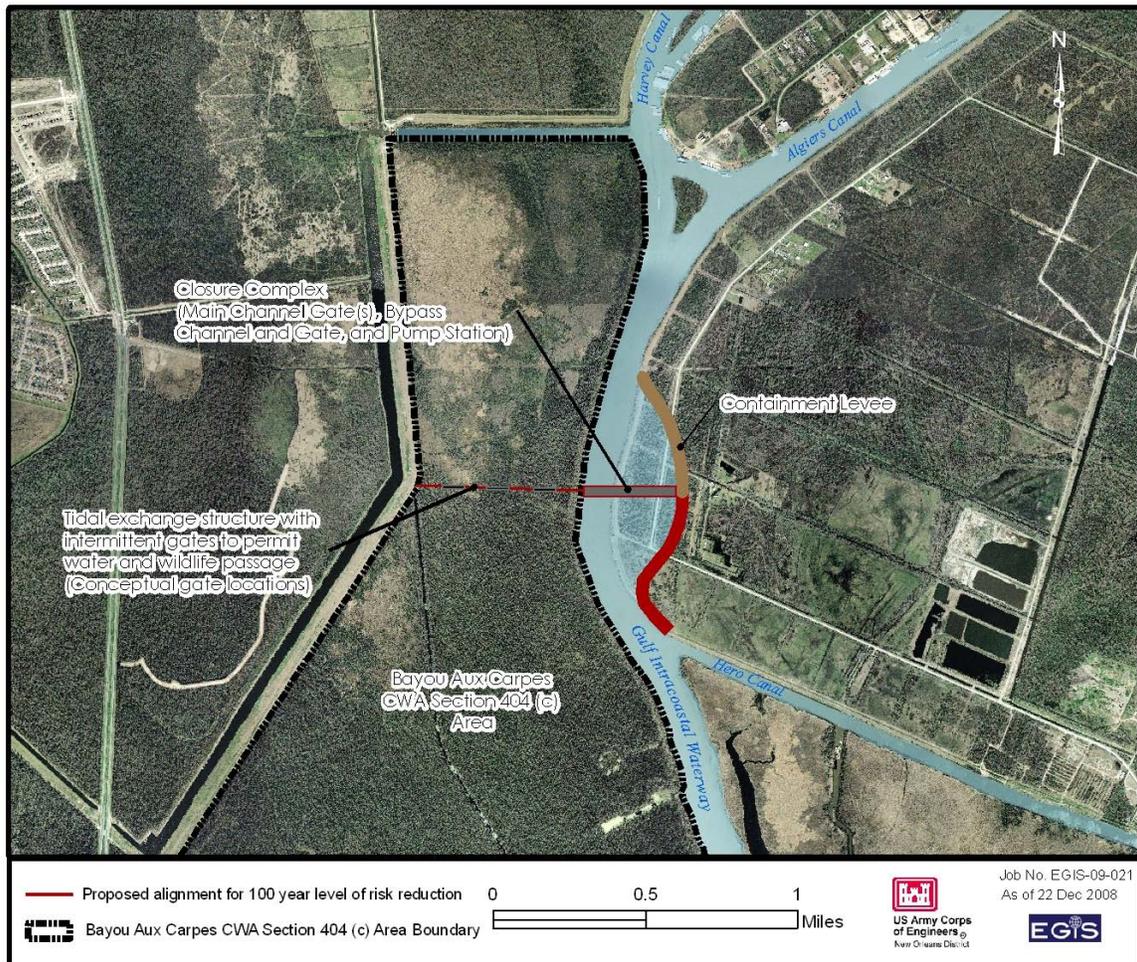
### **2.4.1 No Action**

Under the no action alternative, the proposed action would not be constructed by the CEMVN. The levee and floodwall projects would be built to the previously authorized level of risk reduction rather than the 100-year level of risk reduction. The current project-area levee system of 25 miles includes the Algiers Canal and Harvey Canal levees, a navigable floodgate at Lapalco Boulevard, fronting protection for nine existing pump stations, and the Algiers Lock. With no action, the authorized level of risk reduction would be completed by raising the levees and building flood walls to approximately elevation 10 ft. The Harvey Canal levees and structures are currently being upgraded to the authorized level. The levees were previously improved along much of the Algiers Canal; however, settlement has taken place and as such additional levee lifts would be required.

The protection along the east side of the Harvey Canal and along the west side of the Algiers Canal, from the Belle Chasse Tunnel to the Harvey Canal, is new construction (these areas are currently under construction to provide the previously authorized level of risk reduction). Many industries in these areas front on the canals and limit the space for levees; therefore, many of the areas to be raised as part of the no action alternative would require floodwalls in order to avoid major impacts to these industries and businesses. The level of risk reduction afforded by this alternative would not be adequate to protect against 100-year flood or storm-surge events. Consequently, the no action alternative would potentially result in continued negative impacts due to 100-year storm surge events effecting property, public safety, and local economic stability.

## 2.4.2 Southern Closure Option (GIWW A)

The GIWW A alternative (figure 8) would be similar to the proposed action, but would utilize different levee and floodwall alignments to traverse the Bayou aux Carpes CWA Section 404(c) area.



**Figure 8. Southern Closure Option (GIWW A) Alternative**

A navigable floodgate would be constructed in the GIWW approximately 1 mile south of the confluence of the Harvey and Algiers Canals. The details regarding the navigable closure(s) would be identical to those described for the proposed action (WCC).

The overall structure would include the floodgates, pumping station, and by-pass channel as previously described. A new 3,000-ft long tidal exchange structure would be constructed west of the navigable floodgate across the EPA Bayou aux Carpes CWA Section 404(c) area to the V-line Levee. The tidal exchange structure floodwall would be designed to utilize the smallest construction footprint possible to minimize environmental impacts. Gates in the wall would be constructed at specified locations in an effort to maintain the natural hydrology of the area. The floodwall would also be designed to facilitate the passage of wildlife. While all reasonable and

practicable designs would be utilized to minimize impacts to the 404c area, this alternative would result in the greatest unavoidable impacts to the Bayou aux Carpes CWA Section 404(c) area.

The navigable floodgate and tidal exchange structure would be constructed to the 100-year level of risk reduction of elevation 16 ft. The specific tie-in locations of the GIWW A alternative to other HSDRRS (IER #13 and #14) project elements would provide 100-year level of risk reduction to the study area without raising the parallel protection above that currently authorized along the Harvey and Algiers Canals.

The details regarding the detention basin would be identical to those described for the proposed action (WCC).

### 2.4.3 Algiers Gate (AG)

The AG alternative (figure 9) would require the construction of a navigable floodgate on the Algiers Canal and major levee and floodwall improvements along the Harvey Canal, GIWW, and V-Line Levee.

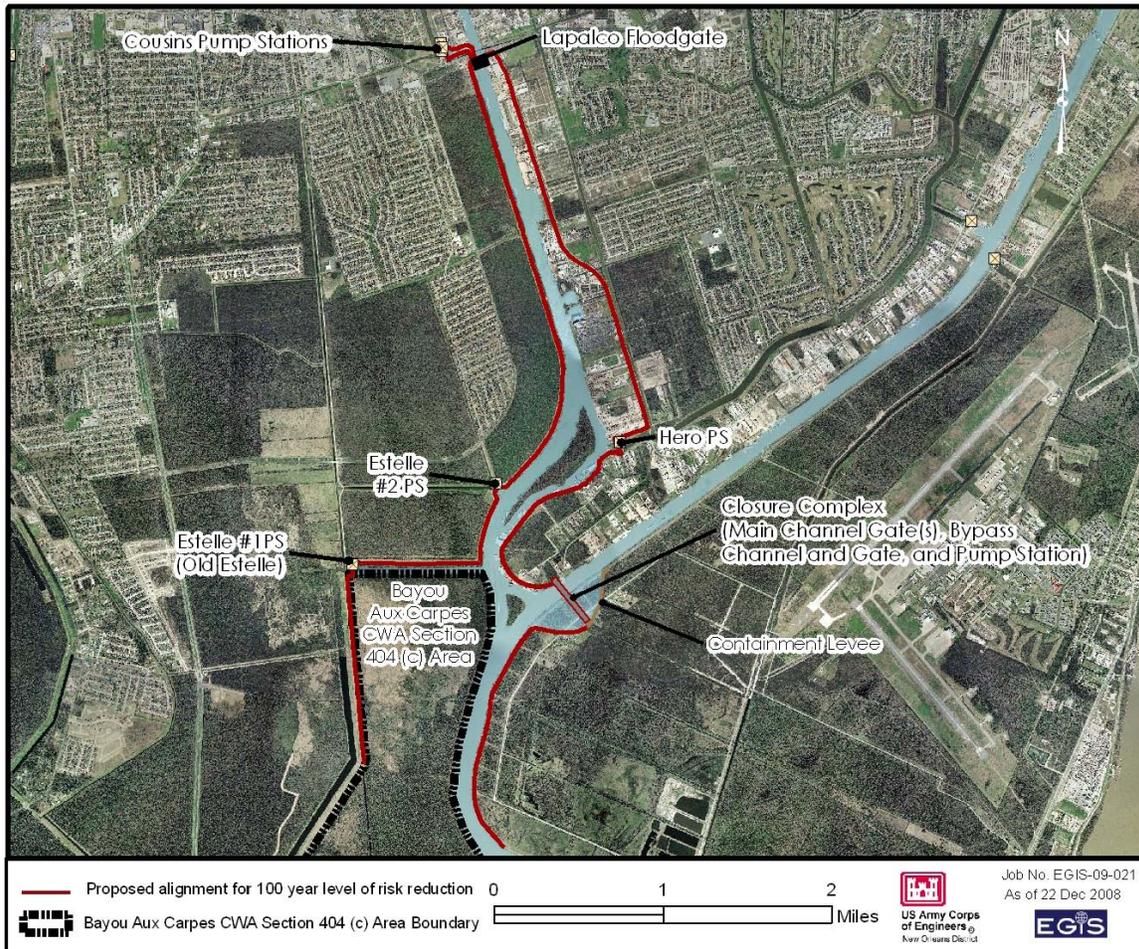


Figure 9. Algiers Gate (AG) Alternative

The AG alternative would include a 150 ft to 300 ft navigable floodgate on the Algiers Canal, just above the confluence with the Harvey Canal. This navigable floodgate would require a permanent pumping station (approximately 20,000 cfs) adjacent to the gate, providing 100-year level of risk reduction along the Algiers Canal. Levee extending from the gate and pump station would need to be raised to 100-year level of risk reduction (14 ft). These improvements would tie into additional levee and floodwall improvements along the GIWW and Harvey Canals. Levees and floodwalls would be raised to 14 ft along both banks of the Harvey Canal, sections of the GIWW, and sections of the V-Line Levee.

Levee improvements would specifically occur in two main locations. Existing levee on the eastern side of the GIWW would be raised from the navigable floodgate on the Algiers Canal to the Hero Canal Levee. In addition, existing levee on the west bank of the Harvey Canal would be raised from Lapalco Boulevard to the Estelle Pump Station Outfall Canal, west to the Estelle Pump Station, and continuing south along the V-line Levee.

Floodwall would be built to 14 ft on the east bank of the Harvey Canal from Lapalco Boulevard south to the GIWW. Floodwall would be used in this area in order to minimize impacts to existing development. These floodwall improvements along the Harvey Canal are currently being constructed under previous authorization.

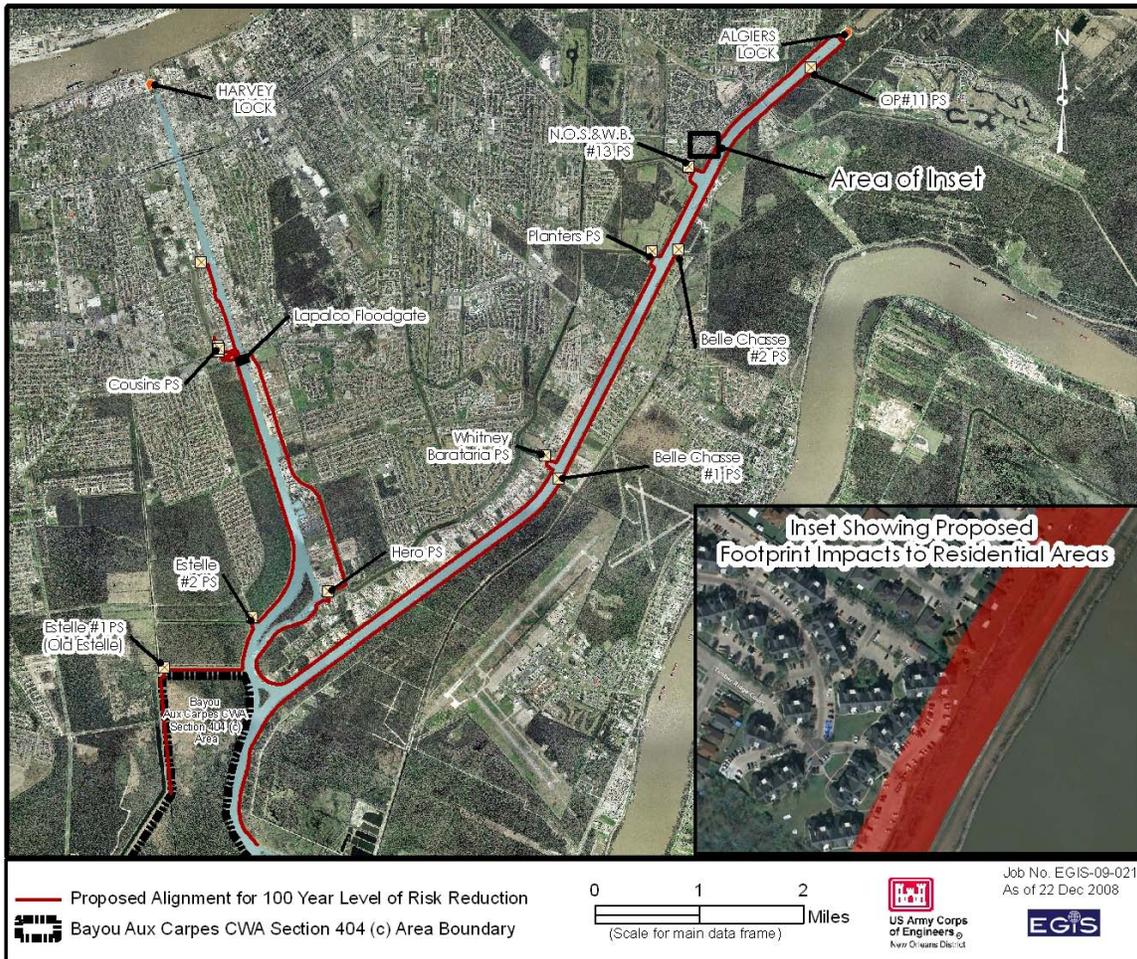
The proposed levee and floodwall improvements would require major modifications to the Harvey Canal Floodgate at Lapalco Boulevard and the Cousins Pump Station discharge channel. Fronting protection to the 100-year level of risk reduction would also be required at the Cousins Pump Station and all pump stations south of Lapalco Boulevard on the Harvey Canal, to prevent inundation of the existing pumps. These additional improvements would provide the desired 100-year level of risk reduction in coordination with levee tie-ins to additional HSDRRS projects (IER #13 and #14).

The details regarding the detention basin along the Algiers Canal behind the structure are identical to those described for the proposed action (WCC) for the Algiers Canal.

These additional improvements would provide the desired 100-year level of risk reduction in coordination with levee tie-ins to additional HSDRRS projects (IER #13 and #14).

#### **2.4.4 Parallel Protection (PP)**

The PP alternative (figure 10) would use only improvements to existing levees and floodwalls along the GIWW, Harvey Canal, and Algiers Canal to achieve 100-year level of risk reduction. This alternative is similar to the AG alternative along the GIWW and Harvey Canal; however, there would be no navigable floodgate built on the Algiers Canal. Instead, 100-year level of risk reduction would be achieved along the Algiers Canal by raising levees and floodwalls.



**Figure 10. Parallel Protection (PP) Alternative**

Levee would be raised to 14 ft along the V-line Levee to the Estelle Pump Station, continuing along the Old Estelle Outfall Canal, and finally running north along the western bank of the Harvey Canal to Lapalco Boulevard. Major modifications to the Cousins PS discharge walls and the Lapalco floodgate would be required. On the opposite side of the Harvey Canal (east bank), floodwall would be raised to 14 ft from Lapalco Boulevard to the Algiers Canal. The existing levees and floodwalls on both banks of the Algiers Canal would be modified from Hero cut to the Algiers Lock. Elevations of the levee and floodwall improvements along the Algiers Canal would range from 14 ft to 16 ft. Improvements to existing flood protections structures would consist of:

- Raising existing levees (which would require the acquisition of additional rights-of-way and the removal of numerous dwellings, apartment complexes, electrical transmission towers, modifying the bridge supporting piers for two vehicle bridges and one railroad bridge crossing the canal, degrading the existing levees, installing a high strength geotextile at elevation 0 ft and rebuilding the levee to the 100-year level of risk reduction);
- Constructing and modifying existing floodwalls; and
- Constructing floodwalls and floodgates on existing levees.

The construction options utilized along the Algiers Canal would be highly dependent upon localized land use and constructability.

In addition to the levee and floodwall improvements, the PP alternative would require elevation modifications and flood protection tie-ins to all pump stations along the Harvey and Algiers Canals, the Algiers Locks, the Lapalco Sector Gate, and the Estelle PS. The existing Belle Chasse tunnel would need to be improved. A T-Wall around the tunnel would be constructed along with five vehicular gates (three on the East and two on the West) and two railroad gates (one on each side). Some of these modifications have already occurred, or are currently under construction as part of a pre-Katrina authorized action. These modifications, and the PP alternative levee and floodwall modifications, would provide 100-year level of risk reduction in coordination with levee tie-ins with additional HSDRRS projects (IER #13 and #14).

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

### **2.5.1 Hollow Core Levees**

Large amounts of borrow material are needed to construct the hurricane protection system in the New Orleans area to the levels required. The CEMVN is considering several alternatives to earthen levees that would change the quantity of borrow material required. One is to substitute construction of an existing levee with a hollow core levee. The concept of the hollow core concrete levee system is that open sections fill with water from the bottom as the storm surge rises. The combined weight of the concrete frame and its water-filled voids inside the frame result in a gravity structure that is designed to resist hydrostatic forces (from a surge), while resisting impact forces from possible vessel collisions. Hollow core levees are comprised of trapezoidal shapes similar to earthen levees. The levee superstructure is comprised of sloped side-walls with a flat-bottom slab, with access to the interior via steel grating or manholes in the crest.

Water inlets or ports are incorporated into the cross-sections near the levee base on the flood side to allow the section to flood with water to contribute to the overall weight for stability purposes. Shear keys in the base are designed to protect against sliding under design loading conditions. The substructure consists of a concrete base slab (pad) that would be supported by steel pipe piles. Excavation and granular backfilling would be required to construct the pile-supported concrete pad. The concrete base slab serves a two-fold purpose. It distributes loads to the pile foundation as well as serves as a “roadway” for cast-in-place construction.

Hollow core levees would not be advantageous to use in lieu of traditional reinforced levee sections for this proposed project because the existing levees in Orleans, Plaquemines, and Jefferson Parishes only need to be raised approximately 4 ft to 6 ft. Therefore, degrading an existing levee and replacing it with a concrete levee section would not be cost effective.

### **2.5.2 Nonstructural Measures**

The nonstructural measures alternative would include options that might significantly reduce flood damage without the construction of major flood protection structures. Such measures would include raising residential and commercial structures in flood prone areas, structure relocation, and rezoning, among others. Generally, each of these potential options would incur high costs and could have high socioeconomic impacts, while providing limited and varying levels of flood damage relief. According to Section 73 of WRDA, ER 1105-2-100, nonstructural measures can be considered independently or in combination with structural measures (USACE 2000).

Independently, nonstructural measures cannot achieve the federal statutory mandate of 100-year level of risk reduction in the project area. Nonstructural measures could reduce flood damages without significantly altering the nature and extent of flooding, inside the protected area of the 100-year level of risk reduction for the WBV project area if this option were pursued.

Flood damage reduction is achieved from nonstructural measures by changing the use made of the floodplain, or by accommodating the uses there to the flood hazard. Typically, structure relocation, raising the structures, flood proofing, and regulation of the floodplain may be involved.

#### 2.5.2.1 Structure Relocation

One way to reduce damages from storms and hurricanes would be a mandatory public acquisition of properties in areas subject to flooding. This would be done pursuant to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 USC Section 4601, et seq., as amended (the Uniform Act) for financial assistance for subject properties. Accordingly, a nonstructural program based on acquisition of commercial and residential properties in flood-prone areas would be subject to these guidelines, including payment of just compensation for the acquired properties and payment of Uniform Relocation Assistance Benefits under Title II of the Uniform Act for the displacement of individuals, families, businesses, farms, and non-profit organizations.

Two primary options exist under this alternative: (1) relocation of the structure to a comparable site outside of the area of flooding; and (2) acquisition of the structure and site by the local sponsor for demolition and relocation. Neither of these options is considered viable under the existing circumstances. Some of the more important marine industries in the New Orleans area are located adjacent to the Algiers and Harvey Canals. Both waterways are used by nearby marine industry. Acquisition and relocation would be very expensive and would defeat the purpose of the original levee system: to provide storm damage risk reduction for commercial, industrial, and residential areas.

#### 2.5.2.2 Raise in Place

This form of flood proofing would require elevating all commercial and residential properties subject to flooding in the study area above the 100-year flood level. In addition, certain infrastructure that would need to be operational in a flooding event might have to be raised also (i.e. roadways, public buildings, and certain utilities). The average cost of elevating residential structures in the New Orleans area has been estimated at \$95 per square ft (USACE 2007). Thus, the cost of raising a 1,800-square-ft residence would be approximately \$171,000. Because the proposed action would be a component in the overall system of levee improvements on the WBV, all residential structures on the WBV would need to be raised if the raise-in-place program was implemented.

A detailed economic study of the WBV and hurricane protection was conducted in 1994, using 1993 figures (WBV Feasibility Report, Technical Appendixes, 1994). While these figures are dated, and while they must be considered in general terms, they remain a relevant estimate of costs for non-structural improvements. The area has developed substantially since this economic assessment was made, providing a very conservative estimate of costs to raise structures in place. In 1993, there were 31,262 residential structures in the WBV (east of the Harvey Canal), 360 apartment complexes, and 2,152 commercial structures.

Assuming each residential structure as a standard 1,800 square-ft house, the 31,262 residential structures in Orleans, Jefferson, and Plaquemines Parishes in the WBV (east of the Harvey Canal) would cost approximately \$5.5 billion to raise above the 100-year level of risk reduction elevation. In addition, apartment buildings, commercial buildings, and other non-residential buildings would need to be raised, along with selected utilities and infrastructure. In 1993, residential structures

constituted 63 percent of the value of total real estate in the area. Using this figure, it might cost another \$2 billion to raise the apartment buildings, commercial buildings, and other non-residential buildings (or otherwise flood-proof them). Moreover, certain critical infrastructure (such as highway escape routes) would require raising, essentially making them bridges, with resultant large cost expenditures. Conservatively, raising in place would likely cost well in excess of \$10 billion for the structures and facilities existing in 1993, which does not include the growth that has occurred over the last 15 years. Therefore, this is not a viable stand-alone option when the costs are compared with the approximate \$1.2 billion required for construction of the proposed action. The proposed action would not only protect existing real estate to the 100-year level of risk reduction, but also lower future development costs. Thus, the option of raising in place has been eliminated from consideration.

#### 2.5.2.3 Floodproofing

Floodproofing can be used to reduce flood damages by modifying structures and relocating building contents. Floodproofing involves techniques to keep water out of structures, as well as reducing the damaging effects of inundation. Raising the structure, as identified in section 2.5.2.2, is a primary technique that can be used as part of a collective action. This can be done either when the building is under construction or through retrofitting of an existing structure. As with raising in place, floodproofing has been eliminated as a major element for consideration due to prohibitive costs.

#### 2.5.2.4 Rezoning

This option provides for zoning tools to be used to preclude or limit land development in flood-prone areas. While this option could minimize future damages from new development in flood-prone areas, the goal is to provide a system of 100-year level of risk reduction throughout the WBV according to Federal statutory requirements. Zoning cannot achieve this goal.

In summary, no combination of non-structural tools could independently achieve the required 100-year level of risk reduction needed to provide hurricane surge protection on the WBV as intended by federal statutes.

### **2.5.3 Structural Alternatives**

Three alternatives identified in the design alternatives study (URS, January 2007) for the proposed project were eliminated from further discussion during the environmental documentation stage. These include the following:

#### 2.5.3.1 Alternative B (Design Report Designation)

Alternative B would include construction of a 150 ft gate and pumping station in the GIWW south of the confluence of the Algiers and Harvey Canals. The permanent gate would be constructed to the 100-year elevation, thus eliminating the need for any increase to the parallel protection along the canals, and eliminating any need to modify existing pump stations. A new pump station would be constructed adjacent to the gate to move interior drainage from the canals, across the gate, and then discharging into the GIWW.

The permanent features would be tied in to the nearest existing levees by either constructing a floodwall northward along the edge of the GIWW and then westward to tie in to the protection at the Old Estelle PS; or by constructing a floodwall, with sluice gates, to the west across high-quality wetlands and tying in to the V-Line Levee.

This alternative was dismissed from further review for the following reasons:

- Alternatives GIWW A and WCC, which are carried forward in this document, would offer more advantages than alternative B, which is very similar.

#### 2.5.3.2 Alternative E (Design Report Designation)

Alternative E would use a permanent 150 ft sector gate located on the Harvey Canal, just above the confluence with Algiers Canal. (Note: The levees would be raised along the GIWW the same as for the PP alternative.) This alternative would require a permanent pumping station adjacent to the sector gate. The sector gate would provide 100-year level of risk reduction along the Harvey Canal. The parallel protection along Algiers Canal would have to be raised to the 100-year level of risk reduction. To quickly provide the authorized level of risk reduction along the Algiers Canal, it would be necessary to raise the parallel protection along the east side of the canal to at least the authorized level of risk reduction during the first phase of this alternative.

This alternative would have the same options as the PP alternative in the area of the existing Highway 23 tunnel at Belle Chasse. Alternative E is based on using floodwalls that would extend back from the canal on both banks, along both sides of the tunnel entrances, and the addition of flood gates across the highway.

This alternative was dismissed from further review for the following reasons:

- This alternative has the highest costs of the alternatives.
- High impacts to residents and businesses in the area.
- Placing a sector gate on the Algiers Canal and raising the protection on the Harvey Canal to a 100-year level of risk reduction (alternative 3) has many advantages over a sector gate on the Harvey Canal and raising protection to 100-year level of risk reduction on the Algiers Canal; thus this option was eliminated.

#### 2.5.3.3 Alternative F (Design Report Designation)

Alternative F would use permanent 150-ft sector gates located on both the Algiers and Harvey Canals, slightly north of their confluence. Along the GIWW, alternative F would require the same protection upgrades as those discussed for the PP alternative. These upgrades would be capable of providing the desired 100-year level of risk reduction in coordination with the sector gates along the Algiers and Harvey Canals and levee tie-ins with additional HSDRRS projects (IER # 13 and # 14). On Algiers Canal, alternative F would require no further upgrades above the authorized level. On Harvey Canal, no further upgrades would be required above the authorized level.

This alternative was dismissed from further review for the following reasons:

- This alternative has higher costs than most of the other alternatives.
- Construction of two sector gates is complex and the difficulty of maintaining traffic on the two canals during construction would be greater than with the GIWW A or WCC alternatives.
- GIWW A and WCC both offer decreased storm load exposure and decreased operational complexity.
- Location of a navigable floodgate in the sharp curve of the Harvey Canal would make

navigating through the structure impractical.

#### 2.5.3.4 Alternative G – GIWW C

Bayou aux Carpes CWA Section 404c area alternatives that would avoid impacts to that area were considered. Alternative G is similar to WCC but would construct the eastern innovative floodwall completely within the GIWW, avoiding all discharges of dredge and/or fill material in the Bayou aux Carpes CWA Section 404(c) area. This alternative was eliminated from further consideration due to constructability and navigation concerns. The construction a floodwall within the heavily used navigation channel that would eliminate all discharges of fill material and eliminate all impacts to the Bayou aux Carpes CWA Section 404(c) area wetland would create engineering and construction challenges producing significant increases in construction time and cost necessary to maintain the same structure reliability achieved by placement of the wall on the bank.

The channel geometry in this area, in particular the very tight curves and narrow channel in the Harvey Canal directly adjacent to this portion of the Bayou aux Carpes CWA Section 404(c) area present challenges that would require impractical actions to achieve a structure that would be able to be completed by June 2011. This action would require the relocation of the navigation channel as well as the wall and berms and or structures required to protect the wall from barge impacts. A small channel behind the wall to maintain hydraulic flows to the Bayou aux Carpes CWA Section 404(c) area would also have to be constructed under this alternative. The greatly increased construction cost and durations as well as the increased risk to the walls make moving the walls into the channel impractical.

Continued coordination with the NPS and EPA on ways to minimize impacts on the 404c will continue throughout the design and construction phase.

## 2.6 SUMMARY TABLE

Table 3 provides a summary of the preliminary alternative screening results.

**Table 3: Summary of Preliminary Alternative Screening**

	Western Levee	Northern Floodwall	Eastern Complex
No Action	☑	☑	☑
Nonstructural	X	X	X
Existing Alignment			
• Earthen Levee	☑	☑	☑
• T-wall Floodwall	X	•	☑
• Earthen Levee with T-wall Floodwall cap	X	☑	☑
Flood-side Shift			
• Earthen Levee	X	•	X
• T-wall Floodwall	X	X	X
• Earthen Levee with T-wall Floodwall cap	X	X	X
Protected-side Shift			
• Earthen Levee	☑	☑	☑
• T-wall Floodwall	X	•	☑
• Earthen Levee with T-wall Floodwall cap	X	☑	☑
New Alternative – GIWW A	☑	☑	☑
New Alternative – WCC	☑	☑	☑
New Alternative – AG	☑	☑	☑
New Alternative – PP	☑	☑	X
Alternative B (Design Report designation)	X	X	X
Alternative E (Design Report designation)	X	X	X
Alternative F (Design Report designation)	X	X	X

- |  |
|--|
| <p>X = Eliminated from further study</p> <p>• = Considered in detail</p> <p>N/A = Not applicable; this alternative was not formulated for this alignment</p> |
|--|

## **CHAPTER 3   AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

### **3.1   ENVIRONMENTAL SETTING**

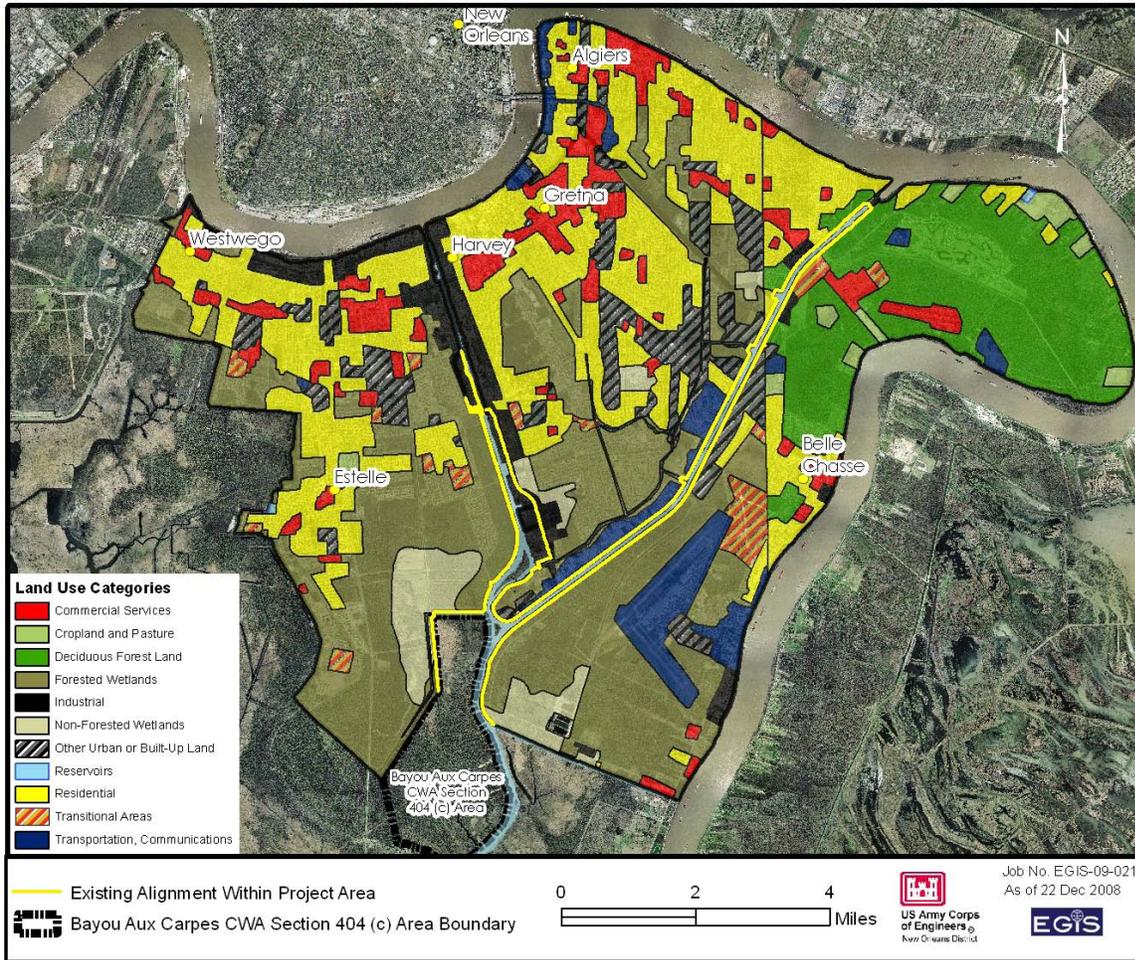
#### **3.1.1   General**

The study area is located on the west bank of the Mississippi River within Orleans, Jefferson, and Plaquemines Parishes. The area, which extends from the Bayou aux Carpes CWA Section 404(c) area on the western end to just north of Hero Canal on the eastern end, is approximately 25 miles long (figure 1). In the vicinity are the Mississippi River to the north and east, Barataria Bay and the Gulf of Mexico to the south, and JLNHPP to the west. The proposed action and the alternatives to the proposed action in this document are situated along the GIWW, Harvey Canal, and Algiers Canal and would influence habitats along those waterways (figures 4a, 4c, and 5-8).

#### **3.1.2   Land Use along Major Waterways**

##### **3.1.2.1   GIWW**

The GIWW area of influence, as described in this document, extends northward on both sides of the GIWW from Hero Canal to the island at the confluence of the Algiers and Harvey Canals (figure 4). This includes a section extending westward to the Estelle Pump Station and then south for approximately 1 mile bordered by the Bayou aux Carpes CWA Section 404(c) area and the JLNHPP. All of the alignments included in the proposed action are associated with this area. The southern end of the IER # 12 project area is undeveloped with land-use primarily restricted to a shooting range on the east bank of the GIWW or recreational use of the pristine marsh and swamp habitat within the Bayou aux Carpes CWA Section 404(c) area west of the GIWW. BLH habitat is dominant along the east and west banks of the GIWW.



**Figure 11. Land Use Within Project Vicinity**

### 3.1.2.2 Algiers Canal

The Algiers Canal is a part of the GIWW that proceeds northeasterly to intersect with the Mississippi River. The Algiers Canal area of influence includes the levees and adjacent land on both sides of the canal, extending from the Algiers Lock located near the Mississippi River (figure 4) to the confluence of the Harvey and Algiers Canals. Existing levees, floodwalls, and gates are located on both sides of this canal. Land use proceeding northeasterly on the east bank of the canal begins as vacant land adjacent to the U.S. Naval Air Station at Belle Chasse, continues north through a new, high-end residential subdivision to LA 23 where the Belle Chasse Tunnel crosses, through the Bayou Barriere public golf course, and proceeds through mostly vacant land with intermittent industrial/commercial, residential, and public uses to the Algiers Lock (a new residential subdivision is located just south of the General De Gaulle Bridge). Starting southwestwardly from the Algiers Lock on the west bank, vacant land is first encountered and then housing is located adjacent to and on both sides of the General De Gaulle Bridge (figure 11; see figure 10 for existing features along the canal). Continuing southward, a large section of vacant land is crossed until a new subdivision is encountered adjacent to LA 23, crossing the Belle Chasse Tunnel. Under the bridge that crosses the Algiers Canal is a parish park that is widely used by recreational walkers, dog owners, and others. South of LA 23 to the Harvey Canal is a dense mix of commercial and industrial enterprises, mostly oriented to the marine industry.

### 3.1.2.3 Harvey Canal

The Harvey Canal area of influence includes the levees and adjacent land on both sides of the canal extending from the confluence with the Algiers Canal to the sector gate and Cousins Pump Station at Lapalco Boulevard (figure 4b). The Harvey Canal is an alternate GIWW, route that affords navigation interests access to the Mississippi River via the Harvey Lock. Proceeding north on the east side of the canal, land is primarily in industrial uses, with barge and tow boat repair and storage predominating (figure 11; see figure 10 for existing features along the canal). Proceeding south from Lapalco Boulevard on the west bank of the Harvey Canal to the Estelle PS, all of the land is vacant and is either BLH or marsh land.

Table 4 identifies land uses within the study area (figure 11).

**Table 4: Land Use in Study Area, By Area of Influence (acres)**

Land Use	GIWW (acres)	Algiers Canal (acres)	Harvey Canal (acres)	Total Acres in Project Area
Residential	0	236	22	<b>258</b>
Commercial	5	8	0	<b>8</b>
Industrial	0	113	405	<b>518</b>
Cropland and Pasture	0	10	0	<b>10</b>
Waterways and Canals	188	654	0	<b>842</b>
Forested Wetland	726	1291	913	<b>2930</b>
Non-Forested Wetland	1128	3	113	<b>1244</b>
Upland/ Urban	0	599	0	<b>599</b>
Transportation or Communications	0	613	0	<b>613</b>
Deciduous Forest	0	536	0	<b>536</b>
Transitional Areas	0	112	0	<b>112</b>
<b>Total</b>	<b>2042</b>	<b>4175</b>	<b>1453</b>	<b>7670</b>

### **3.1.3 Climate**

The project area, which includes the parishes of Plaquemines, Jefferson, and Orleans, experiences a gulf coast regional climate characterized as hot, humid, and subtropical (Ning et al. 2003). The maritime tropical air masses associated with the Gulf of Mexico significantly influence the local climate. Summers are long, humid, and hot. The summer average daily temperature is 81° F, with the average daily high temperature around 90° F. During winter, cooler, dry, polar air masses move southward from Canada, often influencing the project area. Winter average daily temperature is 54° F and the average daily minimum is 44° F. The area receives approximately 65 inches of precipitation annually.

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

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

### **3.1.4 Soils and Subsidence**

Soils in the project area can be divided into three main groups: (1) soils found on naturally occurring levees that are protected from flooding, (2) soils frequently ponded in marshes and swamps that experience frequent flooding, and (3) soils previously ponded, but have been drained and are protected from flood events (Matthews 1983, Trahan 1989).

Almost all of the soils within the study area exhibit substantial subsidence ranging from approximately 6 inches to 51 inches when dried (Soil Survey Staff 2007). To ensure 100-year level of risk reduction, final levee elevation should be determined as the elevation post predicted subsidence, or levee elevation should be monitored and reconstructed as needed. In addition, Cancienne silt loam, Cancienne silty clay loam, Shriever clay, Schriever silty clay loam, and Harahan clay are designated prime and unique farmland soils (Soil Survey Staff 2007). Areas of prime and unique farmland soils are designated in figure 11.

#### **3.1.4.1 Soils found on naturally occurring levees that are protected from flooding**

Sharkey-Commerce soils occur on the naturally formed levees of the Mississippi River and the distributaries within the Mississippi Delta. These clayey/loamy soils are somewhat-poorly to poorly drained. The vast majority of these soils within the project area are currently developed with urban land uses. Within the project area these soils are mainly found directly adjacent to the Mississippi River and at the northern end of the Harvey Canal.

#### 3.1.4.2 Ponded soils in marshes and swamps

Barbary and Kenner-Allemands soils are typically found in flooded swamps and marshes that are consistently ponded. These soils are composed of layers of muck with underlying clay. Areas containing these soils are heavily vegetated with both herbaceous aquatic marshes and forested plant communities and provide excellent habitat for wildlife. Neither Barbary nor Kenner-Allemands soils are well suited for development or agricultural uses.

#### 3.1.4.3 Previously ponded soils that have been drained and are protected from flooding

Harahan-Westwego (also known as Westwego-Harahan) and drained Kenner-Allemands soils occur in protected areas of natural and man-made levees and in broad interlevee basins that were previously accustomed to frequent flooding events. These soils generally have a surface layer of muck over a clay base and are naturally poorly drained. Drainage in many of these areas is assisted by pumps. Much of these areas are developed for agricultural and urban land uses. These drained soils are often built upon; however, they are poorly suited for this purpose and experience significant rates of subsidence. Within the project area these soils can be found within the basin between the existing Harvey and Algiers Canals, and directly to the west of the Harvey, Algiers, and Hero Canal junctions.

### 3.1.5 **Geology**

The study area is located west of the Mississippi River, along the GIWW, Harvey Canal, and Algiers Canal. Natural ground elevations are near sea level. Dominant physiographic features in the area consist of the Mississippi River and its associated natural levees and Bayou Barataria.

The surface is composed of artificial levee material that ranges from 10 ft to 24 ft thick. Beneath the artificial levee deposits lie swamp deposits that are composed of organic clays, fat clays, and peats with occasional sand and silt layers. Swamp deposits are generally between 10 ft and 20 ft thick. Peat layers are common in the swamp deposits between -10 ft and -20 ft in elevation. An abandoned distributary channel crosses the Algiers Canal due west of English Turn. It is located between -5 ft and -46 ft in elevation and filled with interbedded layers of sands, silts, and clays. Flanking the abandoned distributary are natural levee deposits composed of predominantly fat clays and silts. Natural levee deposits are located between -4 ft and -28 ft elevation and range in thickness from 4 ft to 24 ft. Interdistributary deposits are located beneath the natural levee and swamp deposits and consist of interbedded layers of fat and lean clays, silts, and silty sands. They average 40 ft in thickness. Intradelta deposits are present beneath swamp and within interdistributary deposits. Intradelta deposits are typically coarse material with interbedded layers of silt, silty sand, and sand with some clay layers. Intradelta deposits range in thickness from 2 ft to 20 ft and are generally found between -20 ft and -40 ft in elevation. Beneath the interdistributary deposits lie nearshore gulf sediments that are composed predominantly of sand and silty sand with clay layers and shell fragments and prodelta deposits that are mainly clay. Nearshore gulf deposits lie atop Pleistocene deposits that are composed of stiff to very stiff oxidized clays interbedded with layers and lenses of silts and sands. The top of the Pleistocene ranges from -75 ft to -100 ft in elevation and extends to an unknown depth.

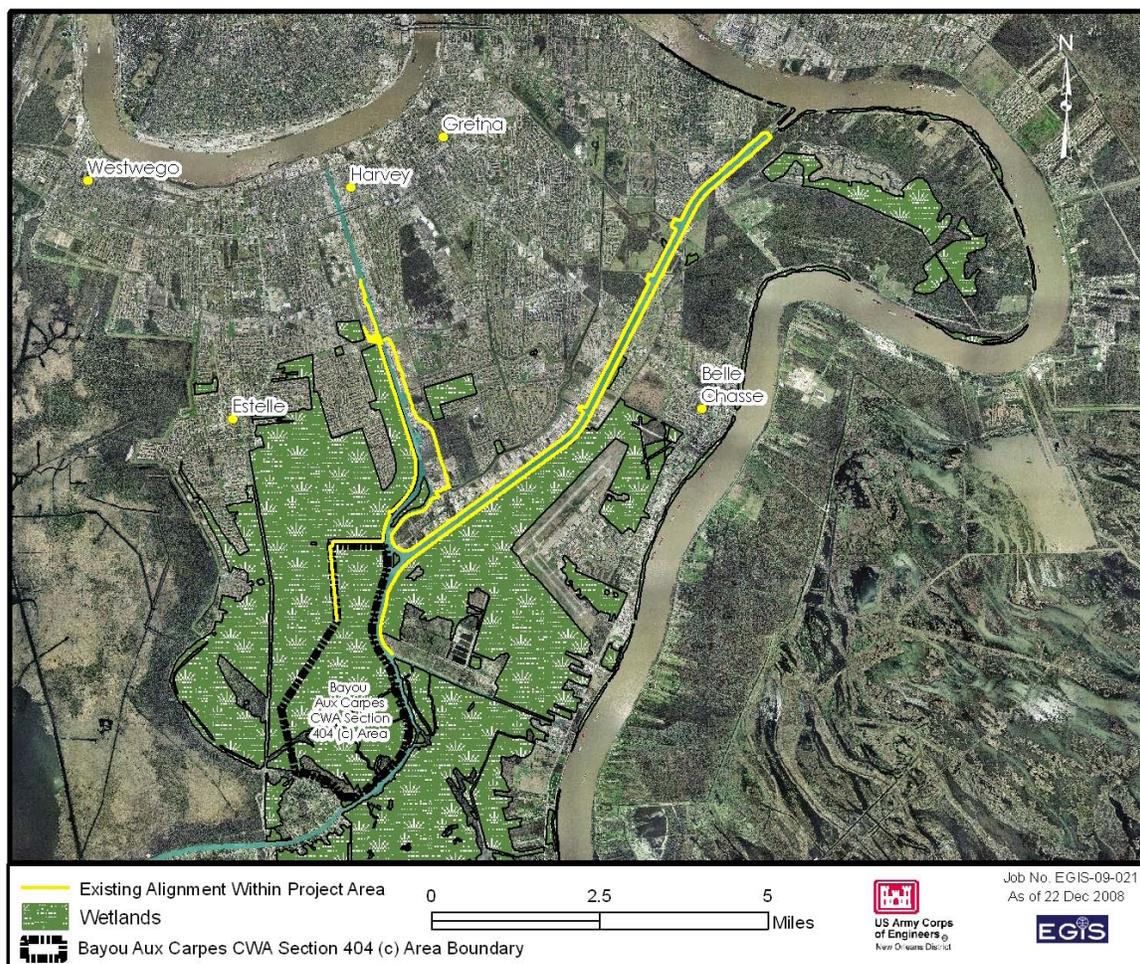
Soils in the area are composed of drained swamp and marsh. Generally, there is a peat or muck layer over soft clays.

Groundwater is at or near the surface. Intradelta silts and sands and the abandoned distributary may be hydraulically connected to the Mississippi River and the Intracoastal Waterway.

Long-term relative subsidence rates average approximately 0.5 ft/century in the study area. It is estimated that eustatic sea level will rise an additional 1.3 ft over the next 100-years (IPCC, 2001). Combined, the relative subsidence rate is estimated to be 1.8 ft over the next 100-years. (Note: all elevations are in NAVD 88.)

### 3.1.6 Vegetation and Wildlife

Vegetation found within the study area is typical of the BLH Region of the Mississippi River Alluvial Plain. Habitat types in the study area consist of oak-dominated BLH forests, cypress-tupelo swamps, various fresh and saltwater emergent, shrub-scrub and forested wetland habitat types, as well as tidal channels, creeks, and estuaries. Most of the vegetation habitats within the study area are considered forested or non-forested wetlands and are indicated as such in figure 10. National Wetland Inventory data regarding wetland habitat in the study area is shown in figure 12 (U.S. Fish and Wildlife Service 2007).



**Figure 12. Wetlands Within Project Vicinity**

The maintenance of habitat types in the region was historically dependent upon sediment input from freshwater flooding events producing a slow and gradual elevation transition. The gradual elevation change provides a highly elongated freshwater to saltwater transition zone capable of supporting a high diversity of wetland and marsh vegetation communities. Currently, these coastal areas are in a

transgressive phase resulting in the rapid replacement of freshwater marsh and swamp habitat with increasingly marine-dominated habitats (Roberts 1997). Historically, the coastal region encompassing the project area would receive freshwater and sediment inputs during frequent flooding events from the Mississippi River. These flooding events would act to maintain the freshwater habitat characteristics and negate the effects of tidal outwash through silt deposition; however, the construction of levees and other flood control measures has significantly altered freshwater, nutrient, and sediment inputs (Kesel 1989, Boesch et al. 1994, Day et al. 2000). If not developed, areas protected from both freshwater and backwater tidal flooding with levees and water pumps have significantly dried, causing both subsidence and the conversion of BLH forest to more upland habitat.

The BLH forests, cypress-tupelo swamps, marshes, and tidal channels provide habitat for an abundance of birds, mammals, amphibians, reptiles, and fish. The wetlands of coastal Louisiana fall within the Mississippi Flyway, a major migration corridor for the majority of all bird species found in North America, and also provide critical nesting and breeding habitat for resident species (Lowery 1974, Barrow et al. in press). Coastal wetlands provide essential habitat for commercially important marine and freshwater species and game species that are wetland-dependent at some stage in their life-cycle. The estimated annual economic input to Louisiana from recreational hunting, fishing, and non-consumptive uses of wildlife (e.g., bird watching, outdoor recreation, ecotourism) exceeds \$1.2 billion per year (U.S. Department of Interior, Fish and Wildlife Service and U.S. Department of Commerce, Census Bureau 2001). Harvested commercial fish and wildlife commodities total over \$500 million per year (Louisiana State University Agriculture Center 2004).

### **3.1.7 Bayou aux Carpes CWA Section 404(c) Area**

As originally authorized in the 1960s, the Harvey Canal-Bayou Barataria Levee Project, south of the V-line levee, included draining over 3,000 acres of the Bayou aux Carpes wetlands for developmental purposes. In response to environmental concerns by the EPA and several public interest groups, the USACE agreed to a modified proposed project design in 1976. Consequently, the proposed project was modified by: 1) substituting floodgates for earthen closures at the mouths of the Bayou Des Familles, Bayou aux Carpes, and the Southern Natural Gas Pipeline Canal, 2) eliminating the land reclamation features, and 3) stipulating if a pump station was needed for flood control, that it be operated in a manner which would maintain the integrity of the swamp. Jefferson Parish also agreed to these modifications, but was unable to provide local assurance for the modified project due to State court litigation brought about by area property owners. The landowners filed suit in Federal court, requesting the court to order the USACE to complete the original project. In that lawsuit, the U.S. District Court (on remand from the U.S. Court of Appeals for the 5<sup>th</sup> Circuit), issued an order that stayed further proceedings and gave the EPA a timeframe within which to decide whether or not to proceed with a veto action under Section 404c of the Clean Water Act. This provision of the Clean Water Act affords the EPA the authority to designate areas in which discharges of dredged or fill material are prohibited.

In October 1985, the EPA exercised its veto authority under Section 404c of the Clean Water Act, and with three specific exceptions, prohibited discharges of dredged or fill material to wetlands in the Bayou aux Carpes site (see [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) for copies of the report). This area is bounded by the existing V-line levee, the Old Estelle Outfall Canal, Bayou Barataria, Bayou des Familles, and the Lafitte-Larose Hwy. The Federal District Court for the Eastern District of Louisiana subsequently found the EPA action, which rendered the original project infeasible, was consistent with the law and was supported by the agency's administrative record. The prohibitions on discharges of dredged or fill material in the Bayou aux Carpes site remains in effect today.

In the 1980s, the USACE proposed to construct a hurricane protection levee for the west bank of Jefferson Parish. The preferred alternative would have resulted in the discharge of dredged or fill material to 59 acres of wetlands in the Bayou aux Carpes and to 257 acres of wetlands in the JLNHPP. The EPA rated the draft EIS “environmentally unacceptable” based on proposed adverse impacts to the Bayou aux Carpes CWA Section 404(c) area, inconsistency with a separate agreement with Jefferson Parish regarding wetland protection at this site, and other adverse wetland and water quality impacts. As an alternative, the EPA supported the “V-Levee North” alignment, which is the alignment that was adopted and subsequently constructed (See figure 3).

## **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 briefly addressed here and are then discussed in section 4.

The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. Further detail on the significance of each of these resources can be found by contacting the CEMVN, or on [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov), which offers information on the ecological and human value of these resources, as well as the laws and regulations governing each resource. Table 5 shows those significant resources found within the project area, and notes whether they would be impacted by the proposed action.

This report assumes that under the no action alternative the HSDRRS would be raised to the previously authorized grade (El. 10) rather than the 100-year level of risk reduction (El. 14 to El. 16). Consequently, the impacts discussed in this report are those impacts specifically associated with raising the level of risk reduction from the originally authorized grade up to the 100-year level of risk reduction. In other words, impacts associated with the no action alternative are not considered. Rather, the no action alternative is considered as the baseline “no impact” alternative. All impact calculations and discussions are assumed to be impacts incurred in addition to the previously authorized action.

**Table 5: Significant Resources in Project Study Area**

SIGNIFICANT RESOURCES	Impacted	Not Impacted
Wetlands	X	
Bayou aux Carpes CWA Section 404(c) Area	X	
Upland Resources	X	
Prime Farmland		X
T&E Species		X
Fisheries	X	
Wildlife	X	
Air Quality	X	
Water Quality	X	
Noise	X	
Aesthetics	X	
Recreational Resources	X	
Cultural Resources		X
Socioeconomics	X	

X = Impacted

### 3.2.1 Wetlands

#### 3.2.1.1 Existing Conditions

Nearly all of the project area constitutes wetland, or previously drained wetland habitats retaining various wetland characteristics. Certain locations within the project area have experienced a significant hydrological shift due to the construction of numerous pump stations during the 1960s to locally control drainage. These drained wetland habitats are found in areas along the entirety of the GIWW, Harvey Canal, and Algiers Canal. Much of this area has become heavily developed for both residential and industrial purposes. Small habitat fragments retain historic vegetative characteristics of BLH forests.

The remainder of the project area contains a wide array of wetland habitat types including: (1) wet and non-wet BLH forest, (2) cypress-tupelo swamp, (3) freshwater emergent and shrub-scrub wetland, and (4) marsh. The only undeveloped areas resembling any substantial upland habitat characteristics are the levees themselves.

Intact tracts of BLH (BLH) forest habitat are primarily located on the eastern side of the Algiers Canal south of Plaquemines Pump Station, and along the western side of the Harvey Canal running from the Old Estelle Pump Station north to the Harvey Canal Sector Gate. BLH forest patches are scattered elsewhere along the Harvey and Algiers Canals, but these patches tend to be small remnants. BLH forests communities are forested alluvial wetlands typically occupying floodplain regions of large flooding water bodies and rivers (Cowardin et al., 1979). These habitats are characterized by a mix of deciduous and evergreen vegetation often grouped into particular species associations based upon the hydrology and topography of the area. Typical dominant overstory species include overcup oak (*Quercus lyrata*), nuttall oak (*Quercus nuttall*), water oak (*Quercus nigra*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), green ash (*Fraxinus*

*pennsylvanica*), water hickory (*Carya aquatica*), hackberry (*Celtis laevigata*), and American elm (*Ulmus americana*), just to name a few (Allen et al. 2002). BLH forests provide all basic ecosystem services of a typical wetland (Smith et al. 1995).

Hydrologically, forested wetlands act to store ground water, maintain surface water, and aid in flood and storm protection by acting as natural “sponges”. Biogeochemically, forested wetlands provide numerous valued services such as carbon sequestration, nutrient detention, and natural nonpoint source pollution mitigation (Coastal Wetland Forest Conservation and Use Science Working Group 2005). BLH forests also support significant wetland biological communities. Numerous species of insects, amphibians, mammals, and birds utilize critical habitat found within BLH forests.



Cypress-Tupelo Swamp

Cypress-tupelo swamp and flotant marsh habitat occupy the areas south of the Old Estelle Pump Station and to the west of the GIWW within the Bayou aux Carpes CWA Section 404(c) area as designated by the EPA (U.S. Environmental Protection Agency 1985). The overstory of Cypress swamp habitat is dominated by Bald Cypress (*Taxodium distichum*), Swamp Red Maple (*Acer rubrum var. drummondii*), and Tupelo Gum (*Nyssa aquatica*), with a relatively sparse and flooded understory dominated by Dwarf Palmetto (*Sabal minor*). Cypress-tupelo swamp habitat is nearly always inundated over the entire growing season.

Cypress-tupelo swamps are flooded on a regular basis and, as such, provide spawning and nursery areas for larval and juvenile fish and shellfish of both freshwater and estuaries such as sunfish (*Lepomis spp.*), menhaden (*Brevoortia sp.*), blue crabs (*Callinectes sapidus*), and bay anchovies (*Anchoa mitchilli*). Cypress-tupelo swamps were heavily impacted beginning in the late 1700s. Bald cypress was harvested and used for house construction, shingles, barrels, tanks, casks, and

coffins (Mattoon 1915). After accounting for much of the economic growth in Louisiana for nearly a century and half, heavy logging and developmental impacts have drastically decreased the historical forested acreage (Norgress 1936, Norgress 1947, Mancil 1972).

The marshes in this area are dominated by smartweed (*Polygonum spp.*), bulltongue (*Sagittaria lancifolia*), pennywort (*Hydrocotyle spp.*), and softstem bullrush (*Scirpus validus*). Flotant marshes are also a highly valuable, unique marsh type, composed of thick, floating mats of vegetation with open water beneath. These marshes are mainly *Panicum hemitomon* dominated.



Flotant Marsh

A variety of other wetland and marsh habitats exist within the project study area. Small patches of freshwater emergent and shrub/scrub wetlands exist primarily in areas protected by levees along the entire project area. These habitats are typically dominated by various rushes, sedges, and hydrophytic shrubs such as waxmyrtle (*Myrica cerifera*) and buttonbush (*Cephalanthus occidentalis*). In addition, more extensive areas of freshwater/brackish marsh exist in the unprotected and undeveloped areas near the GIWW and within the Bayou aux Carpes CWA Section 404(c) area. These marshes are dominated by smartweed (*Polygonum spp.*), bulltongue (*Sagittaria lancifolia*), pennywort (*Hydrocotyle spp.*), and softstem bullrush (*Scirpus validus*), among others. These habitats are important nursery areas for many marine species such as croaker (*Micropogonias undulatus*), white shrimp (*Litopenaeus setiferus*), menhaden (*Brevoortia sp.*), seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), blue crab (*Callinectes sapidus*), and numerous shellfish. They provide habitat for migratory and resident waterfowl, songbirds, and wading birds, and numerous species of fish, amphibians, reptiles, and mammals.

### 3.2.1.2 Discussion of Impacts

#### 3.2.1.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina, utilizing post-Katrina engineering specifications. Generally, this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pump stations. Wetland acreage would be impacted, but few new wetland impacts would occur that have not been previously authorized (Design Alternatives Report, January 2007).

No indirect or cumulative wetland impacts have been identified.

### 3.2.1.2.2 Proposed Action

#### 3.2.1.2.2.1 General Discussion of Wetland Impacts due to the Proposed Action

In general, the proposed action would primarily impact BLH forest (BLH) and cypress-tupelo swamp wetland habitats. The quality of the BLH habitat in much of the project area has been affected by previous levee construction or development activities with the exception of the wetlands within the Bayou aux Carpes CWA Section 404(c) area. This BLH is considered to be a lower quality habitat than the BLH in the 404c area because it has been altered (impounded) for over 20 years.

Implementation of the proposed action (WCC) would directly impact approximately 329 acres of wetland habitat (table 6). A total of 251.7 acres of altered BLH and 2.3 acres of BLH habitat would be unavoidably impacted, specifically requiring in-kind mitigation. It is important to note that approximately 9.6 acres of the total wetland impacts due to the proposed action would potentially occur within the EPA Bayou aux Carpes CWA Section 404(c) area (section 3.2.2).

**Table 6: Proposed Action (WCC) Wetland Impacts from WVA (acres)\*\***

	<b>Wetland Impacts (Acres)</b>	<b>Habitat Type</b>	<b>Description</b>
Western Levee	27.5	Altered BLH*	V-line levee upgrade and Canal Relocation
Northern Floodwall	2.7	Swamp	Old Estelle PS Improvements , Estelle Outfall Canal Floodwall and Flow Control Structure
	3.1	Alt. BLH	
Eastern Floodwall	9.6**	BLH / Swamp	Innovative T-Wall within Bayou aux Carpes CWA Section 404(c) area
	Unknown	BLH/Swamp	Project Feature Augmentations
Closure Complex and Levee and Road Realignment	134	Alt. BLH	Gates, Pump Station, and Levee and Road Realignment
	8.3	Swamp	Gates, Pump Station, and Levee and Road Realignment
	63.6	N/A	Staging Areas - Pasture
Detention Basin Improvements	34.8	Alt BLH	Harvey Canal West Bank Levees
	9.7	Swamp	Harvey Canal West Bank Levees
	20.5	Alt BLH	Algiers Canal West Bank
	3.8	Swamp	Algiers Canal West Bank
	24.9	Alt BLH	Algiers Canal East Bank
	43	Swamp	Algiers Canal East Bank
TOTALS (appx. 329 acres)	251.7	Altered BLH	177.3 AAHUs
	2.3	BLH	1.9 AAHUs (in Bayou aux Carpes CWA Section 404(c) area)
	74.9	Swamp	38.5 AAHUs (7.3 acres/4.2 AAHUs in Bayou aux Carpes CWA Section 404(c) area)

*\*Hydrologically Altered BLH*

*\*\* The CEMVN has calculated that the 100 ft by 4200 ft corridor is 9.6 acres, which is different than the most recent USFWS calculation (appendix I). The CEMVN calculation is used consistently in this IER # 12 as the correct number of acres impacted in the Bayou aux Carpes CWA Section 404(c) area.*

Wetland impacts would be minimized during construction of the proposed action by utilizing innovative design techniques, floodwall lifts, and protected side shifts where practicable. One of the primary design goals of the project planners has been to avoid and/or minimize impacts to the EPA designated 404c area.

All wetland impacts throughout the proposed action alignment would occur adjacent to sections of pre-existing ROW except within the Bayou aux Carpes CWA Section 404(c) area where there is no existing ROW. See sections 6.3, 6, 7 and appendix K for details on collaboration efforts among the CEMVN, the EPA and other Federal and state resource agencies to minimize impacts to the Bayou aux Carpes CWA Section 404(c) area to the greatest extent practicable. In addition, all construction impacts would occur in or adjacent to sections of the area which have been previously disturbed,

including the 9.6 acre corridor in the Bayou aux Carpes CWA Section 404(c) area comprised of an area where dredge material was historically placed during construction of the GIWW.

Direct impacts to BLH forest habitat and cypress-tupelo swamp would be permanent. Wetlands would be mechanically cleared and grubbed to facilitate the construction of the new levee structure and would require mitigation. All construction impacts would occur in or adjacent to sections of the area which have been previously disturbed, including the approximately 9.6 acres of impacts in the Bayou aux Carpes CWA Section 404(c) area which is comprised of an area where dredge material was historically placed during construction of the GIWW.

Indirect effects of construction (e.g., increased turbidity, noise, vibrations, fugitive dust, etc.) would have temporary effects to the wetlands habitat. Indirect loss caused by changes to hydrology and inundation levels could occur. Overall, the adjacent wetlands would stabilize following construction, allowing sediment to settle and vegetation to stabilize the area. Construction-related runoff into the wetlands would be managed through best management practices, which would minimize the potential indirect adverse impacts from this alternative on wetlands. Best Management Practices (BMP) are effective, practical, structural or nonstructural methods which prevent or reduce the movement of sediment, nutrients, pesticides and other pollutants from the land to surface or ground water, or which otherwise protect water quality from potential adverse effects of construction activities. Best management practices would be used to minimize construction related impacts along the entire proposed action alignment.

Project feature augmentation within the Bayou aux Carpes CWA Section 404(c) area would have positive impacts to the wetlands within the area. Augmentations would be implemented only if they were found to have the potential for positive restoration of past hydrological impediments within the area. Section 2.3 discusses the augmented features in more detail.

The proposed action would not increase edge habitat, fragmentation, or hydrologic isolation within the study area by utilizing existing habitat edges and levee ROWs. However, overall indirect and cumulative impacts due to additional wetland losses and levee construction may have a lasting and delayed impact on wetland habitat due to altered hydrological regimes leading to habitat alterations, changes in water salinity and nutrient load, and increased rates of subsidence. These factors may contribute to long-term wetland loss within the region and subsequent negative trickle-down effects on fish and wildlife communities dependent upon nearby wetland habitat.

Cumulative wetland impacts would be expected due to implementation of the proposed action in concert with additional WBV projects. Construction of the proposed action would contribute to the cumulative losses of cypress-tupelo swamp and BLH within the HSDRRS. Cumulative wetland impacts would be mitigated.

#### 3.2.1.2.2.2 Specific Wetlands Impacts due to the Proposed Action

##### *Western Earthen Levee Enlargement*

The proposed action consists of raising the existing earthen levee to 14 ft. The centerline would shift to the protected side as necessary to accommodate footprint expansions, and an additional 125 ft of ROW would be acquired. The drainage canal would be relocated 200 ft to the protected side.

This enlargement would directly impact a total of 27.5 acres of altered BLH west of the pipeline drainage canal that runs along the western edge the Bayou aux Carpes CWA Section 404(c) area. The new ROW required would also be 17 acres. All construction impacts would occur in or adjacent to areas that have been previously disturbed.

#### *Northern Levee Floodwall Cap and Water Control Structure Construction*

The proposed action consists of providing fronting protection at Old Estelle Pump Station, earthen levee enlargement with a T-wall floodwall cap within existing ROW from the pump station to the Harvey Canal, and construction of a water control structure (gate) where the Old Estelle Outfall Canal meets the Harvey Canal.

Construction of the Old Estelle PS fronting protection, T-wall, and flow control structure would have little direct impacts to wetlands. The entire northern section would directly impact a total of 1 acre of wetlands for this section (table 6). All construction impacts would occur in or adjacent to sections of the area that have been previously disturbed and within existing ROW.

#### *Eastern Innovative Floodwall Construction*

The proposed action consists of constructing an innovative T-wall no longer than 4,200 ft and no wider than 100 ft along the eastern boundary of the Bayou aux Carpes CWA Section 404(c) area.

This action would directly impact approximately 9.6 acres of cypress-tupelo swamp and BLH in the Bayou aux Carpes CWA Section 404(c) area. The footprint that would be required for this T-wall was designed to be much smaller to minimize impacts to this unique wetland resource (section 2.3).

Due to the proposed project feature augmentations discussed in section 2.3 and section 7, there are ongoing hydrology and environmental studies being conducted within the Bayou aux Carpes CWA Section 404(c) area to gain baseline soil and water conditions and to determine which, if any, of the proposed project feature augmentations would benefit and further offset adverse impacts within the Bayou aux Carpes CWA Section 404(c) area wetlands (section 7). These project feature augmentations would be implemented in addition to full mitigation of impacts due to the proposed action. These potential future benefits to the Bayou aux Carpes CWA Section 404(c) area wetlands cannot be quantified at this time.

#### *Closure Complex Construction*

The construction of this closure complex and levee and road realignment would directly impact 142.3 wetland acres on the east bank of the GIWW (table 6).

Construction of the closure complex and the bypass channel would temporarily disrupt water habitat in the GIWW during construction. A surge barrier with decreased pumping capacity would be constructed by June 2011, and total construction of all proposed action components would be expected to take 4 years. This could temporarily disturb wetland biota and sediments in the immediate vicinity of construction activities.

Construction in the GIWW could cause downstream increases in turbidity and sedimentation. Those impacts would be temporary in duration and would not be expected to cause any impacts to wetlands in the area.

Under normal conditions, the gate structures would be open, channel velocities would remain stable, and the pump station would not be in operation; however, during a storm event, the operation of the closure complex on the GIWW could directly impact wetlands. The gate structures would only be closed and the pump station would only operate during a storm event (and during routine maintenance activities), and during that time period, the downstream wetlands could be impacted by increased velocities causing erosion and water level fluctuation. These potential wetland impacts cannot be quantified at this time.

Additional measures proposed by the USACE to avoid adverse impacts to the 404c area include the construction of foreshore protection (an approximately 2,000 ft rock structure) in the GIWW south of the innovative T-wall to prevent erosion and scouring along the eastern boundary of the 404c area. There would be no direct impacts to wetlands due to the construction of the foreshore

protection (table 1). The foreshore protection would indirectly impact the edge habitat within the 404c along the GIWW (e.g., increased turbidity, noise, vibrations, etc.), but the impacts would be temporary. The foreshore protection is not expected to alter hydrologic conditions within the Bayou aux Carpes CWA Section 404(c) area.

Due to necessary channel dredging and pile driving activities, relocation of the Enterprise Pipeline would be required. Additional measures proposed by the CEMVN to avoid adverse impacts to the 404c area include the relocation of the Enterprise Pipeline via directional drilling for 4,000 ft past the current ROW inside the 404c to a point west of the V-line levee (See section 2.3 for further details regarding pipeline relocation). There would be direct impacts to 1 acre of wetlands due to relocation of the pipeline (table 1).

#### *Eastern Earthen Levee Construction and Bayou Road realignment*

The proposed action consists of degrading the existing levee on the eastern side of the GIWW and constructing an earthen levee further eastward, moving the levee centerline further into the protected side and putting several acres of land back to the flood side to be exposed to the natural flood regime. Bayou Road would also be realigned on the protected side of the new levee. Loss of altered BLH habitat would total 134 acres for the closure complex, eastern earthen levee, and Bayou Road realignment (tables 6, 7, and 7b).

#### *Detention Basin Dredging and Improvements*

The proposed action consists of dredging 700,000 cy in the Algiers Canal. This material may be beneficially used within the JLNHPP to create wetland habitat (section 7).

Dredging the Algiers Canal would have no direct impacts to wetlands, but as stated previously, the material could be used beneficially to create marsh in area identified by JLNHPP as a critical erosion zone. See section 2.3 for further details regarding the disposal plan and beneficial use of dredge material. Disposal of dredged material at a beneficial use site would create 28 acres of wetland habitat (see section 2.3 for further details regarding the disposal plan and beneficial use of dredge material). It is possible that some wetlands in the vicinity of the disposal area would be impacted temporarily due to the discharge of dredged material and the resulting turbidity plume. Indirect impacts would be temporary.

Detention basin improvements along the Harvey Canal and Algiers Canal consist of building fronting protection at pump stations, capping or replacing floodwalls, constructing impact barriers, providing backflow suppression, reshaping existing levees by constructing a berm, and reinforcing existing levees.

Improvements within the detention basin would directly impact 80 acres of BLH wetlands due to new ROW requirements (table 6). These impacts would be similar to those for the general proposed action.

### 3.2.1.2.3 Alternatives to the Proposed Action

Each alternative to the proposed action would directly impact wetland habitat within the project area.

#### *The GIWW A Alternative*

The GIWW A alternatives would directly impact approximately 254 acres of wetland habitat (table 7). It is important to note that approximately 5.1 acres of the total wetland impacts due to the proposed action would potentially occur within the EPA Bayou aux Carpes CWA Section 404(c) area (discussed under separate heading in section 3.2.2).

This alternative would directly impact 5.1 acres of wetlands within the Bayou aux Carpes CWA Section 404(c) area area proposed to construct a tidal exchange structure that would bifurcate the 404c area (table7).

Aside from directly impacting the 5.1 acres of Bayou aux Carpes CWA Section 404(c) area wetlands within the proposed ROW footprint for this alternative, the creation of the tidal exchange structure would have the potential for extreme indirect and cumulative impacts to the unique area. The construction of the GIWW A alternative alignment could potentially alter hydrology, limit migration and dispersal of animal and plant populations, accelerate habitat fragmentation and ultimately result in long-term habitat recession based upon anthropogenically altered conditions.

Approximately 500 acres of wetland habitat in the Bayou aux Carpes CWA Section 404(c) area would be enclosed by the tidal exchange structure and would be at risk for irreparable indirect impacts, such as habitat degradation, e.g., loss of flotant marsh.

The tidal exchange structure would tie into a closure complex with the exact specifications as the one described in the proposed action. Direct impacts from the closure complex, levee, and road realignment would be approximately 230.8 BLH acres (table 7).

Foreshore protection measures would be required to prevent erosion and scouring within the Bayou aux Carpes CWA Section 404(c) area across from the PS, and the details would be the same as those within the proposed action. There would be no direct impacts to wetlands due to the construction of the foreshore protection.

The detention basin dredging and improvements would also be the same as the proposed action, and approximately 136.7 acres of wetlands would be impacted by these actions.

#### *The AG and PP Alternatives*

The AG and PP alternatives would unavoidably impact wetlands directly adjacent to existing levee ROW. The AG and PP alternatives would directly impact BLH forested wetland that would require in-kind mitigation. The AG alternative would impact approximately 287 acres of forested wetlands, altered BLH requiring in-kind mitigation (table 7). The PP alternative would directly impact 200 acres of forested wetland, altered BLH habitat. Neither the AG nor PP alternative would impact areas within the EPA designated Bayou aux Carpes CWA Section 404(c) area. Local indirect impacts would be expected for the AG and PP alternatives that are similar to those described for the proposed action. These alternatives would not increase edge habitat, fragmentation, or hydrologic isolation within the study area by utilizing existing habitat edges and levee ROWs.

**Table 7. Alternative Comparison of Estimated Wetland Impacts**

	<b>GIWW-WCC (Proposed Action) Acres</b>	<b>GIWW A Acres</b>	<b>Algiers Gate Acres</b>	<b>Parallel Protection Acres</b>
Swamp (404c)	7.3	N/A	N/A	N/A
Swamp	67.5	55.1	59.2	N/A
BLH (404c)	2.3	5.1	N/A	N/A
BLH altered	251.7	230.8	254.7	200
<b>Total</b>	<b>329</b>	<b>291</b>	<b>384</b>	<b>200</b>

The detention basin dredging and improvements would also be the same as the proposed action, and approximately 136.7 acres of wetlands would be impacted by these actions.

In general, the overall indirect and cumulative impacts due to additional wetland losses and levee construction for each alternative may have a lasting and delayed impact on wetland habitat due to altered hydrological regimes leading to habitat alterations, changes in water salinity and increased rates of subsidence. These factors may contribute to long-term wetland loss within the region and subsequent negative trickle-down effects on fish and wildlife communities dependent upon wetland habitat.

**Table 7b. Detailed Comparison of Estimated Wetland Impacts**

	Protected Side Acres (hydrologically altered)				Flood Side Acres (hydrologically connected)		
	Pasture	Early Successional BLH	Mid-Late Successional BLH	Mid-Late Successional BLH (temporary impacts)	Riparian Swamp	404c BLH	404c Swamp
Western Levee (27.5 ac)	----	23.5	4	----	----	----	----
Northern Floodwall (5.8 ac)	----	----	3.1	----	2.7	----	----
Eastern Floodwall (9.6 ac)	----	----	----	----	----	2.3	7.3
Closure Complex, Levee, and Road Realignment (142.3 ac)	----	7.8	126.2	----	8.3	----	----
Eastern Staging Areas (70.5 ac)	63.6	----	----	6.9	----	----	----
Detention Basin – West Bank Harvey (44.5 ac)	----	----	34.8	----	9.7	----	----
Detention Basin – West Bank Algiers (24.3 ac)	----	6.7	13.8	----	3.8	----	----
Detention Basin – East Bank Algiers (67.9 ac)	----	1.2	23.7	----	43	----	----
<i>TOTAL Acres (392.6)</i>	<i>63.6</i>	<i>39.2</i>	<i>205.6</i>	<i>6.9</i>	<i>67.5</i>	<i>2.3</i>	<i>7.3</i>
<i>TOTAL AAHUs Los (217.7)t</i>	<i>0</i>	<i>22.3</i>	<i>150.2</i>	<i>4.8</i>	<i>34.3</i>	<i>1.9</i>	<i>4.2</i>
<b>Total Altered BLH (protected side) = 251.7 acres, 177.3 AAHUs</b>							
<b>Total BLH (404c) (flood side) = 2.3 acres, 1.9 AAHUs</b>							
<b>Total Swamp (flood side) = 74.9 acres (7.3 acres in 404c), 38.5 AAHUs</b>							

\* As indicated in Table 7b, based on the HAM and WVA analyses project implementation would result in the direct loss of 255 and 75 acres, and 179.2 and 38.5 AAHUs, of bottomland hardwood forest and swamp, respectively.

## 3.2.2 EPA Designated Bayou aux Carpes CWA Section 404(c) Area

### 3.2.2.1 Existing Conditions

Under Section 404 (c) of the Clean Water Act (CWA, 33 U.S.C. 1251 et seq), the Administrator of the EPA is authorized to prohibit the specification (including withdrawal of specification) of any defined area as a disposal site, and he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines after notice and opportunity for public hearing, that discharge of dredged or fill materials into such an area will have unacceptable adverse effects on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. Before making such a determination, the EPA Administrator shall consult with the Chief of Engineers, the property owner(s), and the applicant(s) in cases where there has been application for a section 404 permit. The EPA Administrator has delegated this authority to make a Final Determination under Section 404 (c) to the Assistant Administrator for External Affairs, who is EPA's national Section 404 program manager (EPA 1985).

The 3,200-acre Bayou aux Carpes area has been designated a 404c area since 1985. The area is comprised of high quality wetland habitat including BLH forest, cypress-tupelo swamp, scrub-shrub wetland, and flotant marsh. The Bayou aux Carpes CWA Section 404(c) area is directly adjacent to the Jean Laffite National Historical Park and Preserve. It is possible that the Bayou aux Carpes would eventually be incorporated into the National Park Service by Congressional action.

Hydrologic parameters greatly influence the quality and health of cypress-tupelo swamp and flotant marsh. Receding water levels could cause floating marsh vegetation to root into the soil, and the vegetation could potentially drown out when water levels rise again. Increased water flow and velocity into the area could push flotant marsh vegetation out and create open water. In cypress-tupelo swamp habitat, hydrologic variations also play an important role. Regeneration depends on periods of long drought, and hydrologic stresses such as altered tidal exchange can influence sapling growth rates.

The water chemistry in adjacent waterways (Old Estelle Outfall Canal and GIWW) and within the Bayou aux Carpes CWA Section 404(c) area is currently being evaluated as part of the monitoring plan in order to document baseline conditions (see chapter 7 Mitigation and Monitoring).

The wetlands and open water bodies of the 404c area provide nursery, feeding and spawning habitat for numerous recreationally and commercially important freshwater and estuarine fish and shellfish species. Wetlands such as these in the upper Barataria Basin also provide organic detritus to nearby estuarine waters, thereby contributing to the production of estuarine-dependent fish and shellfish species.

The Bayou aux Carpes CWA Section 404(c) area is a highly productive and diverse wetland habitat that is of significant value to the ecosystem for many species of fish and wildlife. The proposed project area in the Bayou aux Carpes site is a BLH area that has formed on top of the GIWW dredge material bank that was created when the GIWW was originally dredged. The portion of the 404c area adjacent to the proposed action consists of wooded wetlands, cypress-tupelo swamps, freshwater marshes, flotant marshes, and scrub-shrub wetlands. The marshes and wooded wetlands comprise a typical mixed BLH/cypress-tupelo swamp habitat dominated by a canopy of bald cypress and tupelo gum trees with localized densities determined by drainage and elevation characteristics. The existing cypress trees within this area are highly valuable, exhibiting successful naturally-regenerating cypress trees. Flotant marshes are also a

highly valuable, unique marsh type, usually found in areas with freshwater or brackish marshes. They are composed of thick, floating mats of vegetation with open water beneath them. Other dominant vegetation is generally black willow, red maple, buttonbush, palmetto, and wax myrtle.

The wetlands serve as valuable feeding, resting, nesting, hunting, and/or escape habitat for numerous species of game and non-game mammals, commercially important furbearers, songbirds, raptors, migratory and resident waterfowl, wading birds, and woodpeckers, as well as many species of amphibians and reptiles, including the American alligator (*Alligator mississippiensis*). Some important wildlife inhabiting the area are the gray squirrel (*Sciurus carolinensis*), pileated woodpecker (*Dryocopus pileatus*), mink (*Mustela vison*), wood duck (*Aix sponsa*), and great egret (*Ardea alba*). These wetlands also serve as groundwater recharge areas, storage areas for storm and flood water, and natural water filtration areas. These wetlands store waters during a rain or tropical storm event and release the water slowly after absorbing pollutants and excess nutrients.

Additional background information regarding the EPA designated Bayou aux Carpes CWA Section 404(c) area can be found in section 3.1.7. See sections 3.2.1.1 (vegetation), 3.2.5.1 (T&E species), 3.2.6.1 (fisheries), and 3.2.7.1 (wildlife) for further details regarding the plant and animal communities that would potentially be impacted within Bayou aux Carpes CWA Section 404(c) area. Also see section 6.3 for details regarding collaboration with the EPA and resource agencies.

### 3.2.2.2 Discussion of Impacts

#### 3.2.2.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pumping stations. No impacts to the Bayou aux Carpes CWA Section 404(c) area would occur (Design Alternatives Report, January 2007).

#### 3.2.2.2.2 Proposed Action

Implementation of the proposed action (WCC), would directly impact approximately 9.6 acres of cypress-tupelo swamp and BLH habitat within the Bayou aux Carpes CWA Section 404(c) area (table 6). Direct impacts to BLH forest and cypress-tupelo swamp habitat would be permanent.

Wetlands would be mechanically cleared and grubbed to facilitate the construction of the new floodwall structure and would require mitigation. The hydrology of the Bayou aux Carpes CWA Section 404(c) area could be directly impacted by construction of the floodwall to the east (along the eastern border of the 404c area) and could be indirectly impacted by construction of the floodwalls to the north (from Old Estelle PS to the Harvey Canal). Project feature augmentations to offset these potential impacts would be developed in conjunction with the EPA, JLNHPP, and USFWS (see section 2.3 for further details regarding measures to minimize impacts to the 404c). See sections 6.3 for details regarding the CEMVN coordination with the EPA and other Federal and state resource agencies. See section 7 for further details regarding the 404c mitigation and monitoring plans, and see appendix K for the detailed letter requesting a modification to the Bayou aux Carpes CWA Section 404(c) Final Determination.

Best management practices would be used to minimize impacts to the adjacent wetlands and open water areas. Impacts to the Bayou aux Carpes CWA Section 404(c) area would be similar to those described in the Wetlands section (3.2.1) of this report.

Two acres of 9.6 acres have been impacted in the project area due to investigative soil borings that were performed in October 2008. Mitigation for these unavoidable impacts will be completed as part of the overall mitigation plan discussed in this document.

Project feature augmentations are being evaluated for effectiveness and feasibility in partnership with the EPA, the NPS, and other resource agencies. Final determination of which project feature augmentations to implement would be determined in collaboration with the Interagency team after modeling, analysis of benefits, and consideration of impacts is completed.

The project feature augmentations and possible impacts include (in order of priority):

1. Gapping the existing earthen bank along the southern side of the Old Estelle Outfall Canal to provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area. Would also provide for a dedicated source of freshwater that could provide additional nutrients to the 404c area.
2. Modifying the existing earthen bank along the Southern Natural Gas Pipeline Canal to provide hydrological exchange between the northern and southern sections of the Bayou aux Carpes CWA Section 404(c) area. This would provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area.
3. Modifying the shell plug at Bayou aux Carpes to provide hydrological exchange between the GIWW and the Bayou aux Carpes CWA Section 404(c) area. This would provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area.
4. Closing the Southern Natural Gas Pipeline Canal to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area. This would provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area.
5. Gapping or grading down drill hole access canal banks to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area. This would provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area.
6. Gapping or grading down oil well access roads to promote hydrological flow within the Bayou aux Carpes CWA Section 404(c) area. This would provide historic sheet flow regime to the Bayou aux Carpes CWA Section 404(c) area.

Project feature augmentations would have direct impacts to the wetland habitat, fisheries, and wildlife (section 3.2) in the 404c area. These impacts would include some temporary adverse impacts due to the removal of earthen material (gapping or grading down) to enhance the hydrology of the area, but the augmentations would be mostly beneficial as they would potentially restore natural hydrology and enhance and/or create wetland habitat. With a potential increase in natural hydrological exchange, water quality, and wetlands habitat, there would also be potential benefits for the fisheries and wildlife. With dredge material banks gapped and canal plugs removed, fisheries and wildlife species would likely begin to have access to resources and habit areas that were previously inaccessible.

The project feature augmentations would have indirect impacts to air quality, noise levels, and aesthetic resources; however, indirect impacts of construction (e.g., increased turbidity, noise, vibrations, fugitive dust, etc.) would have only temporary effects to the Bayou aux Carpes CWA Section 404(c) area. The adjacent wetlands would stabilize following construction, allowing sediment to settle and vegetation to stabilize the area. Construction-related runoff into the wetlands would be managed through best management practices, which would minimize the potential indirect adverse impacts from this alternative on wetlands.

Additional measures proposed to avoid adverse impacts to the 404c area include the construction of foreshore protection (an approximately 2,000 ft rock structure) within the GIWW across from the PS to avoid erosion and scouring and also relocating the Enterprise Pipeline via directional drilling for 4,000 ft past the current ROW inside the 404c to a point west of the V-line levee (See section 2.3 for further details regarding the minimization of impacts, foreshore protection, or pipeline relocation). Both of these measures are being proposed to avoid direct impacts to wetland habitat within the 404c area. Construction of the foreshore protection would indirectly impact the edge habitat within the 404c along the GIWW but (e.g., increased turbidity, noise, vibrations, etc.) but the impacts would be temporary. As with the previously stated temporary indirect impacts, the adjacent wetlands would stabilize following construction, allowing sediment to settle and vegetation to stabilize the area. Additionally, the foreshore protection would offer protection against damage from barges pushing into the bank.

Cumulative wetland impacts would be expected due to implementation of the proposed action in concert with additional WBV projects. Construction of the proposed action would contribute to the cumulative losses of BLH and cypress-tupelo swamp within the HSDRRS.

#### 3.2.2.2.3 Alternatives to the Proposed Action

The AG and PP alternatives would not directly impact the Bayou aux Carpes CWA Section 404(c) area. Elements of the AG and PP alternatives utilize levee construction and improvements located on the opposite bank of any waterway that borders the 404c area.

The GIWW A alternative would directly impact 5.1 acres of wetland habitat within the Bayou aux Carpes CWA Section 404(c) area. These impacts would occur due to the construction of a tidal exchange structure that would bifurcate the 404c area. The structure would tie into the V-line Levee to the west and would tie into a newly constructed closure complex on the GIWW to the east. Although the floodwall would be designed to mimic natural hydrological flow between the protected side and flood side by utilizing strategically placed floodgates, it is possible that protected side 404c wetlands would still be impacted if natural hydrological regimes could not be precisely mimicked. Approximately 500 acres of 404c wetland could potentially become hydrologically isolated, leading to changes in the composition of the habitat and its inhabitants and the potential degradation and/or total loss of the flotant marsh in the area. In this scenario, the GIWW A alternative would potentially have the greatest impact to the EPA designated Bayou aux Carpes CWA Section 404(c) area of all of the alternatives.

Foreshore protection would be required but would not directly impact the 404c area. There would be some temporary indirect impacts to the 404c area during construction. Details regarding this measure to reduce erosion and scouring to edge habitat within the 404c area are the same as those described for the proposed action.

The AG and PP alternatives would not directly impact the Bayou aux Carpes CWA Section 404(c) area. All elements of the AG and PP alternatives utilize levee construction and improvements located on the far bank of any canal that borders the 404c area.

Indirect and cumulative wetland impacts would be expected due to the implementation of each alternative to the proposed action in concert with additional WBV projects. Overall indirect and cumulative impacts due to additional flood control measures and levee construction may have a delayed impact on the Bayou aux Carpes wetland habitat due to altered hydrological regimes leading to habitat alterations, changes in water salinity and nutrient load, and increased rates of subsidence. These factors may contribute to long-term wetland loss within the region, potentially impacting diversity, habitat quality, and the overall ecosystem function of the Bayou aux Carpes CWA Section 404(c) area.

### 3.2.3 Upland Resources

#### 3.2.3.1 Existing Conditions

Terrestrial and upland resources are considered to occur in areas of the project area that are not wetlands or open waters. Non-wetland areas within the project area consist of cleared and drained BLH forest lands used primarily as pasture lands, levees, roads, and commercial or residential use. Although many of these areas within the vicinity of the project area could be classified as wetlands (see figure 12), some areas exhibit upland characteristics.

#### 3.2.3.2 Discussion of Impacts

##### 3.2.3.2.1 No Action

There are non-wet uplands in the IER # 12 project area. Most areas that are not wetlands are the result of the deposition of soil fill for construction of levees, roads, railways, commercial development, residential development, golf courses, and the airfield; spoil from excavation of waterways; and landfill material. Other non-wet uplands on the west bank are a result of drained BLH habitat.

Impacts to uplands due to building HSDRRS to authorized level would be related to borrow material areas, construction staging areas, and additional ROW that may be needed. Since borrow material is analyzed separately in other IERs it is not included in this upland resources impact analysis. Some indirect and cumulative impacts from development could occur as a result of the no action being built due to public belief that they are safer today than pre-Katrina. Indirect impacts would be expected to be less than those experienced if the 100-year level of risk reduction were to be constructed.

##### 3.2.3.2.2 Proposed Action

Implementation of the proposed action (figure 4a, 5) would not directly impact any upland habitats with the exception of cubic yards of earthen material required for borrow, which can be found in the borrow IERs on the [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) website.

Indirect impacts in the three polders protected by the WCC could occur once the 100-year level of risk reduction is constructed due to renewed confidence in the area, feelings of increased levels of safety, and resulting development. Consequently, cumulative impacts to upland areas in the greater New Orleans area are expected for the same reasons stated for the indirect impacts.

##### 3.2.3.2.3 Alternatives to the Proposed Action

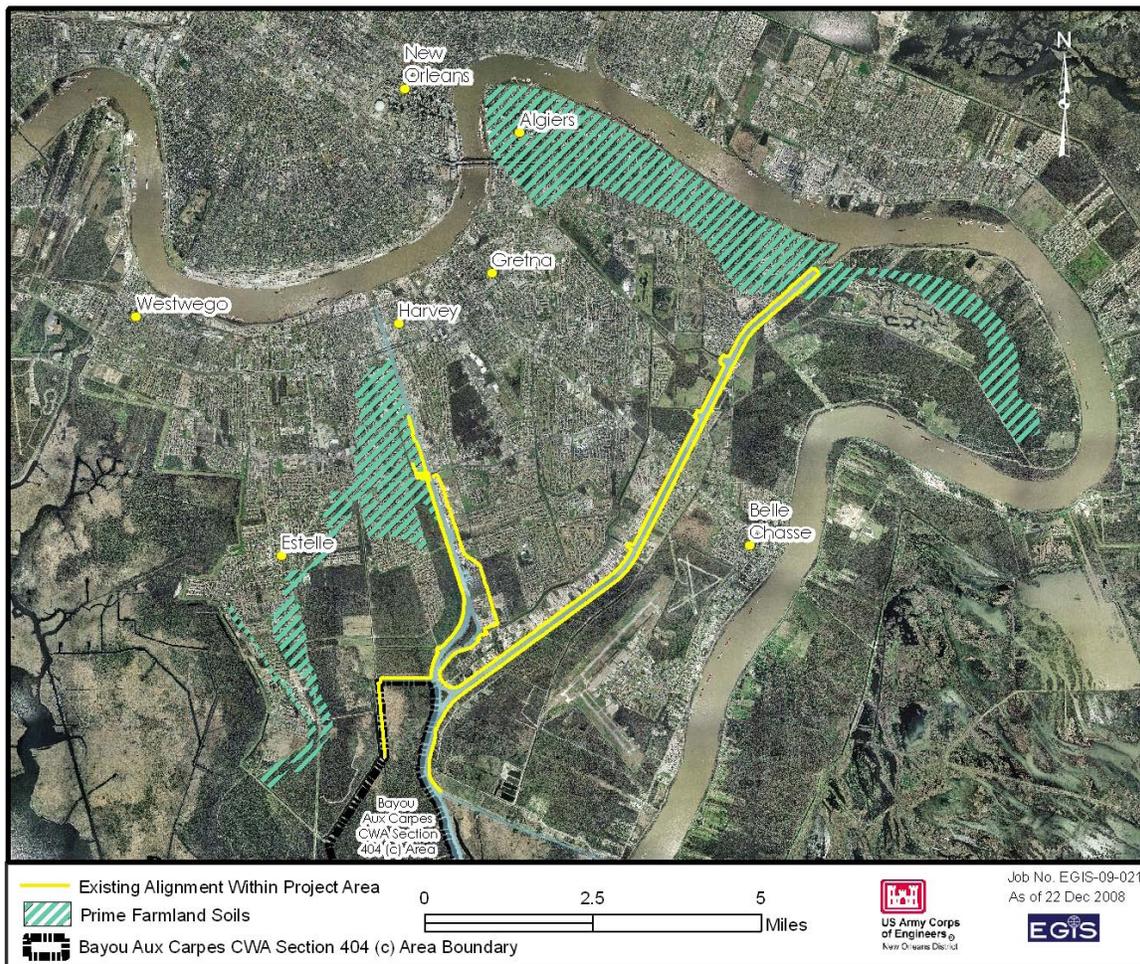
There are naturally occurring uplands found within areas impacted by any of the alternatives (GIWW A, AG, and PP). Impacts to uplands would be due to building HSDRRS to authorized level would be lands acquired for borrow materials, from construction staging areas, and additional ROW that may be needed.

Indirect impacts in the protected polders could occur once the 100-year level of risk reduction is constructed due to development resulting from renewed confidence in the area and the level of safety the public would associate with HSDRRS. Consequently, cumulative impacts to upland areas in the greater New Orleans area are expected for the same reasons stated for the indirect impacts.

### 3.2.4 Prime and Unique Farmland Soils

#### 3.2.4.1 Existing Conditions

Cancienne silt loam, Cancienne silty clay loam, Shriever clay, Schriever silty clay loam, and Harahan clay are designated prime and unique farmland soils (United States Department of Agriculture, 2007). Areas of prime and unique farmland soils are shown in figure 13. The soils are best used for food, forage, and agricultural production due to their high and sustained yields. Many designated prime and unique farmland soil areas within the study area near proposed action have been previously developed or contain existing levees and ROW; however, some potentially impacted areas fall under jurisdiction of the Farmland Protection Policy Act (FPPA) —Subtitle I of Title XV, Section 1539-1549. United States Department of Agriculture (USDA).



**Figure 13. Prime and Unique Farmland Soils Within Project Vicinity**

#### 3.2.4.2 Discussion of Impacts

##### 3.2.4.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally,

this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pumping stations. Foreseeable impacts could occur to prime and unique farmland soils within the project area due to the excavation of the borrow material from the greater New Orleans area.

*3.2.4.2.2 Proposed Action*

No mapped prime and unique farmland soils exist along the GIWW (figure 13). Therefore, no direct impacts to prime and unique farmland soils would be expected due to the implementation of the proposed action (WCC) to build the levee. However, impacts to prime and unique farmlands are expected as a result of the USACE obtaining 3,125,000 cubic yards of borrow material.

Approximately 124 acres of non wetland-area would be required to be excavated to provide the necessary borrow required to construct the proposed action. Indirect impacts in the project area are minimal since there are very few approved borrow sources in the three polders directly protected by the proposed action. Borrow is expected to come from the Lake Catouatche area, the Belle Chasse area or from approved contractor furnished sites in the greater New Orleans area.

The implementation of the proposed action may potentially cause indirect and cumulative impacts to areas of prime and unique farmland soils not directly affected by levee construction and ROW acquisition. Additional flood protection, due to the implementation of the proposed action, and additional WBV projects, would decrease silt deposition and potentially increase drying and subsidence in adjacent areas, thereby, potentially changing soils properties over the long term.

*3.2.4.2.3 Alternatives to the Proposed Action*

The GIWW A alternative could impact up to 10 acres containing mapped prime and unique farmland soils due to the need for 250,000 cubic yards of borrow material. The AG alternative would impact approximately 13 acres of prime and unique farmland soils along the Harvey Canal and could impact an additional 180 acres due to the need for 4,500,000 cubic yards of borrow material. Implementation of the PP alternative (figure 10), would directly impact approximately 33 acres of prime and unique farmland soils along the Algiers and Harvey Canals due to levee expansion and ROW acquisition (table 8). An additional 380 acres could be impacted due to a need for 9,500,000 cubic yards of borrow material. The impacted areas of prime farmland soil are not currently in agricultural production.

The implementation of the AG or PP alternatives would potentially cause indirect and cumulative impacts to areas of prime and unique farmland soils not directly affected by levee construction and ROW acquisition

**Table 8: Prime Farmland Impacts (acres)**

Alternative	Total Prime Farmland Impacts (acres)	Estimated Borrow Needed (cy)	Estimated Borrow Needed (acres)*
WCC (preferred)	0	3,100,000	124
GIWW A	0	250,000	10
AG	13	4,500,000	180
PP	33	9,500,000	380

### 3.2.5 Threatened and Endangered Species

#### 3.2.5.1 Existing Conditions

Although several Federal or state-listed threatened and endangered (T&E) species are dependent on the habitat types present in the study area, no Federally-listed endangered, threatened, or candidate species under USFWS jurisdiction presently occur in the project area. No critical habitat for any T&E species is in the project area. Numerous rare migratory birds utilize project area habitats as stop-over points during migration (e.g., peregrine falcon). Other species specifically utilize the habitat for breeding and raising young (e.g., bald eagle). These species (table 9) are highly dependent on BLH forest habitat found throughout the project area (Louisiana Department of Wildlife and Fisheries 2007). A bald eagle (*Haliaeetus leucocephalus*) nest was documented within the Bayou aux Carpes area in 2007. The bald eagle was removed from the List of Endangered and Threatened Species but recommendations to minimize potential project impacts to the bird and its nest are provided by the USFWS in their National Bald Eagle Management Guidelines publication. The bald eagle continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act.

**Table 9: Federally Listed Threatened and Endangered Species for Plaquemines, Jefferson, and Orleans Parish, Louisiana**

Scientific Name	Common Name	Federal Status
<i>Acipenser oxyrinchus desotoi</i>	Gulf Sturgeon	Threatened
<i>Charadrius melodus</i>	Piping Plover	Endangered
<i>Charadrius melodus</i>	Pallid Sturgeon	Endangered
<i>Pelecanus occidentalis</i>	Brown Pelican	Endangered
<i>Trichechus manatus</i>	Manatee	Endangered

### 3.2.5.2 Discussion of Impacts

#### 3.2.5.2.1 No Action

The no action alternative would not result in any foreseeable new direct, indirect, or cumulative impacts to any T&E species within the project area. With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to, and providing higher access gates and modified pumping stations (Design Alternatives Report, January 2007). It is the CEMVN determination that no adverse impacts to a threatened or endangered species or its designated critical habitat would occur as a result of the implementation of the no action plan.

#### 3.2.5.2.2 Proposed Action

Under the proposed action, no listed endangered, threatened, or candidate species are known to exist in the potential project impact areas. Therefore, no direct, indirect, or cumulative effects are predicted for protected species or their critical habitat as a result of implementing the proposed actions. The USFWS concurred with the USACE's determination that project implementation would not adversely affect any threatened and endangered species or their critical habitat in their letter dated 25 June 2008.

#### 3.2.5.2.3 Alternatives to the Proposed Action

The CEMVN has determined that implementation of the GIWW A, AG, or PP alternatives would have no direct impact on any T&E species within the project area. No foreseeable indirect or cumulative impacts would be expected to occur.

## 3.2.6 Fisheries

### 3.2.6.1 Existing Conditions

The BLH, cypress-tupelo swamps, marshes, and tidal channels provide habitat for an abundance of amphibians, reptiles, and shellfish as previously discussed (see section 3.1.6). Coastal wetlands provide essential habitat for commercially important marine and freshwater species and game

species that are wetland-dependent at some stage in their life-cycle. The estimated annual economic input to Louisiana from recreational hunting, fishing, and non-consumptive uses of wildlife (e.g., bird watching, outdoor recreation, ecotourism) exceeds \$1.2 billion per year (U.S. Department of Interior, Fish and Wildlife Service and U.S. Department of Commerce, Census Bureau 2001). Harvested commercial fish and wildlife commodities total over \$500 million per year (Louisiana State University Agriculture Center 2004). Coastal wetlands, marshes and forests maintain statewide fish and wildlife resources by directly providing permanent habitat or indirectly acting as breeding and rearing refuges necessary to many economically important species.

Areas in and adjacent to the project area are important contributors to the local and regional fisheries. Water bodies within the project area provide habitat for resident populations of numerous species. The canals and surrounding marshes support bowfin (*Amia calva*), spotted gar (*Lepisosteus spatula*), shads (*Alosa spp.*), mosquitofish (*Gambusia affinis*), and channel catfish (*Ictalurus punctatus*), among others. In addition, the project area includes a section of the Bayou aux Carpes CWA Section 404(c) area. The Bayou aux Carpes area was designated a 404c area in 1985 by the EPA according to Section 404c of The Clean Water Act of 1972. Analysis of samples collected in 1985 indicated that forage species (e.g. mosquitofish, threadfin shad, and golden top minnow) were the most abundant fish species in the area. The Bayou aux Carpes CWA Section 404(c) area is primarily BLH, cypress-tupelo swamp, shrub/scrub wetland, and flotant marsh. The habitats within this area provide valuable spawning, feeding, and nursery habitat for recreationally-important freshwater fish such as large-mouth bass (*Micropterus salmoides*), bowfin (*Amia calva*), and sunfish (*Centrarchidae sp.*), crustaceans such as crawfish (*Procambarus clarkii*), grass shrimp (*Palaemonetes pugio*), and the blue crab (*Callinectes sapidus*). The area has been determined to be a major contributor to the greater Barataria Bay Estuary, providing sensitive habitat for both freshwater and marine species. Consequently, these wetland estuaries are critical to maintaining sustainable populations of commercially important marine and freshwater species, such as speckled trout (*Cynoscion nebulosus*), redfish (*Sciaenops ocellatus*), flounder (*Bothidae sp.*), croaker (*Micropogonius undulatus*), and numerous shellfish, by functioning as nurseries.

### 3.2.6.2 Discussion of Impacts

#### 3.2.6.2.1 No Action

No foreseeable new impacts would occur to the existing fisheries resources within the project area due to the implementation of the no action alternative. With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pumping stations (Design Alternatives Report, January 2007).

#### 3.2.6.2.2 Proposed Action

##### 3.2.6.2.2.1 General Discussion of Fisheries Impacts due to the Proposed Action

The proposed action would primarily impact BLH, cypress-tupelo swamp, and marsh wetland habitats that function as part of the Barataria Bay Estuary, potentially initially negatively impacting fish and shellfish populations dependent upon the estuary habitat to maintain locally and regionally sustainable populations. Total expected wetland losses would be approximately 392 acres. However, as previously discussed, the quality of these wetland areas and associated fish habitat have been affected by past development and flood control activities. Best management practices would be used to minimize impacts to water quality and fisheries. Improvements to fisheries populations and habitat would occur as a result of the proposed project augmentations that are being studied.

Temporary direct and indirect impacts on the fisheries and aquatic habitat would be expected. Construction of the project features would disturb wetland biota and sediments in the vicinity and could cause downstream increases in turbidity and sedimentation. Suspended materials could clog fish gills, lower growth rates, and affect egg and larval development (EPA 2003). Fisheries would be impacted as the habitat is cleared and grubbed for new construction. Motile organisms would relocate to adjacent undisturbed waters. Some benthic organisms would be impacted because they cannot vacate the construction area. The utilization of floodwall, as opposed to levee, may act as a dispersal or migration barrier for selected species.

Indirect effects to adjacent waters would consist primarily of effects from increased local turbidity on the surrounding open water areas, decreased dissolved oxygen levels, vibrations, and subsurface noise due to construction activities. Conditions of adjacent waters would return to normal after construction completion, allowing sediment to settle, benthos to repopulate, and fish to return.

Construction of the proposed action would contribute to the cumulative losses of fisheries and aquatic habitat resources within the HSDRRS. Cumulative impacts would include temporary, and construction-related impacts.

#### 3.2.6.2.2.2 Specific Fisheries Impacts due to the Proposed Action

##### *Western Earthen Levee Enlargement*

The proposed action consists of raising the existing earthen levee to 14 ft (table 1). The centerline would shift to the protected side as necessary to accommodate footprint expansions, and an additional 125 ft of ROW would be acquired. The drainage canal would be relocated 200 ft to the protected side.

The proposed action would require the relocation of the existing canal further into the protected side of the reach. Fisheries and aquatic life in the existing canal would be adversely impacted as the canal would need to be filled to accommodate the levee expansion. Once filled, the canal would be lost as possible habitat for fish and other aquatic organisms, but would be replaced by the new canal which would re-populate native fisheries and aquatic life. Motile organisms present would attempt to avoid construction activities and seek refuge in adjacent undisturbed waters. Some benthic organisms would be impacted due their inability to vacate the construction area. Construction activities would likely cause indirect effects by increased local turbidity, decreased dissolved oxygen levels, vibrations, and subsurface noise.

##### *Northern Levee Floodwall Cap and Water Control Structure Construction*

The proposed action consists of providing fronting protection at Old Estelle PS, earthen levee enlargement with a T-wall floodwall cap within existing ROW from the pump station to the Harvey Canal, and construction of a water control structure (gate) where the Old Estelle Outfall Canal meets Harvey Canal.

This action would cause impacts in the Old Estelle Outfall Canal similar to those described for the general proposed action to fisheries in the Estelle Outfall Canal. In addition, when the flow control structure is closed it would prevent the movement of fish from the canal to the GIWW, impacting the quality of the canal for fish habitat.

##### *Eastern Innovative Floodwall Construction*

The proposed action consists of constructing an innovative T-wall approximately 4,200 ft long and 100 ft wide along the eastern boundary of the GIWW within the Bayou aux Carpes CWA Section 404(c) area.

Implementation of the proposed action (figure 4a, 5) would directly impact approximately 9.6 acres of potential estuary habitat within the EPA designated Bayou aux Carpes CWA Section 404(c) area. This estuary habitat is considered an important fisheries resource within the greater Bayou Barataria Estuary and the loss of this habitat could impact fisheries populations dependent on this area.

Project feature augmentations would have direct impacts to the wetland habitat, fisheries, and wildlife (section 3.2) in the 404c area. These impacts would include some adverse impacts due to the removal of earthen material (gapping or grading down) to restore the hydrology of the area, but the augmentations would be mostly beneficial as they would potentially enhance and/or create wetland habitat. With a potential increase in natural hydrological exchange, water quality, and wetlands habitat, there would also be potential benefits for the fisheries and wildlife. With spoil banks gapped and canal plugs removed, fisheries and wildlife species would likely begin to have access to resources and habit areas that were previously inaccessible.

#### *Closure Complex Construction*

The proposed action consists of constructing gate(s) and pumping station across and on the east bank of the GIWW.

This would temporarily disrupt 4 acres of open water fish habitat during construction. A surge barrier with reduced pumping capacity would be in place by June 2011, but total construction of all proposed action components would require 4 years. Installation of the structures would disturb wetland biota and sediments in the vicinity during construction. Other impacts would be as described for the general proposed action.

Under normal conditions, the gate structures would be open, channel velocities would remain stable, and the pump station would not be in operation; however, during a storm event, operation of the closure complex on the GIWW would directly impact fisheries. Only during a storm event would the gate structures be closed to fish, and during that time, closing the gates would limit fish movement on one side or the other. The pump station would only operate during a storm event, and at that time fish could be caught in the ancillary structures. Any increased velocities due to the PS during a storm event would be countered by storm surge.

Additional measures proposed to avoid adverse impacts to the 404c area include the construction of foreshore protection (an approximately 2,000 ft rock structure) within the GIWW across from the PS to avoid erosion and scouring and also relocating the Enterprise Pipeline via directional drilling for 4,000 ft past the current ROW inside the 404c to a point west of the V-line levee (See section 2.3 for further details regarding the foreshore protection or pipeline relocation). The foreshore protection would have temporary indirect impacts to adjacent edge habitat during construction; however, the suspended sediments, noise, vibrations, etc, would cease following construction. The foreshore protection could potentially create habitat for fish and shell fish species. This rock structure could potentially create habitat along its outer edge by creating a complex habitat structure for species to seek refuge, and by reducing water velocities behind the structure, this could potentially improve edge habitat conditions in the vicinity and increase the fish and shell fish communities there. The foreshore protection is not expected to alter hydrologic conditions within the Bayou aux Carpes CWA Section 404(c) area.

#### *Eastern Earthen Levee Construction and Bayou Road realignment*

The proposed action consists of degrading the existing levee on the eastern side of the GIWW and constructing an earthen levee further eastward, moving the levee centerline further into the protected side and putting several acres of land back to the flood side to be exposed to the natural flood regime. Bayou Road would also be realigned on the protected side of the new levee.

As this section is comprised of altered BLH, permanent direct or indirect impacts on the fisheries and aquatic habitat would be expected. Habitat for fisheries species may actually be created by the addition of the acres of wetlands back to the flood side.

#### *Detention Basin Dredging and Improvements*

The proposed action consists of dredging 700,000 cy in the Algiers Canal. Detention basin improvements along the Harvey Canal and Algiers Canal consist of building fronting protection at pump stations, capping or replacing floodwalls, constructing impact barriers, providing backflow suppression, reshaping existing levees by constructing a berm, and reinforcing existing levees.

Impacts would be similar to those impacts described for the general proposed action. In addition, fisheries in the disposal area would be impacted temporarily due to the discharge of dredged material onto the water bottoms. Fish species would vacate the area during the operations but would return to the general area after completion of work. Discharge of dredged material and the resulting turbidity plume could indirectly affect phytoplankton productivity in adjacent areas, but the overall effect on primary productivity would be negligible. Indirect impacts would be temporary.

The beneficial use that would be provided by the dredged material from this project may benefit fisheries by creating additional habitat (See section 2.3 for further details regarding the disposal plan and beneficial use of dredge material).

#### *3.2.6.2.3 Alternatives to the Proposed Action*

The GIWW A alternative would impact wetlands adjacent to existing levee ROW and 5.1 acres of wetlands within the Bayou aux Carpes CWA Section 404(c) area due to the proposed construction of the tidal exchange structure that would bifurcate the 404c area. Aside from directly impacting the 5.1 acres of wetlands within the proposed ROW footprint for this alternative, the creation of the tidal exchange structure would have the potential to indirectly impact the fisheries by altering the hydrology, limiting migration and dispersal of fish and shellfish populations, accelerating habitat fragmentation. These indirect impacts could result in long-term habitat recession that would impact the fisheries in the 404c area. A total of 254 acres of wetland would be impacted by this alternative. Approximately 500 acres of wetland habitat would be enclosed by the tidal exchange structure and would be at risk for irreparable indirect impacts, such as habitat degradation, e.g., loss of floatant marsh, which would also decrease fish and shell fish habitat. Impacts from the navigation / gate(s) and pump station complex, eastern earthen levee construction, and detention basin dredging and improvements would be the same as the proposed action.

The AG and PP alternatives would have direct impacts similar to those described for the proposed action. Indirect impacts due to the AG and PP alternatives would be expected and would also be comparable to any indirect or cumulative impacts incurred due to the proposed action. These alternatives do not increase edge habitat, fragmentation, or hydrologic isolation within the study area by utilizing existing habitat edges and levee ROWs thereby minimally impacting fisheries resources.

Indirect and cumulative impacts on fisheries would be similar to those described for the proposed action.

### **3.2.7 Wildlife**

#### *3.2.7.1 Existing Conditions*

BLH, cypress-tupelo swamps, marshes, and tidal channels provide habitat for an abundance of birds, mammals, amphibians, reptiles, and fish as previously discussed (see sections 3.2.1.1, 3.2.2.1,

3.2.5.1, and 3.2.6.1). Coastal wetlands, marshes and forests maintain statewide fish and wildlife resources by directly providing permanent habitat or indirectly acting as breeding and rearing refuges necessary to many economically important species. See appendix I for more information on species names.

The diversity and abundance of wildlife inhabiting the project area is largely dependent on the quality and extent of suitable habitat present. The proposed project area is covered by a natural community of forested wetlands or swamp, with float marsh in limited areas. Farther north, the landscape changes to industrial, commercial, and residential use. There are numerous dredged canals that traverse the project corridor. In addition, levees and floodwalls line the existing waterways.

Undeveloped areas near the existing levee system, including the JLNHPP and the Bayou aux Carpes Section 404(c) area, are dominated by freshwater and brackish marsh and varying quality wooded wetlands that provide valuable food and shelter to a wide range of wildlife species. Local wildlife specifically observed within the vicinity of the proposed project included the American alligator (*Alligator mississippiensis*), great blue heron (*Ardea herodias*), gray squirrel (*Sciurus carolinensis*), and white-tail deer (*Odocoileus virginianus*). The wildlife resources found within the project area have significant recreation and commercial uses. Please see sections 3.2.1.1 and 3.2.5.1 for a more detailed discussion of fauna commonly found within the project study area and the impacts of these resources to the local and statewide economies.

Wetland game birds that occur in the study area are the wood duck (*Aix sponsa*), common snipe (*Gallinago gallinago*), and American woodcock (*Scolopax minor*). Non-game birds in the study area include many species of shorebirds, and songbirds (both migratory and non-migratory). Wading birds that utilize the nearby canals and roost in trees include the little blue heron (*Egretta caerulea*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*).

Wildlife that typically inhabit cypress-tupelo 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 within the project area can be identified based on the geographical ranges and habitat preferences of each species. Amphibians likely to occur in these habitats include the southern dusky salamander (*Desmognathus auriculatus*), dwarf salamander (*Eurycea quadridigitata*), central newt (*Notophthalmus viridescens louisianensis*), three-toed amphiuma (*Amphiuma tridactylum*), western lesser siren (*Siren intermedia nettingi*), gulf coast toad (*Bufo valliceps*), and northern cricket frog (*Acris crepitans crepitans*), (Conant and Collins 1998, Felley 1992, Wigley and Lancia 1998).

Reptiles that typically utilize habitats such as those of the project area include the common snapping turtle (*Chelydra serpentina*), green anole (*Anolis carolinensis*), broadhead skink (*Eumeces laticeps*), 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*), mink (*Mustela vison*), swamp rabbit (*Sylvilagus aquaticus*), cotton mouse (*Peromyscus gossypinus*), fox squirrel (*Sciurus niger*), and raccoon (*Procyon lotor*) (Whitaker 1998, Wigley and Lancia 1998).

Although the bald eagle (*Haliaeetus leucocephalus*) was delisted as a Federally threatened species in August 2007, it continues to be protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act. In Louisiana, the bald eagle typically nests from October to mid-May (U.S. Fish and Wildlife [USFWS] 2007a). Following nesting activities in autumn, egg laying/incubation and hatching/rearing of young typically occur between fall and

spring, with fledging of young as early as January and typically by mid-May (USFWS 2007a, USFWS 2007b, USFWS 2007c). Bald eagle nests typically are in bald cypress trees near fresh and brackish marshes or open water in southeastern Louisiana parishes. In its consultation letter the USFWS stated that there is a known bald eagle nest located within the vicinity of the proposed project area. The closest nest site and its associated 660 ft buffer falls well outside the footprint for the proposed action.

The project area supports a variety of game species. White-tailed deer (*Odocoileus virginianus*), the only big game animal found in the study area, utilize project-area forested wetlands. Small game mammals, such as gray squirrel (*Sciurus carolinensis*), also utilize those habitats.

### 3.2.7.2 Discussion of Impacts

#### 3.2.7.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pumping stations. No new impacts to wildlife would occur that have not been previously authorized (Design Alternatives Report, January 2007).

#### 3.2.7.2.2 Proposed Action

##### 3.2.7.2.2.1 General Discussion of Wildlife Impacts due to the Proposed Action

The proposed action (WCC), would directly impact wetland habitat utilized by local wildlife within the project area (figure 4). ROW acquisition would potentially cause edge habitat loss to BLH forest and other wetlands (392 total acres), including 9.6 acres of the Bayou aux Carpes CWA Section 404(c) area. It is likely that local wildlife would disperse from the area during the construction phase of the project; however, it is highly likely that either recolonization of the project area would occur post construction, or that adjacent habitat would be sufficient to absorb and support any wildlife that would be permanently displaced due to habitat alternations.

The greatest potential for effects on wildlife associated with the implementation of the proposed action would occur during the construction period (approximately 4 years). The presence of construction-related activity, machinery, and noise would be expected to cause most wildlife to avoid the area 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 adversely affected if construction activities caused abandonment of nesting sites. In order to minimize the potential for construction under the proposed action to disturb colonial-nesting wading birds, procedures recommended by the USFWS would be followed (USFWS 2007a, appendix I).

Numerous rare migratory birds utilize project area habitats as stop-over points during migration (e.g., peregrine falcon). Other species specifically utilize the habitat for breeding and raising young (e.g., bald eagle). These species (table 9) are highly dependent on BLH forest habitat found throughout the project area (Louisiana Department of Wildlife and Fisheries, 2007).

The abundance and diversity of species within the project area should remain unchanged. Levees constructed as part of this alignment would not act as a dispersal barrier for the majority of local native species; however, floodwall construction would hinder dispersal and migration of some terrestrial species

A small number of less mobile and wetland dependent species (i.e., mice, reptiles, amphibians) would be lost during construction; however, most wildlife species would likely avoid the vicinity of the proposed action during the construction period (estimated to be approximately 4 years) and return following the completion of construction.

In order to minimize the potential for construction activities under the proposed action to disturb nesting bald eagles, procedures recommended by the USFWS (USFWS 2007a, appendix I) based on the National Bald Eagle Management Guidelines (USFWS 2007b) would be followed if any new nests are found.. The closest nest site and its associated 660 ft buffer falls well outside the footprint for the proposed action including project feature augmentations.

Indirect effects to wildlife species due to construction activities (e.g., noise, vibration) would be temporary. Utilization of floodwall, as opposed to levee may act as a dispersal or migration barrier for selected species.

Project feature augmentations would have direct impacts to the wetland habitat, fisheries, and wildlife (section 3.2) in the 404c area. These impacts would include some adverse impacts due to the removal of earthen material (gapping or grading down) to enhance the hydrology of the area, but the augmentations would be mostly beneficial as they would potentially restore natural hydrology and enhance and/or create wetland habitat. With a potential increase in natural hydrological exchange, water quality, and wetlands habitat, there would also be potential benefits for the fisheries and wildlife. With spoil banks gapped and canal plugs removed, fisheries and wildlife species would likely begin to have access to resources and habit areas that were previously inaccessible.

Disposal of dredged material as beneficial use could create 28 acres of wetland habitat (see section 2.3 for further details regarding the disposal plan and beneficial use of dredged material).

Potential indirect impacts on wildlife from the proposed action include the potential movement of displaced wildlife currently inhabiting the project area into nearby habitats that would not be directly impacted by this alternative. This migration would not be expected to result in exceeding the carrying capacity of the extensive, similar terrestrial and aquatic habitats in the vicinity. Relatively small populations and habitat areas would be affected and the extensive adjacent habitats should be able to support the immigrants.

Potential cumulative impacts on wildlife from the proposed action would involve the combined effects on wildlife of habitat loss and displacement of wildlife populations from the multiple WBV flood control projects in the Jefferson, Orleans, and Plaquemines Parish area. Construction of the proposed action would contribute to the cumulative losses of wildlife resources within the HSDRRS.

#### 3.2.7.2.2.2 Specific Wildlife Impacts due to the Proposed Action

##### *Western Earthen Levee Enlargement*

The proposed action consists of raising the existing earthen levee to 14 ft to 16 ft. The centerline would shift to the protected side as necessary to accommodate footprint expansions, and an additional 125 ft of ROW would be required. The drainage canal would be relocated 200 ft to the protected side.

The levee upgrade and canal relocation would directly impact wildlife in an around the construction area. The wildlife species would relocate during construction activities as the canal would need to be filled to accommodate the levee expansion. The canal would be temporarily lost as possible habitat, but would be replaced by a new canal which would eventually repopulate with wildlife species. Juvenile species of animals that inhabit the project area would

attempt to avoid construction activities and seek refuge in adjacent undisturbed waters, but may be directly impacted by construction activities.

#### *Northern Levee Floodwall Cap and Water Control Structure Construction*

The proposed action consists of providing fronting protection at Old Estelle Pump Station, earthen levee enlargement with a T-wall floodwall cap within existing ROW from the pump station to the Harvey Canal, and construction of a water control structure (gate) where the Old Estelle Outfall Canal meets Harvey Canal.

This section does not provide high quality wetland habitat for wildlife. Similar and higher quality habitat is available nearby for any wildlife displaced from the proposed project area.

#### *Eastern Innovative Floodwall Construction*

The proposed action consists of constructing an innovative T-wall no longer than 4,200 ft and 100 ft wide along the eastern edge of the Bayou aux Carpes CWA Section 404(c) area.

This action would result in a loss of 9.6 acres of cypress-tupelo swamp and BLH wetland habitat for wildlife.

The construction of the T-wall within the Bayou aux Carpes CWA Section 404(c) area would directly impact the wildlife. The construction of the wall would directly remove valuable habitat. Wildlife species would likely relocate into adjacent similar habitat. There would also be temporary indirect impacts to wildlife including noise and vibration that could potentially force species farther from the construction area; however, habitat adjacent to the wall would likely stabilize following construction completion. Construction would be expected to take 2 years.

Beneficial impacts to 404c area wildlife would occur due to project feature augmentations as described in section 2.3.

#### *Closure Complex Construction*

The proposed action consists of constructing gate(s) and a pump station across and on the east bank of the GIWW. The construction of this closure complex along with the required levee and road relocation would directly impact 149 acres of wetlands.

Impacts would be similar to those described for the general proposed action for wildlife.

Under normal conditions, the gate structures would be open, channel velocities would remain stable, and the pump station would not be in operation; however during a storm event, the operation of the gates and pump station on the GIWW would impact wildlife. The gate structures would only be closed during a storm event, and at that time wildlife would be impacted by the noise and vibrations of operation. The pump station would only operate during a storm event, and at that time the noise and vibrations of operation would also impact wildlife.

Adverse impacts to 404c area wildlife would be avoided by relocating the Enterprise Pipeline via directional drilling for 4,000 ft past the current ROW inside the 404c to a point west of the V-line levee. Using this method to relocate the pipeline minimizes surface impacts to wetlands habitats and fisheries and wildlife species because the pipeline would be drilled deep under the ground.

#### *Eastern Earthen Levee Construction and Bayou Road realignment*

The proposed action consists of degrading the existing levee on the eastern side of the GIWW and constructing an earthen levee farther to the protected side. Bayou Road would be realigned on the protected side of the new levee.

Existing wildlife habitat would be replaced with earthen levee fill and asphalt/concrete. This would result in a total loss of potential wildlife habitat. Wildlife species would likely relocate to adjacent similar habitat.

#### *Detention Basin Dredging and Improvements*

The proposed action consists of dredging 700,000 cy in the Algiers Canal. Detention basin improvements along the Harvey Canal and Algiers Canal would consist of building fronting protection at pump stations, capping or replacing floodwalls, constructing impact barriers, providing backflow suppression, reshaping existing levees by constructing a berm, and reinforcing existing levees.

Indirect effects from the removal of dredged material from the canal would temporarily increase turbidity and most wildlife would vacate the area to return once the plume settles and construction activities cease.

The beneficial use that could be provided by the dredged material from this project would benefit wildlife by creating additional habitat (See section 2.3 further details regarding the disposal plan and beneficial use of dredge material).

#### *3.2.7.2.3 Alternatives to the Proposed Action*

The GIWW A alternative would have more substantial direct impacts on local wildlife due to more significant effects on high quality wildlife habitat along the GIWW and especially across the Bayou aux Carpes CWA Section 404(c) area. This alternative would directly impact cypress-tupelo swamp, BLH habitat and marsh due to ROW acquisition causing 254 acres of habitat loss (5.1 acres within the EPA designated Bayou aux Carpes CWA Section 404(c) area). These impacts would be primarily along existing edge habitat, with the exception of the 5.1 acres of impacts through the Bayou aux Carpes CWA Section 404(c) area. This alternative would include the construction of a tidal exchange structure that would potentially alter and isolate 500 additional acres of the 404c wetlands. The tidal exchange structure would be designed to allow for wildlife passage, but could impede the migration of certain species. Consequently, indirect impacts from the GIWW A alternative would increase habitat fragmentation, limit the movement of wildlife, and has the potential to accelerate long-term high-quality habitat loss. Cumulative impacts would be similar to those described for the proposed action.

The implementation of the AG and PP alternatives would directly impact wetland habitat utilized by wildlife within the project area but not within the Bayou aux Carpes CWA Section 404(c) area. It is likely that local wildlife would disperse from the area during the construction phase of the project; however, it is highly likely that recolonization of the project area would occur post construction, or that adjacent habitat would be sufficient to absorb and support any wildlife that is permanently displaced due to habitat alternations. The AG alternative would impact approximately 287 acres of habitat. Approximately 200 acres of habitat would be impacted by the PP alternative. Overall diversity and abundance of species within the project area would not be expected to be negatively impacted due to the potential habitat loss associated with either the AG or PP alternative.

As with the proposed action and GIWW A alternatives, the utilization of floodwall, as opposed to levee, for both the AG and PP alternatives would act as a dispersal or migration barrier for selected species.

The AG and PP alternatives would be expected to contribute indirect and cumulative impacts similar, but greater, than that described for the proposed action.

### 3.2.8 Air Quality

#### 3.2.8.1 Existing Conditions

Based on the Clean Air Act of 1963, National Ambient Air Quality Standards (NAAQS) have been established for seven pollutants: carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), lead (Pb), ozone (O<sub>3</sub>), and two sizes of particulate matter (PM 10 – diameter 10 microns and less, and PM 2.5 - diameter 2.5 microns and less. If the required standards are not met, states are required to prepare a State Implementation Plan (SIP) to attain ambient NAAQS for all airsheds not in “attainment.” Jefferson, Orleans, and Plaquemines Parishes have been classified as attainment for all of the NAAQS (U.S. Environmental Protection Agency 2006) (table 10).

Air quality throughout the project area is good, due to the rural nature of most of the area. Along the GIWW there are no industrial firms and no emissions contributors. The east side of the Algiers Canal is either all open spaces or is in limited residential uses, with a few scattered industrial and commercial uses south of the General Charles De Gaulle Bridge. Few emissions sources are in evidence, other than the nearby Naval Air Station at Belle Chasse. On the southwest side from the Algiers Lock and LA 23, most of the land is in open spaces, with residential nodes around the approach to the General Charles De Gaulle Bridge; no industry or emission sources are located in this section. South of LA 23 between the Algiers Canal and Engineer Drive is a large complex of industrial and commercial enterprises, mostly oriented toward marine enterprises. While small emission sources are in evidence, none constitute a major air emissions source. Both LA 23 and the General Charles De Gaulle Bridge are linear highway facilities that cross the Algiers Canal and carry substantial vehicular traffic, with resultant emissions.

The east side of the Harvey Canal up to Lapalco Boulevard is heavily industrialized. While small emission sources are in evidence, none constitute a major air emissions source. The west side of the Harvey Canal is devoted entirely to open space uses. Lapalco Boulevard is a major highway that crosses the Harvey Canal, adding to vehicular emissions to ambient air quality.

The proposed construction of levees and floodwalls, by their nature, would have no long term effects. Construction impacts would be of short duration. There is a data gap concerning emissions associated with the transportation of construction material that will be addressed in the transportation section of the upcoming CED.

**Table 10. Ambient Air Pollution Levels in Jefferson Parish**

Pollutant	Concentration	Standard Limit
Lead	0.13 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>
Nitrogen Dioxide	0.009 ppm	0.053 ppm
Ozone (1-hour)	0.100 ppm	0.12 ppm
Ozone (8-hour)	0.08 ppm	0.08 ppm

*Similar levels are found in Orleans and Plaquemines Parishes.*

*Source: [http://www.city-data.com/county/Jefferson\\_Parish-LA.html](http://www.city-data.com/county/Jefferson_Parish-LA.html).*

#### 3.2.8.2 Discussion of Impacts

##### 3.2.8.2.1 No Action

With the no action alternative, the 100-year level of risk reduction would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10 ft elevation, and providing higher access gates and modified pumping stations. These construction actions would

lead to temporary, direct air quality impacts. Long term, there would be no indirect or cumulative impacts from these temporary impacts.

#### 3.2.8.2.2 Proposed Action

Temporary increases in air pollution would occur from the use of construction equipment and vehicles including: haul trucks, bull dozers, cranes, pile divers, excavators, and the possible use of clamshells and tug boats. Construction of levees, flood walls, and gates could temporarily be a source of fugitive dust including 10 and 2.5 micron particulate matter (PM). Local weather patterns and mandatory dust controls implemented during construction would determine the extent of this temporary condition. Construction equipment and vehicles could generate NO<sub>2</sub>, CO, O<sub>3</sub>, and SO<sub>2</sub> from combustion in diesel engines. Long term, no change would be expected to air quality. Regional air quality standards would not be violated. The proposed project would be in conformance with NAAQS.

No permanent direct impacts are expected; therefore, foreseeable indirect impacts would not be likely to occur. Temporary, direct air quality impacts are expected. Portions of the study area south of the LA 24 Bridge on the west bank of the Algiers Canal and the east bank of the Harvey Canal up to Lapalco Boulevard are heavily industrialized, as is the eastern bank of the Harvey Canal. Cranes, trucks, and other diesel equipment are constantly in use in much of the area. The addition of minor amounts of air pollutants from the temporary construction that would be anticipated from the proposed action would not likely measurably degrade ambient air quality.

During the construction of the proposed project, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the appropriate design standards. Dust suppression methods would be implemented to minimize fugitive dust emissions. Air emissions from the proposed action would be temporary and would not significantly impair air quality in the region.

No permanent direct or indirect impacts would occur.

Cumulative temporary impacts due to the ongoing construction of WBV HSDRRS projects would occur, due to the activities described as having a direct effect on air quality. The principal air quality concern associated with the proposed action would be construction related emissions of priority pollutants and of fugitive dust near construction areas. These impacts would be temporary in nature, and would be expected to occur concurrently or near the same time as other projects for the HSDRRS.

#### 3.2.8.2.2 Alternatives to the Proposed Action

With the implementation of any of the available alternatives, the impacts to air quality would be approximately the same, but greater, as for the proposed action. Of the alternatives to the proposed action, the PP alternative has the longest construction duration, and would have greater impacts than the AG and GIWW A alternatives. Temporary impacts would occur in generally the same amount as identified for the proposed action, but no long-term impacts to air quality would occur. No foreseeable indirect impacts would occur for any alternative.

No permanent direct or indirect impacts are expected.

Cumulatively, the alternatives to the proposed action would contribute to temporary air quality impacts within the HSDRRS.

### 3.2.9 Noise

#### 3.2.9.1 Existing Conditions

Noise can be identified as unwanted sound. Noise in the study area is sourced from various forms of traffic on LA 23, General De Gaulle Drive, Lapalco Boulevard, Engineers Road, Peters Road, and other local roads. Heavy equipment and manufacturing operations at the many industrial sites in the study area contribute to noise levels. Periodic high noise levels are generated and impact a large zone around the study area by aircraft as they approach and depart the U.S. Naval Air Station at Belle Chasse. Boat traffic on the GIWW, Algiers Canal, and Harvey Canal is another source of noise.

Noises can be evaluated either objectively or subjectively. Objective noise measurements are used by the Federal Highway Administration (FHWA), among others, and usually involve a logarithmic scale with a unit of decibels. Noise is normally computed over a 24-hour period and adjusted for night time when noise can be more of an annoyance to produce a day-night sound level (DNL). Subjective noise can be judged by a person, a group or a community and consists of a noise level that becomes an “annoyance.” Subjective evaluation seems appropriate since, except during the construction period and periodic maintenance, levees and floodwalls are not sound generators. Ambient noise in the project area can be subjectively judged as moderate.

The GIWW area is primarily made up of vacant land with very low noise levels, punctuated periodically with high levels of jet noise sourced from aircraft taking off and landing at the nearby Naval Air Station at Belle Chasse. Boat traffic in the GIWW, Algiers Canal, and Harvey Canal is another intermittent source of noise, mostly low-level.

Three-quarters of the Algiers Canal is in open spaces or residential uses, generating low noise levels. However, the section on the west bank south of LA 23 to the end of the canal, bounded on the east by the canal and the west by Engineers Road, is heavily industrialized, with most oriented toward the maritime industry serving Mississippi River and Gulf of Mexico businesses. Noise of heavy machinery and metal working is common. Again, periodic high noise from the nearby Naval Air Station at Belle Chasse is also common. Traffic on LA 23 and the General Charles De Gaulle Bridge generate additional noise. Similar conditions (and industry) are found along the east side of the Harvey Canal. The west side is nearly all vacant land containing few noise generators.

#### 3.2.9.2 Discussion of Impacts

##### 3.2.9.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10-ft elevation, and providing higher access gates and modified pumping stations. Much of the area is industrial or residential. Any associated noise impacts have already been considered.

Long term, there would be no negative indirect or cumulative impacts from these temporary impacts. However, the increase in levee height would incrementally absorb or deflect existing noise, improving conditions for sensitive receptors over the life of the project.

##### 3.2.9.2.2 Proposed Action

With the proposed action, temporary noise would occur during construction, and periodically for maintenance. The noise would affect wildlife during construction causing them to avoid the area and return once the structures are completed. The areas along the GIWW containing the proposed

action (figure 4a, 5) have no sensitive residential receptors in the study area and noise is not an environmental factor of importance. Noise impacts within the less populated areas along the proposed project ROW may be less significant and limited to primarily impacting employees constructing and maintaining the project area (table 11).

No permanent direct or indirect impacts would be expected.

Cumulative impacts from the construction of WBV HSDRRS projects would occur. Noise from increased traffic, pile driving, and other construction activities would be temporary in nature.

### 3.2.9.2.3 Alternatives to the Proposed Action

With implementation of the GIWW A and AG alternative, noise would be similar to the proposed action. Temporary noise would occur during construction. However, portions of the GIWW, Harvey Canal, and Algiers Canal containing these alternatives have no sensitive receptors in the study area and noise is not an environmental factor of importance. Much of the Harvey Canal and Algiers Canal is industrial and construction noise would not significantly differ from noise generated by the commercial operations already present. Therefore, no permanent direct or indirect impacts would occur if this alternative was utilized. Cumulative impacts would be similar to those described for the proposed action.

Direct noise impacts would occur due to the implementation of the PP alternative at five sensitive receptor areas near possible Algiers Canal levee construction. Proceeding from the north on the east bank, a subdivision is located adjacent to the existing levee just south of the LA 23 Bridge, with another located south of the General Charles De Gaulle Bridge. Proceeding south from the Algiers Lock on the west bank, two residential developments are located adjacent on both sides of the General Charles De Gaulle Bridge, and another is located just north of the LA 23 Bridge. The PP alternative would involve raising levee embankments and floodwalls from the approximate 10-ft authorized level of risk reduction to approximately 16 ft. Higher access gates and modified pumping stations would also be required. These actions would lead to temporary, direct noise impacts for this construction. Table 11 is a listing of noise generating equipment typically used for construction of levees and floodwalls, using data from the FHWA.

**Table 11: FHWA noise levels at distance from the source (dBA)**

Noise Generator	50 ft*	100 ft*	200 ft*	500 ft*	1000 ft*
Dump Truck	76	70	64	56	50
Backhoe	78	72	68	58	52
Front End Loader	79	73	67	59	53
Concrete Mixer	79	73	67	59	53
Crane	81	75	69	61	55
Bull Dozer	82	76	70	62	56
Auger Drill	84	78	72	64	58
Pile Driver	91	85	79	71	65

\* Distance from receptor.

Source: FHWA 2007. The decibels (dBA) at 50 ft is measured; the others are model estimates.

The PP alternative would have the most noise impact of proposed project alternatives. Construction noise impacts could be expected to temporarily exceed 65 dBA at residential receptors in the five residential areas. However, the noise would be attenuated within the residential structures and the short duration required for construction lessens the overall impact. Restricting hours of operation could limit the impacts to normal working hours. Temporary maintenance noise would also be expected.

Long term, there would be no negative indirect or cumulative impacts from these temporary impacts. Conversely, the increase in levee height would incrementally absorb or deflect existing noise, particularly from boats using the Algiers Canal, improving conditions for sensitive receptors over the life of the project. Temporary cumulative impacts would be expected.

### 3.2.10 Water Quality

#### 3.2.10.1 Existing Conditions

The EPA Surf Your Watershed data places the project area within the East Central Louisiana Coastal Watershed, U.S. Geological Survey (USGS) Cataloging Unit 08090301 (USEPA 2008). This watershed includes project area channels such as Harvey Canal, Algiers Canal, GIWW (Barataria Bay Waterway), Estelle Pump Station Outfall Canal, and the drainage canal along the V-line levee.

Water quality within the watershed is evaluated throughout several riverine, estuarine, and wetlands/freshwater systems and is reported by the State of Louisiana for inclusion in the EPA's National Assessment Database. State water quality assessments are typically based on five types of monitoring data: biological integrity, chemical, physical, habitat, and toxicity.

The major systems within the area include listings as non-supporting designated use for recreation and fish and wildlife propagation. No specific impairments are listed for the Barataria Bay Waterway. A Total Maximum Daily Load (TMDL) would be developed for those impairments that are preventing a waterbody from achieving its designated use. TMDLs are prepared by the EPA with input and review by the State of Louisiana. For example, a TMDL to address the nearby assessment unit LA021102\_00 (Barataria Basin Coastal Bays and Gulf Waters) was finalized by in 2006. All IER # 12 project area waterbodies are in good status (table 12).

**Table 12: Water Quality Data for Project Area**

<u>Waterbody Name</u>	<u>Waterbody ID</u>	<u>Most Current Data Available</u>	<u>Location</u>	<u>Size</u>	<u>Unit</u>	<u>Status</u>	<u>State TMDL Development Status</u>
<a href="#">Barataria Basin Coastal Bays And Gulf Waters</a>	LA021102_00	2006	Barataria Basin Coastal Bays And Gulf Waters To The State Three-Mile Limit	211.0	Square Miles	Impaired	TMDL completed
<a href="#">Barataria Waterway</a>	LA020903_00	2006	Barataria Waterway (Estuarine)	1.0	Square Miles	Good	
<a href="#">Barataria, Caminada, Hackberry Bay, Bay Batiste &amp; Bay Long</a>	LA021101_00	2006	Barataria Bay (Including Caminada Bay, Hackberry Bay, Bay Batiste, And Bay Long) (Estuarine)	150.0	Square Miles	Good	
<a href="#">Bayou Barataria/Barataria Waterway</a>	LA020802_00	2006	Bayou Barataria/Barataria Waterway-Intracoastal Waterway To Bayou Rigolettes (Estuarine)	6.0	Miles	Good	
<a href="#">Intracoastal Waterway - Larose To Bayou Villars &amp; Barataria</a>	LA020801_00	2006	Intracoastal Waterway-Larose To Bayou Villars And Bayou Barataria (Estuarine)	34.0	Miles	Good	

Source: USEPA, Watershed Assessment Results

The study area includes water quality resources such as wet bottomland hardwoods, cypress-tupelo swamps, an existing canal on the protected side of the existing levee, and borrow sites on the protected side of the existing Hero Canal levee.

Area wetlands, including wet bottomland hardwoods and cypress-tupelo swamps, perform important water quality functions by removing and/or transforming nutrients, such as nitrogen and phosphorus. The mechanisms by which wetlands perform this function include the storage of nutrients within the sediment or plant material, the transformation of inorganic nutrients to their organic forms, and strategic transformation and subsequent removal of nitrogen as a gas. The ability of wetland vascular plants to remove nutrients from water and sediments during the growing season and release them later when light or temperatures will not support profuse algae growth is a general phenomenon, and important in maintaining water quality in adjoining systems.

### 3.2.10.2 Discussion of Impacts

Points for assessment of the alternatives are potential for scour, turbidity/suspended sediment impacts, changes in regional salinity values and dissolved oxygen.

#### 3.2.10.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. Generally, this would mean raising levee embankments and floodwalls to approximately a 10-ft elevation, and providing higher access gates and modified pumping stations. Much of the area is industrial or residential. Any associated water quality impacts have already been considered.

Long term, there would be no negative indirect or cumulative impacts from these temporary impacts.

#### 3.2.10.2.2 Proposed Action

While the potential for scour around the proposed floodwalls and closure complex exists, proper scour protection is included as part of the design criteria of the structures to prevent this from having a significant impact on water quality. No lasting impacts to water quality as a result of scour would be expected.

Both fill and excavation activities as described in the proposed action would be required to prepare the site for construction of the proposed structures and barriers. The construction and fill activities would result in localized, temporary turbidity impacts. During construction, these suspended sediments would be released into the surrounding waters and wetlands. Most of the earth moving activities (dredging and backfilling) would take place in the first several months of construction and would be minimal after that point. Water quality would be managed utilizing BMPs to the maximum extent practicable.

Additionally, dredged sediment would be disposed of in the designated disposal area as discussed as part of beneficial use efforts discussed in section 3.2. This would increase the potential for suspended sediments to be released into the water column.

Release of sediment into the water column as part of these activities could temporarily decrease oxygen levels in the waters immediately surrounding the construction site by inhibiting photosynthesis or promoting solar heating. Also, some particles could contain chemically reduced substances (e.g., sulfides), which have a high chemical oxygen demand (COD), while

other particles may have microorganisms attached, which could decompose organic matter and create a biological oxygen demand (BOD). Thus, a localized and temporary reduction in dissolved oxygen could occur in the immediate area of discharge. Oxygen levels would be expected to return to normal soon after construction.

Excessive turbidity can also lead to water body temperature increases. Increased suspended solids produced during construction could absorb incident solar radiation and slightly increase the temperatures of water bodies, especially near the surface. However, these effects would be temporary and would occur only during construction.

Indirect impacts to water quality could occur because of boats having to navigate through the proposed gate structures. With the gate structures present, and a more constricted navigational opening, there is a slight risk for damage to occur to vessels that pass through the gates, which could result in releases of fuels and oils into the water column. The potential for these impacts to occur are minimized, however, through design parameters that require structures to allow for “safe” passage velocities, and navigational aids such as guidewalls, fendering, dolphins, and Coast Guard signage.

The incremental effects of the proposed action would not be expected to have a significant long-term effect on the large-scale water quality conditions in the study area since the water quality would continue to be influenced by industrial and commercial uses. Concurrent construction of other 100-year HSDRRS projects could cause short-term impacts to water quality that could exceed LADEQ’s water quality standards. The cumulative construction impacts of the proposed action would be additive to similar impacts caused by other HSDRRS projects planned. This could lead to increased turbidity and possible reductions in dissolved oxygen levels in the vicinity and downstream of construction activities. These impacts would generally be localized to areas where construction would occur and are anticipated to be temporary. The implementation of BMPs and Stormwater Pollution Prevention Plans (SWPPPs) would minimize cumulative impacts from construction.

Continued industrial activities, urban wastewater discharges, and construction activities contribute to a continued decline in water quality within the study area. However, state and Federal programs are in place to regulate and improve water quality, so the net cumulative impact over time could be the improvement of water quality for the study area. The temporary impacts associated with this alternative would not be expected to detract from these projects and programs.

### 3.2.10.2.3 Alternatives to the Proposed Action

The GIWWA and AG alternatives generally follow the same alignment as the proposed action. Potential for impacts to water quality as a result of scour, salinity changes, and long term DO would be the same as those of the proposed action.

In contrast, a higher potential for impacts associated with turbidity exists under the PP than the proposed action. The PP alternative would have a longer footprint than the proposed action. Due to constructability constraints, it is anticipated that construction would take significantly longer for the PP alternative than for the proposed action. There would be an increase in the time that ground disturbing activities and potential impacts from turbidity would occur. Therefore impacts to water clarity, salinity, and DO as described under the proposed action may continue for a longer period of time when compared to the proposed action.

Indirect impacts under these alternatives would be the same as those discussed under the proposed action.

The cumulative effects of these alternatives to water quality would be similar to those described in the proposed action, with the exception that it would take significantly longer to construct the PP alternative and a greater area of disturbance would be necessary due to the length. Therefore, under these alternatives there would be a potential for a greater degree of water quality impact than under the proposed action. These temporary impacts would be minimized through the use of BMPs and SWPPPs. As discussed under the proposed action, it is anticipated that there could still be a net gain in water quality due to regulatory programs in place to improve water quality.

### **3.2.11 Aesthetic (Visual) Resources**

#### **3.2.11.1 Existing Conditions**

Visually, the project area's landscape is dominated by urban development protected by flood control measures that includes earthen levees, drainage canals, pumping stations, and navigation canal locks and dams. Also prevalent within the project area are maritime related industry and residential development occasionally broken up by undeveloped land and recreation venues. Beginning in the southern portion of the project area, the area adjacent to the GIWW is primarily undeveloped, essentially in bottomland hardwoods on the east bank and marsh land and bayous on the west bank. Bayou aux Carpes has been designated a 404c area because of its unique ecological features; see section 3.2.2 (EPA Designated Bayou aux Carpes CWA Section 404(c) Area) for additional information. Moving North East, the Algiers Canal adjacent area begins as vacant land then transitions to a residential area until reaching the LA 23 Bridge; from there, a golf course is first encountered and then mostly vacant land with intermittent industrial/commercial, residential, and public uses until reaching the Algiers Lock. Proceeding southwesterly from the Algiers Lock on the west bank, vacant land is first encountered. Then residential development located adjacent to and on both sides of the Woodland Highway Bridge. Continuing southward, a large section of vacant land is crossed until more residential development is encountered adjacent to and north of LA 23. South of LA 23 to the Harvey Canal is a dense mix of commercial and industrial enterprises, much of it oriented to the marine industry, which includes industrial buildings, manufacturing processes, equipment, and storage. Proceeding north along the east side of the Harvey Canal to LaPalco Boulevard the visual setting is comprised of dense, primarily industrial uses, with barge and tow boat repair and storage predominating. Proceeding south from LaPalco Boulevard on the west bank of the Harvey Canal to the Estelle Pumping Station, nearly all of the land is vacant and is in either bottomland hardwoods or marsh land, except for the existing levee.

#### **3.2.11.2 Discussion of Impacts**

##### **3.2.11.2.1 No Action**

With the no action alternative, the 100-year level of risk reduction would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. This would involve a combination of levee and floodwall improvements. Visual resources would either (1) change due to future land use, or (2) change as dictated by HSDRRS system maintenance.

##### **3.2.11.2.2 Proposed Action**

Visually, the vast majority of the footprint of disturbance necessary to construct the proposed action is in areas where flood protection measures, navigation-related channel improvements, and other civil works projects including roads currently exist. The area along the GIWW is remote and flood protection measures are visually inaccessible to most. The Bayou aux Carpes CWA Section 404(c) area is directly adjacent, and partially within, the proposed project area. It is possible that the Bayou aux Carpes could eventually be incorporated into the Jean Laffite National Historical Park and Preserve by Congressional action. Currently, there are no designated recreation

land uses in the immediate project area, or surveys documenting incidental visitation. Therefore, the viewshed into the project area is insignificant and the direct and indirect impacts to visual resources are minimal. Cumulatively, the visual impacts caused by flood protection measures throughout the WBV and nationwide could be considered significant. Flood prone natural landscape protected by unnatural levees and floodwalls similar to those to be generated by the proposed action may be increasingly converted to developable land. Urbanization of this land may be considered visually distressing depending on the complexity of natural or cultural elements lost.

#### 3.2.11.2.3 Alternatives to the Proposed Action

The indirect and cumulative impacts to visual resources would be similar to the proposed action. Direct impacts to visual resources would be incremental based on the amount of construction-related activity with the GIWW A alternative having the least overall effect and the AG alternative being the most obtrusive; these impacts would be temporary and the negative visual effects to the project area would cease once the flood protection measures are constructed.

### **3.2.12 Recreational Resources**

#### 3.2.12.1 Existing Conditions

There are three recreational resources in the study area that could be affected by project alternatives. These include the Bayou Barriere public golf course on the east side of the Algiers Canal, just north of the LA 23 Bridge; a small parish park under the west approaches to the bridge on the west side of the Algiers Canal; and fishing and recreational boating in the GIWW, Algiers Canal and Harvey Canal. The Bayou Barriere golf course is situated longitudinally along the existing levee system, with several holes that abut the levee. The small, parish park under the western approach of the LA 23 Bridge is intensively used. Additionally, the Bayou aux Carpes CWA Section 404(c) area may be incorporated into the Jean Laffite National Historical Park and Preserve in the future. Finally, the Audubon Nature Institute is involved in initiating the Parc des Familles project in Crown Point, which would create the metro area's second-largest public park. The proposed park is planned along the western side of the 404c area.

#### 3.2.12.2 Discussion of Impacts

##### 3.2.12.2.1 No Action

With the no action alternative, the 100-year level of risk reduction work would not occur and the HSDRRS system would be built only to the levels authorized prior to Hurricane Katrina. The existing levee system would be raised to approximately 10 ft, which would affect all of the three recreational resources in the project area. Land could be taken from holes at the Bayou Barriere public golf course; however, it would be expected that floodwalls would be constructed in this locale to minimize impacts to the golf course. Still, holes adjacent to the levee would need to be reconfigured, or possibly removed. Land would also be required for the parish park under the LA 23 Bridge; however, the essential functions of the park would remain unimpaired.

No indirect or cumulative impacts would be likely.

##### 3.2.12.2.2 Proposed Action

There are no recreation facilities along the GIWW, in the locale of the proposed action (table 13), other than the waterway itself. The only direct impact due to the proposed action would be sedimentation that escapes from the required erosion and sedimentation controls that would be developed for the construction phase of the project. Additionally, if the project feature augmentations are found to be beneficial (see section 7) recreational opportunities could also

increase. If Bayou aux Carpes CWA Section 404(c) becomes part of the National Park Service preserve in the future, the proposed floodwall would not directly hinder any recreational use of the area. No indirect impacts would be likely for the proposed action.

Implementation of the proposed action would have beneficial cumulative impacts on recreational resources throughout the greater New Orleans metropolitan area. This proposed action is part of the ongoing Federal effort to reduce the threat to property posed by flooding. The combined effects from construction of the multiple projects underway and planned for the Lake Pontchartrain and West Bank and Vicinity Hurricane Protection Systems reduce flood risk and storm damage to hundreds of recreation facilities and associated infrastructure and parks. On the other hand, construction of the HSDRRS could have adverse impacts on recreation infrastructure by impeding use of land for recreation or by removal of recreational structures such as volleyball courts, picnic tables, and shelters. Additionally, some proposed actions could also affect fisheries, which would impact recreational fishing opportunities.

*3.2.12.2.3 Alternatives to the Proposed Action*

The GIWW A alternative could directly and indirectly impact the recreational use of the Bayou aux Carpes CWA Section 404(c) area due to the construction of the tidal exchange structure. Construction of this structure that would cross through the 404c area could potentially impact bird watching, canoeing, kayaking, photography and swamp tours. In addition, this alternative could affect the potential inclusion of the Bayou aux Carpes CWA Section 404(c) area into the national park service refuge due to the floodwall segmenting the park and creating land management issues.

The only direct impact due to the AG alternative would be minor and insignificant. The PP alternative would have similar, but greater, impacts as those described for the proposed action. Implementation of the PP alternative would require levee improvements to elevation 16. Land would be taken from holes number 1 through number 5 at the Bayou Barriere public golf course. Floodwalls would be expected to be constructed in this locale to minimize impacts, but it would still be necessary to reconfigure or remove these five holes (the green for number 9 hole would be bisected, requiring relocation of the green). Floodwalls would also be required at the parish park under the LA 23 Bridge. While land would be required from the park, no functions would be lost to levee construction. The recreational aspects of the local waterways would be little affected. Table 13 identifies the direct impacts to recreational facilities that would occur based on project alternatives.

No indirect impacts would be likely for the AG or PP alternatives. Cumulative impacts would be similar to those for the proposed action.

**Table 13: Impacts to Recreation Facilities in Study Area**

<b>Alternative</b>	<b>Bayou Barriere GC</b>	<b>Parish Park</b>	<b>Bayou aux Carpes 404c area</b>
No Action	Major Impact	Minor Impact	No impact
WCC (preferred)	No Impact	No Impact	Minor impact*
GIWW A	No Impact	No Impact	Major Impact
AG	No Impact	No Impact	No impact
PP	Major Impact	Minor Impact	No impact

\* Temporary, minor impact to recreational fishing and wildlife viewing during construction activities for approximately two years.

### 3.2.13 Cultural Resources

#### 3.2.13.1 Existing Conditions

Records on file at the Louisiana Division of Archaeology and the CEMVN indicate six previously recorded archaeological sites are located within one mile of the IER # 12 project area. Site forms and archaeological reports on file at the Louisiana Division of Archaeology and the CEMVN describe these known sites. The only two sites recorded within the project corridor (16PL40 and 16PL41) are scatters mixed with modern debris and rip-rap, and are no longer regarded as sites. Another three sites are the ruins of a nineteenth to early 20th century drainage machine (16PL164) and two associated historic period scatters (16PL162 and 16PL163) to the east on the Belle Chasse Naval Air Station property. Only one site, 16PL164 is considered eligible for listing on the National Register of Historic Places (NRHP). The sixth site, 16JE73, is a small prehistoric shell midden of uncertain age well to the west of the current study area. No properties within one mile of the project area are listed on the NRHP and no significant standing structures have been recorded near the area.

Five cultural resources investigations have been previously conducted within portions of the IER # 12 project area. In the first study, conducted by Coastal Environments, Inc., researchers assessed the impact of dredging and spoil disposal along 315 miles of the GIWW. The two archaeological sites mentioned above, 16PL40 and 16PL41, were identified within the current project corridor as shell scatters (Gagliano et al. 1975). In 1991, R. Christopher Goodwin and Associates, Inc. investigated portions of the project area including a tract on the west side of Harvey Canal and a tract in the Gate Option area. No cultural resources were found in the survey. Archaeological sites 16PL40 and 16PL41 were reexamined and determined to be modern shell deposits (Hinks et al. 1991).

Earth Search, Inc. conducted an archaeological survey of a portion of the current project area located on the south bank of Bayou Baratavia near the Hero Cutoff in 1999 (Lee et al. 2000). Despite intensive auger testing, no cultural deposits were identified. Earth Search, Inc. conducted another survey along a proposed right of way extension along Peters Road in 2004 (Stanton et al. 2004). This survey crossed the IER # 12 project area at Bayou Baratavia and the GIWW. No archaeological sites or significant standing structures were recorded. Earth Search, Inc. conducted a third survey of a proposed borrow site which is partially located in the Gate Option portion of the project area. No cultural resources were identified.

The CEMVN contracted Coastal Environments Inc. to conduct reconnaissance and Phase 1 terrestrial surveys of the IER # 12 project area (Wells 2008). In this study, researchers utilized background research, previous cultural resource investigations review, soil and topographic analyses, field reconnaissance information, and Phase 1 survey data to identify and investigate high potential areas for archaeological resources and assess historic structures in the project area. Utilizing information provided in previous cultural resources investigation reports, soil and topographic analyses, and recent field reconnaissance information, researchers identified seven parcels of land in the IER # 12 project area that exhibited a high potential for archaeological resources. Phase 1 level field investigations were conducted in these high potential areas and no cultural resources were identified. One historic period residential structure was identified just on the edge of the project area at 415 Planters Canal Road. Although the original portion of the house exhibits a colonial period floor plan, the house does not appear on a 1932 USGS quadrangle map and suggests that the house was either moved to its present location, or built sometime after 1932. Structural modifications to the house, including additions and modern windows, were noted. Researchers believe the house is not eligible for listing on the NRHP.

The CEMVN held meetings with State Historic Preservation Office staff and Tribal governments to discuss the emergency alternative arrangements approved for NEPA project review and the

development of a Programmatic Agreement (PA) to tailor the Section 106 consultation process under the alternative arrangements. The CEMVN formally initiated Section 106 consultation for the West Bank and Vicinity Hurricane Protection Project (100-year), which includes IER # 12, in a letter dated 9 April 2007. This letter emphasized that standard Section 106 consultation procedures would be implemented during PA development. A public meeting was held on 18 July 2007, to discuss the working draft PA. It is anticipated that the PA will be executed in the near future.

In letters sent to the State Historic Preservation Officer (SHPO) and Indian Tribes dated 7 July 2008, the CEMVN provided project documentation, evaluated cultural resources potential in the project area, and found that the proposed actions would have no impact on cultural resources. The SHPO and the Seminole Tribe of Florida concurred with our "no historic properties affected" finding in a letter dated 1 August 2008, and an email dated 8 July 2008, respectively. No other Indian Tribes responded to our request for comments. Section 106 consultation for the proposed action is concluded. However, if any unrecorded cultural resources are determined to exist within the proposed project boundaries, then no work 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.

### 3.2.13.2 Discussion of Impacts

#### 3.2.13.2.1 No Action

Under the no action alternative, all activities associated with raising the existing levees and floodwalls up to the originally authorized grade would be conducted within the existing project right of way and would have no impact on significant cultural resources. The existing project right of way has been subjected to severe ground disturbing activities associated with levee, floodwall, and pump station construction. Recent investigations found no cultural resources in high probability areas and the likelihood for intact and undisturbed cultural resources is considered extremely minimal. No further cultural resources investigations are recommended.

#### 3.2.13.2.2 Proposed Action

Based on the review of state records, previous cultural resources studies, and the results of a recent reconnaissance and Phase 1 cultural resources investigation, implementation of the proposed action would have no direct impact on cultural resources. Only two previously recorded cultural resources are located in the boundaries of the proposed action alternative. These two sites (16PL40 and 16PL41) are surface scatters mixed with modern debris and rip-rap and are no longer regarded as sites. High probability areas in the proposed action alternative were examined with both terrestrial and bankline survey (Wells 2008). Bankline survey consisted of visual survey supplemented with judgmentally-placed probing to a depth of 1.5 meters along both banks of the distributary channels. Terrestrial survey was accomplished using parallel transects of shovel tests spaced 30 meters apart, with tests dug at 30 meter intervals. No artifacts were noted in any shovel test and no intact deposits were noted. Soil profiles consisted of fill and backswamp clays to a depth of 1.5 meters.

Implementation of the proposed action would have beneficial indirect impacts by providing an added level of flood protection to known and unknown archaeological sites in the project vicinity on the protected side of the levee by reducing the damage caused by flood events. Erosion of ground deposits during flood events can result in severe damage and destruction of archaeological sites. Four previously recorded archaeological sites are within one mile, but are located well outside of the proposed action alternative boundaries and will not be indirectly impacted. Three of these archaeological sites, 16PL162, 16PL163, and 16PL164, are situated on

the Belle Chasse Naval Air Station property to the east. The fourth archaeological site, 16JE73, is located to the west.

Implementation of the proposed action would have beneficial cumulative impacts on historic properties in the West Bank metropolitan area. This proposed action is part of the ongoing Federal effort to reduce the threat to property posed by flooding. The combined effects from construction of the multiple projects underway and planned for the West Bank Hurricane Protection System would reduce flood risk and storm damage to significant archaeological sites, individual historic properties, engineering structures and historic districts.

### 3.2.13.2.3 Alternatives to the Proposed Action

Implementation of the GIWW A, AG, and PP alternatives would have no direct impacts on cultural resources. No previously recorded cultural resources are located within the boundaries of any alternatives to the proposed action. Specific locations within the alternative areas exhibiting a high potential for archaeological deposits were investigated. No cultural resources were identified. Implementation of these alternatives would also have the same beneficial indirect and cumulative impacts as those described for the proposed action.

## **3.3 SOCIOECONOMICS**

### **3.3.1 General**

This section evaluates the relative socioeconomic impacts of construction activities associated with the proposed levee, floodwall, and other alternative improvements adjacent to the GIWW, Harvey Canal, and Algiers Canal. The project area includes portions of Jefferson, Orleans, and Plaquemines Parishes in the state of Louisiana, and is an upgrade of existing flood protection. This analysis relies on data from 2000 as well as updated estimates from various sources. Due to the changed conditions since Hurricanes Rita and Katrina there is a data gap relative to the age of the data.

### **3.3.2 Population and Housing**

#### Existing Conditions

Public Law 91-611 established by the River and Harbor and Flood Control Act of 1970 states, in part, that project planning should consider whether or not a project might cause “injurious displacement of people” among a variety of other human resources. Population trends are directly related to the demand for housing. In evaluating these resources, this report includes population and housing data evaluated of impact areas listed as IPET Polders developed after Hurricane Katrina. The project area includes the areas along the Estelle Outfall Canal, Harvey Canal, Algiers Canal, and GIWW on the west bank of the Mississippi River between the V-line levee and Hero Canal, as well as the area on the west bank of the Harvey Canal. Additionally, the Belle Chasse area is included, because this area would benefit from the decreased flood risk that the project would provide. These areas are covered by the Harvey-Westwego, Gretna-Algiers, and Belle Chasse IPET Polders. According to the August 2007 population estimate, the Gretna-Algiers polder has a population of 150,900 and the Belle Chasse polder has a population of 15,900 people, for a total project area population of 166,800. Residential development ranges from upper middle-income to subsidized low-income housing and from single-family to multi-family developments.

## Discussion of Impacts

### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 ft to 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the storm surge risk reduction system would not comply with the minimum requirements of the National Flood Insurance Program (NFIP).

There would be no displacement of population or housing under the no action alternative. However, since this alternative fails to provide the 100-year level of risk reduction as required under the NFIP, the actual and perceived risks to population under this alternative would be higher than under the proposed alternative. Floods occurring under the no action plan that would have been avoided under the proposed plan increase the potential for permanent displacement of population and housing.

### Proposed Action

Under this alternative flood control features (levees, floodwalls, and ancillary structures) would be constructed from the V-line levee in Jefferson Parish north to the Old Estelle PS, east to the Harvey Canal, south along the Bayou aux Carpes 404c area boundary, and east across the GIWW just north of Hero Canal.

This alternative would have some potential for displacement of population and housing. While construction would occur in areas that are relatively far from dense residential development and construction impacts would be minimal and temporary, there would be impacts to this area consisting of increased traffic, construction noise including pile driving noise, and increased road dust and dirt. Although little could be done to eliminate the noise associated with these activities, they would be scheduled so as to cause the least disruption possible, while still pursuing the need to have surge barrier completion by June 2011. Significant 24-hour construction activities should be expected. Water trucks would be required in an effort to reduce road dust.

Although no residential structures would be directly affected, a small portion of land, less than one half acre, on a single residential property located on East Bayou Road would likely be directly affected by the relocation of East Bayou Road. A dock and access road are situated there and could be relocated. Attempts are being made to engineer the alignment so as to avoid this impact; however, no final decisions have been made.

Prior to Hurricane Katrina, only a small number of people were living immediately within the vicinity of protection facilities. In the year 2000, there were 78 housing units within this potentially impacted area, with a total population of 129. Typically socioeconomic data for such small populated areas are collected every 10 years by the Census Bureau; and the latest information available was collected in April of 2000. No independent source of information is currently available. Although construction of the project may have limited adverse impacts to houses and population, increased flood and hurricane protection may have relatively greater positive benefits. Preliminary surveys conducted by USACE employees following Hurricane Katrina noted that structures were severely damaged, if not completely destroyed; however, some structures have since been restored as in the case of the larger metropolitan area. The

information is relevant because it provides available information conditions occurred prior to the hurricane and how conditions may occur in the future. The potentially adversely impacted area under the proposed action, extending for one 1 mile in all directions, comprises the following geography, according to the 2000 Census:

:

Jefferson Parish:

- Tract 278.09, Block Group 4, Blocks 4001, 4004
- Tract 278.12, Block Group 1, Blocks 1003, 1004, 1006, 1995

Plaquemines Parish:

- Tract 502: Block Group 2, Block 2043, 2044, 2999
- Tract 503, Block Group 3, Blocks 3001, 3002, 3034, 3996
- Tract 504, Block Group 1, Blocks 1011, 1085, 1984, 1986, 1987

As previously indicated, a much larger population and residential area would receive benefits from increased hurricane protection, none fully quantifiable. For example, the cost of restoring a house damaged by a hurricane can be measured while the personal value of contents may be irreplaceable.

### Alternatives to the Proposed Action

#### Alternative 1 – GIWWA

Socioeconomic impacts under this alternative would be similar to those under the proposed action, since the only difference between the two alternatives is the construction of a modified floodwall through the Bayou aux Carpes Section 404c area 1 mile south of the confluence of the Harvey and Algiers Canals. As such, the potentially impacted area under this alternative is the same as that for the proposed action.

This alternative would have some potential for displacement of population and housing. While construction would occur in areas that are relatively far from dense residential development, and construction impacts would be minimal, a house and a dock along East Bayou Road may be affected by this alternative. Attempts are being made to engineer the alignment so as to avoid this impact; however, no final decisions have been made. Impacts would be similar to the proposed action, including possible adverse impacts as well as improved flood protection. In the year 2000, there were 78 housing units within this potentially impacted area, with a total population of 129.

The potentially impacted area, extending for 1 mile in all directions from the proposed project area, comprises the following geography, according to the 2000 Census:

Jefferson Parish:

- Tract 278.09, Block Group 4, Blocks 4001, 4004
- Tract 278.12, Block Group 1, Blocks 1003, 1004, 1006, 1995

Plaquemines Parish:

- Tract 502: Block Group 2, Block 2043, 2044, 2999
- Tract 503, Block Group 3, Blocks 3001, 3002, 3034, 3996
- Tract 504, Block Group 1, Blocks 1011, 1085, 1984, 1986, 1987

As mentioned regarding the proposed plan, a much larger population and residential area would receive benefits from increased flood protection, none fully quantifiable.

### Alternative 2 – Algiers Gate

This alternative consists of constructing a navigable floodgate and pumping station on the Algiers Canal, just north of the confluence with the GIWW and Harvey Canal. Levees would be raised on the west bank of the Harvey Canal from Lapalco Boulevard to the Estelle Pumping Station Outfall Canal, while existing floodwalls would be utilized on the east bank in order to minimize impacts to existing development. Levees would also be raised on the east side of the GIWW from the proposed floodgate to the Hero Canal Levee.

The potentially impacted area, extending for one mile in all directions from the proposed project area, comprises the following geography, according to the 2000 Census:

Jefferson Parish:

- Tracts 278.05, 278.10, 278.11, 278.12

Plaquemines Parish:

- Tract 502, Block Group 2, Block 2034, 2035, 2038, 2039, 2041, 2044, 2045

According to the U.S. Census, in 2000 there were 6,520 housing units within this potentially impacted area, with a total population of 20,597.

This alternative would have some potential for displacement of population and housing. While construction would occur in areas that are relatively far from dense residential development, several residences along Bayou Road would be impacted by implementing this alternative.

Additionally, since this alternative exposes a greater amount of the protection system to storm surges, it is considered less reliable than the proposed action. Under this alternative there is a relatively greater amount to potential future displacement of population and housing caused by extreme future storm events.

### Alternative 3 – Parallel Protection

Under the parallel protection alternative, levees would be raised to the 100 year-level of risk reduction along both banks of the Harvey Canal from Lapalco Boulevard to the Algiers Canal. Levees and floodwalls along the Algiers Canal would be raised to between 14 ft and 16 ft.

This alternative has high potential to displace population and housing. This alternative uses only improvements to existing levees and floodwalls along the GIWW, Harvey Canal, and Algiers Canal to achieve 100-year level of risk reduction. In order to raise these levees, additional ROW would need to be acquired, and structures (homes and businesses) would have to be removed.

The potentially impacted area under this alternative, extending 1 mile in any direction of the project, encompasses a wide area. According to the 2000 U.S. Census:

Jefferson Parish:

- Tracts 250.01, 262, 278.04, 278.05, 278.07, 278.10, 278.11, 278.12.

Orleans Parish:

- Tracts 6.11, 6.12, 6.14.

Plaquemines Parish:

- Tracts 502, 503

There were 23,337 housing units, with a population of 67,905, within this potentially impacted area in the year 2000 (2000 Census).

This alternative has the potential to severely impact population and housing along the Algiers Canal frontage, which abuts residential areas. There would be potential impacts to

approximately 600 housing units and over 1,200 residents if levee improvements are used, which these impacts could be reduced if floodwalls are used instead in critical locations.

Additionally, since this alternative has the highest level of exposure to storm surges of all the alternatives, there is a consequentially a higher potential for future displacement of population due to future storm events.

### **3.3.3 Impacts to Employment, Business, and Industrial Activity**

#### Existing Conditions

The area of New Orleans within Plaquemines and Jefferson Parishes is a mixture of commercial, industrial, and general business development along with mixed residential development. The Harvey Canal and Algiers Canal are both part of the GIWW system. They provide a route for conveyance of goods and materials for local consumption and distribution. The areas immediately adjacent to the project are typified by industrial, residential, and open space usage. Large amounts of the developed property along the canal's frontage are in the industrial land-use category. The businesses located within this land use range from shipbuilding/restoration/transportation to automobile salvage and recycling centers. Approximately 9 miles of the levee system primarily along the east bank of the Harvey Canal and the west bank of the Algiers Canal lie within this land use.

Along the north side of the Algiers Canal, industrial and commercial occupy most of the land from LA 23 downstream to the GIWW. Approximately 22 firms occupy land adjacent to the canal, with docks and other marine facilities making use of the canal. Along the east side of the Harvey Canal from the Algiers Canal upstream to Lapalco Boulevard, 15 firms are located adjacent to the canal and have docks and other marine facilities making use of the canal. These businesses are on the flood side of the current HSDRRS protection.

#### Discussion of Impacts

##### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 and 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

There would be no incremental direct impacts to business and industry under the no action alternative. However, under these conditions, the actual and perceived risks to businesses in the vicinity would be directly impacted. Costs associated with business development and sustainment would likewise be impacted. The lack of enhanced flood protection could be a long term detriment to the economic vitality of the area to be protected.

Additionally, there may be moderate congestion-related impacts to businesses due to an increased presence of construction vehicles.

Under the no action alternative, businesses along the Harvey and Algiers Canals that are outside of the current HSDRRS would remain outside of protection.

## Proposed Action

The potentially impacted area under the proposed action contains little development. There would be minimal direct negative impacts to businesses. There may be congestion-related impacts because of construction vehicles using Highway 23, Walker Road, Buccaneer Road, and East Bayou Road. However, these impacts would be temporary.

High Point Shooting Range would be directly affected by this alternative. The proposed alignment would require the acquisition of approximately 34 acres located within this property. While most of this is buffer zone between the actual range and East Bayou Road, it is possible that some observation towers as well as target launching structures would have to be relocated.

In addition to the direct impacts to the range, there would be other impacts to this area consisting of increased traffic, construction noise including pile driving noise, and increased road dust and dirt. Although little could be done to eliminate the noise associated with these activities, they would be scheduled so as to cause the least disruption possible, while still pursuing the need to have surge barrier completion by June 2011. Significant 24-hour construction activities would be expected.

This alternative would provide protection to businesses along the east bank of the Harvey Canal that would be left out of protection under the no action, Algiers gate, and parallel protection alternatives.

## Alternatives to the Proposed Action

### Alternative 1 – GIWWA

Socioeconomic impacts under this alternative would be similar to those under the proposed action, since the only difference between the two alternatives is the construction of a floodwall through the Bayou aux Carpes CWA Section 404(c) area. As such, the potentially impacted area under this alternative is the same as that for the proposed action. Since the potentially impacted area contains little development, there would be no direct negative impacts to businesses in the area. There may be congestion-related impacts as a result of construction vehicles using Highway 23, Walker Road, Buccaneer Road, and East Bayou Road. However, these impacts would be temporary.

This alternative would provide protection to businesses along the east bank of the Harvey Canal that would be left out of protection under the no action, Algiers gate, and parallel protection alternatives.

There may be impacts to the High Point gun range under this alternative. While buildings on the property would not be affected, access may be impacted due to the Bayou Road relocation.

### Alternative 2 – Algiers Gate

There would be direct negative impacts to area businesses under this alternative. On the east bank of the Harvey Canal, floodwall lies along Peters Road, and this floodwall would be upgraded under this alternative. However, businesses that front the canal, or that lie between the canal and Peter's Road, would receive no flood protection under this alternative.

There would also be congestion-related impacts as a result of construction vehicles using Engineers Road, Concord Road, and Bayou Road, all on the east bank of the Harvey Canal near the confluence with the Algiers Canal and the GIWW. Additionally, there would potentially be added congestion on Peters Road and Lapalco Blvd. Highway 23, Walker Road, Buccaneer

Road, and East Bayou Road would also be affected by added congestion. This congestion would have the potential to indirectly affect businesses in the area, but is temporary in nature.

There may be impacts to the High Point gun range under this alternative. While buildings on the property would not be affected, access would be impacted due to the Bayou Road relocation.

### Alternative 3 – Parallel Protection

There would also be direct negative impacts to area businesses under this alternative. On the east bank of the Harvey Canal, floodwall lies along Peters Road, and this floodwall would be upgraded under this alternative. However, businesses that lie along the east bank of the canal, or that lie between the canal and Peter's Road, would receive no flood protection under this alternative.

There would also be congestion-related impacts as a result of construction vehicles using Engineers Road, Concord Road, and Bayou Road, all on the east bank of the Harvey Canal near the confluence with the Algiers Canal and the GIWW. Additionally, there would potentially be added congestion on Peters Road and Lapalco Blvd. This congestion would have the potential to indirectly affect businesses in the area, but it would be temporary in nature.

Since this alternative also includes upgrading flood protection on both banks of the Algiers Canal, additional impacts to businesses due to this construction could potentially occur. If additional ROW needed to be procured to increase flood protection, this would have direct impact on businesses that front the canal, especially on the west bank. These impacts can be reduced if floodwalls are used instead of levees. The same impacts would apply to businesses that front the east side of the Algiers Canal.

In addition to these direct impacts, there may also be temporary, congestion-related impacts to nearby businesses as a result of construction vehicles using Highway 23 and Engineers Road on the west bank of the Algiers Canal, in addition to Highway 23 and Barriere Road on the east bank.

## **3.3.4 Availability of Public Facilities & Services**

### Existing Conditions

There is a wide range of public facilities within the project area. As reported by the 2000 U.S. Census, within the Belle Chasse and Gretna-Algiers polders, there are 6 police stations, 11 fire stations, 62 school buildings, and 3 hospitals. There are 44 buildings that function as nursing and assisted living facilities. Additionally, there are 11 utilities facilities, 6 electrical facilities, 1 natural gas distribution facility, 12 telecommunications facilities, and 12 water transportation facilities.

### Discussion of Impacts

#### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 ft and 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the

storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

There would be no direct impacts to the availability of public facilities and services under the no action alternative. However, under these conditions, the actual and perceived risks to public facilities in the vicinity would be directly impacted, and the costs of providing these services would likewise be impacted. The lack of enhanced flood protection could be a long term detriment to the economic vitality of the area to be protected.

#### Proposed Action

The proposed action would have no direct effect on the availability of public facilities and services. Increased protection from flooding would preserve and enhance the availability of public services in the area.

#### Alternatives to the Proposed Action

##### Alternative 1 – GIWWA

This alternative would have no direct effect on the availability of public facilities and services. Increased protection from flooding would preserve and enhance the availability of public services in the area.

##### Alternative 2 – Algiers Gate

This alternative would have no direct effect on the availability of public facilities and services. Increased protection from flooding would preserve and enhance the availability of public services in the area.

##### Alternative 3 – Parallel Protection

This alternative would have no direct effect on the availability of public facilities and services. Increased protection from flooding would preserve and enhance the availability of public services in the area. No known police stations, schools, fire stations, hospitals, or nursing care facilities would be displaced or directly affected by the change in ROW under this alternative.

### **3.3.5 Effects on Transportation**

#### Existing Conditions

The primary transportation network in the project area consists of the following roadways: LA 406, utilizing the bridge over the Algiers Canal at the end of General de Gaulle Drive (Intracoastal Waterway Bridge); LA 23 utilizing the Belle Chasse Bridge and Tunnel over the Algiers Canal, Lapalco Boulevard and the Lapalco Bridge over the Harvey Canal. Local roads include Engineers Road and Barriere Road parallel to and adjacent to the Algiers Canal; and Peters Road and Destrehan Avenue parallel to the Harvey Canal.

#### Discussion of Impacts

##### No Action

Under the no action alternative, levees and floodwalls along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to

levels previously authorized. This would be between 4.5 ft to 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

Under the no action alternative, there would be congestion related impacts to transportation due to an increased presence of construction vehicles in the vicinity. Potentially affected roadways include Engineers Road, Concord Road, and Bayou Road, all on the east bank of the Harvey Canal near the confluence with the Algiers Canal and the GIWW. Additionally, there may potentially be increased congestion on Peters Road and Lapalco Boulevard Highway 23, Walker Road, Buccaneer Road, and East Bayou Road; as well as on General DeGaulle Drive, Highway 406, Barriere Road, and Destrehan Avenue. However, all congestion-related impacts would be temporary in nature.

Additionally, borrow material would have to be transported to construction sites. Constructing the no action alternative would require an estimated 1,250,000 cubic yards of borrow material, or approximately 62,500 truckloads (based on 20 cubic yards per truck). The increased congestion, in addition to wear and tear on local roadways as a result of transporting borrow material, would be less under the no action alternative than under the proposed action, GIWW A, Algiers gate, and parallel protection alternatives. However, the impacts described previously would be expected to be moderate to severe due to the sheer amount of borrow material that must be transported to construct this alignment.

Due to the increased flood risk under this alternative, the risk of flood damage to transportation resources under this alternative would also increased.

To the extent that work crews would operate from barges in the Harvey and Algiers Canals, congestion to commercial barge transportation may occur. Any delays would be temporary and no complete closures would be expected.

### Proposed Action

Under the proposed alternative, congestion-related impacts to transportation due to an increased presence of construction vehicles in the vicinity have the potential to be moderate. Potentially affected roadways include Highway 23, Walker Road, Buccaneer Road, and East Bayou Road. Highway 23 is a well-traveled road, and congestion as a result of the project would add to already substantial amounts of traffic during regular commuting hours. However, the other roads are much less crowded. There is a possibility that congestion from construction vehicles may delay vehicles trying to access the U.S Naval Air Station Reserve Base in Belle Chasse, since both the construction site and the base are accessed from Highway 23. However, all congestion-related impacts would be temporary in nature.

Additionally, borrow material would have to be transported to construction sites. Constructing the proposed action would require an estimated 3,100,000 cubic yards of borrow material, or approximately 155,000 truckloads (based on 20 cubic yards per truck). This volume of material is 1,850,000 cubic yards, or 92,500 truckloads, more than under the no action alternative. Because of the relatively remote location of the construction site compared to the no action alternative and the parallel protection alternative, traffic congestion would generally be limited to through-streets.

The increased congestion, in addition to wear and tear on local roadways, as a result of transporting borrow material would be less under the proposed action alternative than under the Algiers gate and parallel protection alternatives. However, the impacts described previously

would be expected to be moderate to severe due to the sheer amount of borrow material that must be transported to construct this alignment.

This alternative would require relocating Bayou Road in order to create a bypass channel on the east bank of the GIWW.

To the extent that work crews would operate from barges in the GIWW, congestion to commercial barge transportation may occur. A bypass waterway would be constructed in order to minimize these impacts.

Realizing the importance of unobstructed waterways to commercial navigation, it is the intent to limit delays to marine traffic attributable to the West Closure Complex both during the construction phase and after the structure is complete and operational.

During Construction: Option 1 and Option 2 have different impacts to navigation interests transiting the area.

Option 1: The main navigation gates would be constructed in segments within the existing channel of the GIWW. Under this method, there would be a period of between 9 months and 18 months when barge traffic would be passing through the secondary navigation structure, 75 ft to 150 ft wide. This would be necessary to facilitate the completion of the main navigation structure in the existing channel.

Option 2: Under option 2, the main navigation structure would be constructed in the dry east of the existing navigation channel. Upon completion of the main navigation structure and excavation of the bypass channel, navigation would be routed through the main navigation structure and the existing navigation channel would be closed for completion of the secondary structure and pumping station.

After construction: The normal operating status of the gates would be in the open position with infrequent closure of the gates for tropical events.

Lastly, under this alternative, approximately 700,000 cubic yards of material would be dredged from the Algiers Canal and removed by barge. This may lead to congestion on the canal, but these impacts would be temporary.

## Alternatives to the Proposed Action

### Alternative 1 – GIWW A

As with the proposed action, there may be temporary, congestion-related impacts to transportation due to an increased presence of construction vehicles in the vicinity. Because the GIWW A alternative is the same as the proposed action, except for the presence of a floodwall instead of levees, the potential impacts to transportation are approximately the same as those under the proposed action.

The congestion-related impacts to transportation due to an increased presence of construction vehicles in the vicinity have the potential to be moderate.

The potentially affected roadways include Highway 23, Walker Road, Buccaneer Road, and East Bayou Road. Highway 23 is a well-traveled road, and congestion because of the project would add to already substantial amounts of traffic during regular commuting hours. However, the

other roads are much less crowded. There is a possibility that congestion from construction vehicles may delay vehicles trying to access the U.S Naval Air Station Reserve Base in Belle Chasse, since both the construction site and the base are accessed from Highway 23. However, all congestion-related impacts would be temporary.

Additionally, borrow material would have to be transported to construction sites. Constructing this alternative would require an estimated 2,900,000 cubic yards of borrow material, or approximately 145,000 truckloads (based on 20 cubic yards per truck). The increased congestion, in addition to wear and tear on local roadways, as a result of transporting borrow material would be less under this alternative than under any other alternative. However, the impacts described previously would be expected to be moderate to severe due to the sheer amount of borrow material that must be transported to construct this alignment.

Because of the relatively remote location of the construction site compared to the no action alternative and the parallel protection alternative, traffic congestion would generally be limited to through-streets.

This alternative would require relocating Bayou Road in order to create a bypass channel on the east bank of the GIWW.

To the extent that work crews would operate from barges in the GIWW, congestion to commercial barge transportation may occur. A bypass waterway would be constructed in order to minimize these impacts.

Realizing the importance of the waterway to commercial navigation, it is the intent to limit adverse effects of the West Closure Complex to the practical minimal amount both during the construction phase and after the structure is complete and operational.

During Construction: Option 1 and option 2 have different impacts to navigation interests transiting the area.

- Option 1: The main navigation gates would be constructed in segments within the existing channel of the GIWW. Under this method, there would be a period of between 9 months and 18 months when barge traffic would be passing thru the secondary navigation structure, 75 ft to 150 ft wide. This would be necessary to facilitate the completion of the main navigation structure in the existing channel.
- Option 2: Under option 2 the main navigation structure would be constructed in the dry east of the existing navigation channel. Upon completion of the main navigation structure and excavation of the bypass channel, navigation would be routed thru the main navigation structure and the existing navigation channel closed for completion of the secondary structure and pumping station.

After construction: The normal operating status of the gates would be in the open position with infrequent closure of the gates for tropical storm events.

Lastly, under this alternative, approximately 700,000 cubic yards of material would be dredged from the Algiers Canal and removed by barge. This may lead to congestion on the canal, but these impacts would be temporary in nature.

### Alternative 2 – Algiers Gate

There may be temporary, congestion-related impacts to transportation due to an increased presence of construction vehicles in the vicinity. The congestion-related impacts have the potential to be moderate. The potentially affected roadways include Engineers Road, Concord Road, and Bayou Road, all on the east bank of the Harvey Canal near the confluence with the Algiers Canal and the GIWW. Additionally, there may potentially be added congestion on Peters Road and Lapalco Boulevard. Highway 23, Walker Road, Buccaneer Road and East Bayou Road may also be affected by added congestion. However, all congestion-related impacts would be temporary in nature.

Additionally, borrow material would have to be transported to construction sites. Because of the relatively remote location of the construction site compared to the no action alternative and the parallel protection alternative, traffic congestion would generally be limited to through-streets. Constructing this alternative would require an estimated 4,500,000 cubic yards of borrow material, or approximately 225,000 truckloads (based on 20 cubic yards per truck). The increased congestion, in addition to wear and tear on local roadways, as a result of transporting borrow material would be less under this alternative than under parallel protection, but more than under the no action, proposed action, or the GIWWA alternative. However, the impacts described above are expected to be moderate to severe due to the sheer amount of borrow material that must be transported to construct this alignment.

Additionally, increased traffic from transporting borrow on local roads would increase wear and tear on the roadways.

This alternative would require relocating Bayou Road.

To the extent that work crews would operate from barges in the Harvey and Algiers Canal and the GIWW, congestion to commercial barge transportation may occur. Any delays would be temporary and no closures would be expected.

Lastly, under this alternative, approximately 700,000 cubic yards of material would be dredged from the Algiers Canal and removed by barge. This may lead to congestion on the canal, but these impacts would be temporary.

### Alternative 3 – Parallel Protection

Under this alternative, there would be temporary direct impacts to transportation resources. In order to raise existing levees, it may be necessary to modify supporting piers for two vehicle bridges and one railroad bridge that cross the Algiers Canal.

Additionally, there may be permanent impacts to the Belle Chasse Tunnel under this alternative. The tunnel structure is probably inadequate to support higher embankment of water load for a 100-year level of risk reduction. As a result, there are two options for the tunnel under this alternative.

- Flood closure gates across the highway at either end of the tunnel. This would result in flooding the tunnel during periods of high water, which may be necessary to prevent structural damage from high water.
- Abandon use of the tunnel and reroute the highway to a new high-level bridge. This plan would also require relocating the roadway and the addition of ramps to the bridge, and might also require backfilling the tunnel for structural security.

No other permanent direct impacts to transportation resources would be expected under this alternative. There may be temporary, congestion-related impacts to transportation due to an increased presence of construction vehicles in the vicinity. The congestion-related impacts have the potential to be moderate. The potentially affected roadways include Engineers Road, Concord Road, and Bayou Road, all on the east bank of the Harvey Canal near the confluence with the Algiers Canal and the GIWW. Additionally, there may potentially be increased congestion on Peters Road and Lapalco Boulevard. Highway 23, Walker Road, Buccaneer Road, and East Bayou Road; as well as on General DeGaulle Drive, Highway 406, Barriere Road, and Destrehan Avenue. However, all congestion-related impacts would be temporary.

Additionally, borrow material would have to be transported to construction sites. Constructing this alternative would require the most borrow material of all the alternatives, an estimated 9,500,000 cubic yards, or approximately 475,000 truckloads. In addition to increasing congestion, transporting such a large quantity of borrow material would create severe wear and tear on the roadways.

To the extent that work crews would operate from barges in the Harvey and Algiers Canal and the GIWW, congestion to commercial barge transportation may occur. Any delays would be temporary and no closures would be expected.

Additionally, modifications would need to be made to the Algiers Lock under this alternative, and the Harvey floodgate would need to be closed while it is rebuilt to 100-year elevation. Both would cause congestion on the canals during the construction period.

**Table 14. Estimated Loads of Borrow Material**

<b>Alternative</b>	<b>Borrow Needed (cy)</b>	<b>Truckloads (20 cy/truck)</b>
No Action	1,250,000	62,500
WCC (Proposed Action)	3,100,000	155,000
GIWWA	2,900,000	145,000
AG	4,500,000	225,000
PP	9,500,000	475,000

### **3.3.6 Disruption of Community and Regional Growth**

#### Existing Conditions

Community growth is considered a growth that provides a net increase in benefits to a local or regional economy, social conditions, and the human environment, including water resource development. Similar to other references to social and economic conditions, community and regional growth has been heavily dependent on reliable flood protection. The proposed project is planned with the result being improved flood and hurricane risk reduction.

#### Discussion of Impacts

##### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 ft to 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity project to the 100-year level of risk reduction, and without it the

storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

There would be no direct impacts to community and regional growth under the no action alternative. However, under these conditions, the actual and perceived risks to businesses and residences in the vicinity would be directly impacted, reducing the potential for community and regional growth. Costs associated with business and residential development and sustainment would likewise be impacted. The lack of enhanced flood protection could be a long term detriment to the economic vitality of the area to be protected.

### Proposed Action

The proposed project would advance the growth of communities within the HSDRRS by reducing their flood risk. Without strong storm and flood protection, a community's growth will necessarily be limited. The limitation in growth is primarily caused by the inability to certify the levee system such that the protected area could comply with the requirements of the NFIP, and consequently would face higher flood risk and insurance premiums. Although improving improvements to flood and hurricane protection would not fully eliminate the threat of storm damages in the future, by advancing the hurricane and storm damage risk reduction system, confidence and investment in the greater New Orleans community would increase. Since this alternative would provide the most reliable flood risk reduction, it would most likely have the greatest effect in increasing community growth although in some cases may require additional right-of-way.

Additionally, construction activities would most likely advance community growth by increasing activity and traffic around the proposed project areas. This increased activity would likely benefit businesses in the area.

### Alternatives to the Proposed Action

#### *Alternative 1 – GIWWA*

Under this alternative, community growth would be advanced by improving the hurricane and storm damage risk reduction system protecting the community. Without strong storm and flood protection, a community's growth would necessarily be limited. By advancing the hurricane and storm damage risk reduction system, confidence and investment in the greater New Orleans community would increase. Since this alternative, like the proposed action, would provide the most reliable flood risk reduction, it would also most likely have the greatest effect in increasing community growth.

Additionally, construction activities would most likely advance community growth by increasing activity and traffic around the proposed project areas. This increased activity would likely benefit businesses in the area through the improved flood protection.

#### *Alternative 2 – Algiers Gate*

Under this alternative, community growth would be advanced by improving the hurricane and storm damage risk reduction system protecting the community. Without strong storm and flood protection, a community's growth will necessarily be limited. By advancing the hurricane and storm damage risk reduction system, confidence and investment in the greater New Orleans community would increase. Since this alternative provides less reliable flood risk reduction than the proposed action, it would likely not have as great an effect on community growth.

Additionally, construction activities would most likely advance community growth by increasing activity and traffic around the proposed project areas. This increased activity would likely benefit businesses in the area.

### Alternative 3 – Parallel Protection

Under this alternative, community growth would be advanced by improving the hurricane and storm damage risk reduction system protecting the community. Without strong storm and flood protection, a community's growth would necessarily be limited. By advancing the hurricane and storm damage risk reduction system, confidence and investment in the greater New Orleans community would increase. Since this alternative provides the least reliable level of flood risk reduction, its potential effect in increasing community growth would be far less likely.

Additionally, construction activities would most likely advance community growth by increasing activity and traffic around the proposed project areas. This increased activity would likely benefit businesses in the area.

### **3.3.7 Impacts to Tax Revenues and Property Values**

#### Existing Conditions

The project area includes the areas along the west bank of the Mississippi River between the Harvey Canal and the Algiers Canal. It also includes the area on the west bank of the Harvey Canal. Additionally, the Belle Chasse area is also included, as this area would benefit from the decreased flood risk that the project would provide. These areas are covered by the Gretna-Algiers and Belle Chasse IPET Polders. According to the 2000 U.S. Census map, the project area includes the following:

#### Jefferson Parish:

- Tracts 250.01, 250.02, 250.03, 251.02, 251.03, 251.04, 252.01, 252.02, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 278.03, 278.04, 278.05.

#### Orleans Parish:

- Tracts 1, 2, 3, 4, 6.01, 6.02, 6.03, 6.04, 6.05, 6.08, 6.11, 6.12, 6.14.

#### Plaquemines Parish:

- Tracts 502, 503.

Residential development in the project area ranges from upper middle-income to subsidized low-income housing; and from single-family to multi-family developments. Median values for specified owner-occupied housing units in the project area range from \$37,200 to \$434,300 (2000 U.S. Census).

#### Discussion of Impacts

##### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 ft to 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

There would be no direct impacts to tax revenues under the no action alternative. Under these conditions, the actual and perceived risks to businesses and residences in the vicinity would be directly impacted. Costs associated with business and residential development and sustainment would likewise be impacted. As a result, tax revenues may be affected by a relative decrease in development. The lack of enhanced flood protection could be a long term detriment to the economic vitality of the area to be protected.

#### Proposed Action

The proposed action would likely increase property values in the project area. Increased confidence in the HSDRRS providing storm surge protection to the area would have a positive effect on property values in the vicinity. As a result of the higher property values, tax revenues would increase as well.

#### Alternatives to the Proposed Action

##### Alternative 1 – GIWWA

This alternative would likely increase property values in the project area. Increased confidence in the HSDRRS providing storm surge protection to the area would have a positive effect on property values in the vicinity. As a result of the higher property values, tax revenues would increase as well.

##### Alternative 2 – Algiers Gate

This alternative would likely increase property values in the project area. Increased confidence in the HSDRRS providing storm surge protection to the area would have a positive effect on property values in the vicinity. As a result of the higher property values, tax revenues would increase as well. However, since this alternative provides less reliable flood protection than the proposed action, the positive impact on property values and tax revenue may be less pronounced under this alternative than under the proposed action.

##### Alternative 3 – Parallel Protection

This alternative would likely increase property values in the project area. Increased confidence in the HSDRRS providing storm surge protection to the area would have a positive effect on property values in the vicinity. As a result of the higher property values, tax revenues would increase as well. However, since this alternative provides less reliable flood protection than the proposed action, the positive impact on property values and tax revenue may be less pronounced under this alternative than under the proposed action.

Additionally, since this alternative would require the removal of up to 600 residential units, it may result in decreased tax revenue. However, the overall effect in the project area should be an increase in total tax revenue.

### **3.3.8 Changes in Community Cohesion**

#### Existing Conditions

Community cohesion refers to the common vision and sense of belonging within a community that is created and sustained by the extensive development of individual relationships that are social, economic, cultural, and historical in nature. The degree to which these relationships are facilitated and made effective is contingent upon the spatial configuration of the community itself: the functionality of the community owes much to the physical landscape within which it is

set. The viability of community cohesion is compromised to the extent to which these physical features are exposed to interference from outside sources.

### Discussion of Impacts

#### No Action

Under the no action alternative, flood protection along the Algiers Canal, Harvey Canal, and the GIWW would not be raised to the 100-year level of risk reduction. Rather, the existing levees and floodwalls along the GIWW, Algiers Canal, and Harvey Canal would be raised to levels previously authorized. This would be between 4.5 ft to 6.5 ft lower than the 100-year level of risk reduction mandated for the project area. However, this project is integral to the upgrade of the West Bank and Vicinity Project to the 100-year level of risk reduction, and without it the storm surge risk reduction system would not comply with the minimum requirements of the NFIP.

There would be no direct impacts to community cohesion under the no action alternative. However, under these conditions, the actual and perceived risks to businesses and residences in the vicinity would be directly impacted. Costs associated with business and residential development and sustainment would likewise be impacted. The lack of enhanced flood protection could be a long term detriment to the economic vitality of the area to be protected.

Additionally, an increased risk of flooding due to a lower level of risk reduction may have detrimental effects on community cohesion in the area.

#### Proposed Action

The proposed project is intended for the purpose of advancing the HSDRRS to the 100-year level of risk reduction. Storm surge protection measures are designed to protect the community from the catastrophic effects of flooding, preserving the physical integrity of the developed landscape that promotes patterns of social interchange. The proposed action would increase the level of community cohesion because the entire project area is within the HSDRRS and as a result would benefit from its advancement. Additionally, no feature of the construction plan would have a direct, long-term, adverse impact on community cohesion.

#### Alternatives to the Proposed Action

##### *Alternative 1 – GIWW A*

Since this alternative is almost identical to the proposed action, its effects on community cohesion are likewise similar: the project is intended for the purpose of advancing the HSDRRS to the 100-year level of risk reduction. Storm surge protection measures are designed to protect the community from the catastrophic effects of flooding, preserving the physical integrity of the developed landscape that promotes patterns of social interchange. The proposed action would increase the level of community cohesion since the entire project area is within the HSDRRS and, as a result, would benefit from its advancement.

Additionally, no feature of the construction plan would have a direct, long-term, adverse impact on community cohesion.

##### *Alternative 2 – Algiers Gate*

Since this alternative provides less reliable storm surge reduction, its effects on community cohesion are not as assured as under the proposed action. However, any alternative that provides

storm surge protection would increase the level of community cohesion by protecting the community from the catastrophic effects of flooding, thus preserving the physical integrity of the developed landscape that promotes patterns of social interchange. Additionally, no feature of the construction plan would have a direct, long-term, adverse impact on community cohesion.

### Alternative 3 – Parallel Protection

This alternative would have negative impacts on community cohesion. The raising of levees along the Algiers Canal would require the acquisition of additional rights-of-way, and 600 residential units fronting the canal have the potential to be directly impacted. This would likely decrease the level of community cohesion in the neighborhoods in the vicinity of the construction area. However, the overall effect of the project would be an increase in community cohesion, since the project would advance the HSDRRS providing flood risk reduction to the Greater New Orleans area.

Since this alternative would provide less reliable storm surge reduction, its effects on community cohesion are not as assured as under the proposed action. However, any alternative that provides storm surge protection would increase the level of community cohesion by protecting the community from the catastrophic effects of flooding and by preserving the physical integrity of the developed landscape that promotes patterns of social interchange.

## **3.4 ENVIRONMENTAL JUSTICE**

### **3.4.1 General**

The Environmental Justice (EJ) input has been developed per requirements of the following:

- Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations," 1994)
- "Department of Defense's Strategy on Environmental Justice" (March 24, 1995).

In accordance with these directives, EJ analysis identifies and addresses, as appropriate, disproportionately high, and adverse human health or environmental effects of the IER project on minority and low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the study area using up to date economic statistics, aerial photographs, the 2000 Census, Environmental Systems Research Institute (ESRI) estimates, as well as conducting community outreach activities such as small neighborhood focus meetings.

For purposes of analyzing disproportionate impacts to minority and/or low income population, 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. Disproportionate impact is determined to occur when the percent minority and/or percent low income population in a EJ project area are greater than those in the reference community. Sources explaining this rationale in detail are listed in the References section of this document.

The sources for the data used in the analysis include the 2000 U.S. Census and estimates from Environmental Systems Research Institute, Inc. (ESRI). Despite the 2000 U.S. Census being eight 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.
- 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 metro area, and the likely shift in demographics and income, the 2000 Census data is supplemented with more current data, including 2008 estimates and 2013 projections provided by ESRI.

### **3.4.2 Existing Conditions**

For purposes of environmental justice analysis, all Census Block Groups within a one-mile radius of the IER 12 footprint, excluding Census Blocks within St. Bernard Parish, are defined as the IER 12 EJ project area. This IER 12 EJ project area is located along the Intracoastal Waterway that spans from the Mississippi River to the Harvey Canal, on the West Bank of Orleans, Jefferson and Plaquemines Parishes. It abuts several communities, including the Old Aurora, English Turn, and Tall Timbers/Brechtel neighborhoods in New Orleans, and areas of Harvey and Gretna in Jefferson Parish.

The large collection of neighborhoods abutting IER 12, taken together, are very diverse. A significant proportion of New Orleans' Asian population (most notably, the Vietnamese population) resides within the IER 12 EJ project Area. The IER 12 EJ project area contains a large number of African Americans as well. Minorities comprise a bare majority of the area's population. Our Lady of Holy Cross College, Timberlane Country Club, Stonebridge Golf Course, and the Harvey Canal are significant landmarks in the area.

The housing stock is mostly modern ranch homes and multi-family garden apartments. Many of the homes in proximity to the IER # 12 project footprint are upscale homes within gated communities.

Per the U.S. Census data, the IER 12 EJ project area was a minority, non-low income community in 2000. According to ESRI estimates, the low-income population decreased and the minority population increased slightly from 2000 to 2008 in this area. Therefore, the IER # 12 EJ project area continues to be a minority, non-low income community. A summary of this data is provided below and detailed data sets are provided at the conclusion of this section.

**Table 15. Summary Demographic Data**

	IER 12 EJ Project Area		Orleans, Plaquemines and Jefferson Parishes		Louisiana	
	Number	Percentage	Number	Percentage	Number	Percentage
Minority Population, 2000	41,031	53.0%	524,791	54.2%	1,689,422	37.8%
Estimated Minority Population, 2008	47,522	56.7%	399,738	50.1%	1,708,852	38.00%
Low Income Population, 2000	9,572	12.5%	197,186	20.9%	851,113	19.6%
*Estimated Low Income Population, 2008	2,925	10.6%	56,567	19.2%	345,777	20.50%

\*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.

Orleans, Jefferson, and Plaquemines Parishes are considered the reference communities for disproportionate impact analysis. This is reflected in the data in the summary table above as well as in the detailed data sets presented at the conclusion of this document. The 2000 census data is utilized as the primary deciding variable per data accuracy and reliability as described above. The 2008 estimates are utilized for reference purposes only. Maps depicting low income and minority Block Groups in 2000 and 2007, respectively, in the IER #12 EJ project area have been prepared and are available for review.

### 3.4.3 Analysis of Environmental Justice Impacts

#### 3.4.3.1 Environmental Justice Impact – No Action Alternative

With the no action alternative, the proposed 100-year level of risk reduction construction would not occur, although construction would occur to build the HSDRRS system to previously authorized level of risk reduction. The resulting level of risk reduction would not protect against the 100-year flood or storm surge events, thus continuing the potential occurrence of negative impacts affecting property, public safety, and local economic stability from 100-year storm surge events in the IER 12 EJ project area. Construction for previously authorized level of risk reduction are planned so that major impacts are avoided, e.g. installing floodwalls in lieu of levees in locations where space is limited. No structural improvement alignments would be shifted and no community is excluded from the HSDRRS that was not already within the previously authorized project area. No other public safety or environmental impacts would occur in the IER 12 EJ project area that has not already been evaluated for the existing, authorized projects.

The status quo for this area is the absence of 100-year level of risk reduction. The no action alternative leaves the status quo intact. Therefore, the no action alternative would not exert any impact on the IER 12 EJ project area. Thus, no direct, indirect or cumulative adverse

disproportionate impacts to minority and/or low income population would result from the no action alternative.

### **3.4.3.2 Environmental Justice Impact – Proposed Action (West Closure Complex/WCC)**

Following are the demographic and land use characteristics along the various levee reaches:

- The "western" section (south of Old Estelle Pump Station) is located on uninhabited land. No minority and/or low income community is located within 1 mile of this section. Construction in this section would require additional right-of-way on the protected side, which would mean taking of property. This taking would occur in 'unpopulated' area per Census data.
- The "northern" section (Old Estelle Pump Station eastwards to Harvey Canal) is located on uninhabited land. A minority community is located within one mile (to the North) of this section. Construction in this section would occur within existing right-of-way on the protected side, which would mean no property would be taken.
- The "eastern" section (southwards from Harvey Canal, cross GIWW, end just north of Hero Canal) runs along uninhabited land. Constructing of new levee east of GIWW is planned south of human establishments along East Bayou Road. A low income community is located within 1 mile (to the East) of this section. Construction in this section would require additional right-of-way on the protected side, which would mean taking of property. The taking would occur in a low income, non-minority area.

#### *Direct Impacts*

Direct adverse impact from the proposed action would include taking of low income property to the east of GIWW ("eastern" section) where East Bayou Road would be relocated to make space available for a new levee. Direct adverse impact from construction activities such as air quality, noise, traffic, etc. would be exerted in the "northern" and "eastern" sections on minority community and low income community, respectively, within 1 mile of project area. However, all of these direct adverse impacts would occur on a minority and/or low-income population whose percentage presence is lower in the IER # 12 EJ project area than in the reference community as shown in the summary table previously. Therefore, adverse human health and environmental impacts are not disproportionate to minority and/or low income population. Thus, the proposed action would not exert any direct adverse environmental justice impact.

#### *Indirect Impacts*

This proposed action would enhance Federal hurricane protection in an area with existing lower level protection. Indirect impacts from this action may include residential and commercial growth within the protected area. This indirect impact would not be anticipated to exert disproportionately high indirect, adverse human health and environmental impacts on minority and/or low-income communities from the proposed action.

#### *Cumulative Impacts*

The proposed action would enhance Federal hurricane protection in the project via construction of features in the general vicinity of existing hurricane protection features. Therefore, no incremental adverse impact is anticipated from the completion of this proposed action. Thus, disproportionate adverse cumulative human health and environmental impacts are not anticipated on minority and/or low income communities from the proposed action.

### 3.4.3.3 Environmental Justice Impact – Alternative 1 (Southern Closure Option/GIWW-A)

Following are the demographic and land use characteristics along the various levee reaches, including the detention basin:

- The levee on the west side of Harvey Canal is located on uninhabited land. Minority and/or low income communities are located within 1 mile of this section.
- The levee on the east side of Harvey Canal is located along a commercial/heavy industrial area. A minority community is located within 1 mile of this section.
- The levee on the north side of Algiers canal runs along commercial/heavy industrial area in its western half (west of Hwy. 23) and along residential areas in its eastern half (east of Hwy. 23). These residential areas are minority and/or low income in character.
- The levee on the south side of Algiers Canal runs through uninhabited area in its western half, along a residential area immediately west of Hwy. 23, and along a golf club and uninhabited area to the east of Hwy. 23. This residential area is not minority and/or low income in character, although low income community is located within 1 mile (to the East) of this section.
- The levee along the eastern side of GIWW is located mostly along uninhabited area. Low income community is located within 1 mile (to the East) of this section.

#### *Direct Impacts*

The specific tie-in locations of the GIWW-A alternative project elements would provide 100-year level of risk reduction to the study area without raising the parallel protection above that currently authorized along the Harvey and Algiers Canals. Therefore, construction in the above sections would not require any additional right-of-way, which would mean no property would be taken, and no direct adverse impact would occur. Direct adverse impact from construction activities such as air quality, noise, traffic, etc. would occur on minority and low income communities within one mile of project area. However, all of these direct adverse impacts would occur on a minority and/or low-income population whose percentage presence is lower in the IER # 12 EJ project area than in the reference community as shown in the summary table previously. Therefore, adverse human health and environmental impacts are not disproportionate to minority and/or low income population. Thus, construction of the GIWW-A alternative would not exert any direct adverse environmental justice impact.

#### *Indirect Impacts*

Construction of the GIWW-A alternative would enhance Federal hurricane protection in an area with existing lower level protection. Indirect impacts from this action may include residential and commercial growth within the protected area. This indirect impact would not be anticipated to exert disproportionately high indirect, adverse human health and environmental impacts on minority and/or low-income communities from construction of the GIWW-A alternative.

#### *Cumulative Impacts*

Construction of the GIWW-A alternative would enhance Federal hurricane protection in the project via construction of features in the general vicinity of existing hurricane protection features. Therefore, no incremental adverse impact is anticipated from the completion of this alternative. Thus, disproportionate adverse cumulative human health and environmental impacts are not anticipated on minority and/or low income communities from construction of the GIWW-A alternative.

#### **3.4.3.4 Environmental Justice Impact – Alternative 2 (Algiers Gate/AG)**

Following are the demographic and land use characteristics along the various levee reaches:

- The levee on the west side of the Harvey Canal is located on uninhabited land. Minority and/or low income communities are located within 1 mile of this section.
- Floodwall on the east side of Harvey Canal is located along a commercial/heavy industrial area. Minority and low income communities are located within 1 mile of this section.
- The levee along the eastern side of GIWW is located mostly along uninhabited area. Low income community is located within one mile (to the East) of this section.

##### *Direct Impacts*

Enlargement of levee to the west of Harvey Canal would require additional right-of-way and taking of property in uninhabited area. Construction of floodwall to the east of Harvey Canal would not require any taking of property. Enlargement of levee along the eastern side of the GIWW would require taking of property in low income area, which is a direct adverse impact. Direct adverse impact from construction activities such as air quality, noise, traffic, etc. would occur on minority and low income communities within one mile of project area. However, all of the above direct adverse impacts would occur on a minority and/or low-income population whose percentage presence is lower in the IER # 12 EJ project area than in the reference community as shown in the summary table previously. Therefore, adverse human health and environmental impacts are not disproportionate to minority and/or low income population. Thus, construction of the Algiers gate alternative would not exert any direct adverse environmental justice impact.

##### *Indirect Impacts*

Construction of the Algiers gate alternative would enhance Federal hurricane protection in an area with existing lower level protection. Indirect impacts from this action may include residential and commercial growth within the protected area. This indirect impact would not be anticipated to exert disproportionately high indirect, adverse human health and environmental impacts on minority and/or low-income communities from construction of the Algiers gate alternative.

##### *Cumulative Impacts*

Construction of the Algiers gate alternative would enhance Federal hurricane protection in the project via construction of features in the general vicinity of existing hurricane protection features. Therefore, no incremental adverse impact would be anticipated from the completion of this alternative. Thus, disproportionate adverse cumulative human health and environmental impacts are not anticipated on minority and/or low income communities from construction of the Algiers gate alternative.

#### **3.4.3.5 Environmental Justice Impact – Alternative 3 (Parallel Protection/PP)**

Following are the demographic and land use characteristics along the various levee reaches:

- The levees along V-Line Levee, Estelle Outfall Canal and west bank of Harvey Canal are located on uninhabited land. Minority and/or low income communities are located within 1 mile of this section.
- The levee on the east side of Harvey Canal is located along a commercial/heavy industrial area. Minority communities are located within one mile of this section.
- The levee on the north side of Algiers Canal runs along commercial/heavy industrial area in its western half (west of Hwy. 23) and along residential areas in its eastern half (east of Hwy. 23). These residential areas are minority and/or low income in character.

- The levee on the south side of Algiers Canal runs through uninhabited area in its western half, along a residential area immediately west of Hwy. 23, and along a golf club and uninhabited area to the east of Hwy. 23. This residential area is not minority and/or low income in character, although low income community is located within one mile (to the East) of this section.
- The levee along the eastern side of GIWW is located mostly along uninhabited area. Low income community is located within 1 mile (to the East) of this section.

#### *Direct Impacts*

The parallel protection alternative has high potential to displace residents. Approximately 600 housing units would be displaced by this alternative if levee improvements are used and less than 600 if floodwalls are used in critical locations. Many of these takings and relocations would create direct adverse impacts on minority and/or low income areas. Direct adverse impact from construction activities such as air quality, noise, traffic, etc. would occur on minority and low income communities within 1 mile of project area. However, all of the above direct adverse impacts would occur on a minority and/or low-income population whose percentage presence is lower in the IER # 12 EJ project area than in the reference community as shown in the summary table previously. Therefore, adverse human health and environmental impacts are not disproportionate to minority and/or low income population. Thus, construction of the Algiers gate alternative would not exert any direct adverse environmental justice impact.

#### *Indirect Impacts*

Construction of the parallel protection alternative would enhance Federal hurricane protection in an area with existing lower level protection. Indirect impacts from this action may include residential and commercial growth within the protected area. This indirect impact would not be anticipated to exert disproportionately high indirect, adverse human health and environmental impacts on minority and/or low-income communities from construction of the parallel protection alternative.

#### *Cumulative Impacts*

Construction of the parallel protection alternative would enhance Federal hurricane protection in the project via construction of features in the general vicinity of existing hurricane protection features. However, many takings and relocations would occur in minority and/or low income areas, which would exert incremental adverse impact from the completion of this alternative. However, this incremental adverse impact would occur on a minority and/or low-income population whose percentage presence is lower in the IER # 12 EJ project area than in the reference community as shown in the summary table previously. Thus, disproportionate adverse cumulative human health and environmental impacts would not be anticipated on minority and/or low income communities from construction of the parallel protection alternative.

### **3.5 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE**

Under Engineer Regulation (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), would be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

An American Society of Testing Materials (ASTM) E 1527-05 Phase I Environmental Site Assessment (ESA) was completed for the project area. Copies of the Phase I ESA reports will be maintained on file at the CEMVN and are incorporated herein by reference. The reports can also be found at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov). The Phase I ESAs documented numerous Recognized Environmental Conditions (RECs) for the study area (appendix M). Most of the RECs found in the study area are located along the Harvey and Algiers Canals in areas of commercial industry.

The Harvey Canal and Algiers Canal areas have been heavily industrialized since World War II. There is widespread low-level contamination of soil throughout the area, and it is often better not to disturb such material; it poses less risk when left in place than when it is disturbed. For this reason, the Algiers Canal sediment is being tested for contamination in the proposed areas for dredging as well as other sample sites. The dredge plan, disposal plan, and testing results for Algiers Canal can be found in section 2.3 and in appendix L.

Unlike the parallel protection or Algiers gate alternatives, the proposed action avoids the most problem-prone areas, and decreases the probability of encountering HTRW during the course of construction. In contrast to the other alternatives, within the proposed action footprint the probability of encountering a REC is very low. The proposed action is in a relatively uninhabited location. The project footprint is bordered by man-made canals, natural waterways, pasture, low-density residential areas, and forested habitat.

If a REC cannot be avoided, due to construction requirements, the Coastal Protection and Restoration Authority, acting as the non-Federal sponsor for this project, may further investigate the REC to confirm the presence or absence of contaminants, and may recommend actions to avoid, sequester, or remove possible contaminants. Federal, state, or local coordination may be required. Because the CEMVN plans to avoid RECs, the probability of encountering HTRW in the project area is low. Copies of the reports are available by requesting them from the CEMVN, or accessing them at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov).

## **CHAPTER 4 CUMULATIVE IMPACTS**

NEPA requires a Federal agency to consider not only the direct and indirect impacts of a proposed action, but also the cumulative impacts of the action. A cumulative impact is defined as the “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7).” Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. These actions include on- or off-site projects conducted by government agencies, businesses, or individuals that are within the spatial and temporal boundaries of the actions that are considered in this IER

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

## 4.1 STUDY METHODS

Cumulative impact analyses require defining the area of impact, the range of activities that are “cumulative,” and a time period. Generally, the following guiding principles have been used to establish cumulative impacts for the proposed action:

- Proximity – within the same general land and hydrological area.
- Effect on resources – other actions will affect the same general resources as the proposed action.
- Timeliness – the actions will likely occur within the selected time period.
- Progression – the proposed action and other actions considered could lead to other actions (land development) that could affect the same resources.
- Reasonableness – are future actions likely to occur and reasonably foreseeable.

The HSDRRS is divided into three USACE authorized projects: the West Bank and Vicinity (WBV), the Lake Pontchartrain and Vicinity (LPV), and the New Orleans to Venice projects. Only the WBV actions are included in this cumulative impact consideration since the others are removed geographically and are hydrologically disconnected from the WBV project. A total of approximately 250,000 people in metro New Orleans live in the protected area west of the Mississippi River and seven projects are included. In addition, cumulative effects on urban development are expected in the vicinity of the seven federal actions and may include improvements to the transportation network, medical facilities, residential development and economic growth in the area. These will be evaluated where known or are reasonably foreseeable. Cumulative effects are projected for a 50-year period, from 2007 through 2057 (USACE 2007).

In addition to this proposed action, CEMVN actions that could have cumulative impact implications and are considered and addressed include the following WBV hurricane protection projects:

- The Hero Canal Project
- Harvey to Westwego Levee
- Lake Cataouatche Levee
- Western Terminal Levee
- Company Canal Floodwall
- Borrow Areas, Multiple Sites
- West Bank Vicinity Mitigation Pools

The CEMVN anticipates generating and implementing two large-scale IERs to provide for mitigation for impacts caused by the improvements to the HSDRRS for metropolitan New Orleans. These will be a compilation of the mitigation found in the individual IERs, including IER # 12.

## 4.2 PROJECTS WITH CUMULATIVE IMPACT POTENTIAL

Rebuilding efforts as a result of Hurricane Katrina are taking place 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 would be a component of the regional rebuilding effort. Although the full extent of construction in Orleans, Jefferson, and Plaquemines Parishes 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. 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 protection, hurricane protection in Jean Lafitte and lower Jefferson Parish, a study of coastal area damage that could be attributable to the USACE of Engineers, the MRGO deep-draft deauthorization, an EIS for the IHNC lock, and the formation of a Coastal Louisiana Ecosystem Protection and Restoration Task Force (Alpert 2007). The majority of these projects or studies still require specific appropriations. 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. Overall cumulative impacts, a finalized mitigation plan, and future operations and maintenance requirements will also be included. The following discussion describes an overview of other actions, projects, and occurrences that may contribute to the cumulative impacts previously discussed.

Cumulative impacts include past, present, and future actions.

#### **4.2.1 CEMVN HSDRRS Projects**

- IER # 13 – Hero Canal and Eastern Terminus, Plaquemines Parish, LA - Includes improvements to the Hero Canal Levee, running from the GIWW to the community of Oakville; with seven alternatives for protecting Oakville running from the Hero Canal to the Mississippi River Levee. The project is likely to incorporate new levee and floodwalls. Existing flood protection will generally be raised. The proposed action would be based on the NEPA environmental documentation and the public coordination process.
- IER # 14 - Harvey to Westwego Levee, Jefferson Parish, LA - Includes improvements extending from the old Westwego Pumping Station to the line levee east of Vertex (near the Estelle Pump Station). It will incorporate approximately 12 miles of levee, construction of 7,013 linear ft of floodwalls, and modifications to three pump stations.
- IER # 15 - WBV, Lake Cataoutache Levee, Jefferson Parish, LA - Includes improvements extending from Highway 90 to near Segnette State Park and incorporates approximately 8 miles of levee and fronting protection and modifications for one pump station.
- IER # 16 – Western Terminus Levee, Jefferson Parish, LA - Includes improvements extending to connect to IER # 17 near Segnette State Park. It would incorporate construction of a new levee section to complete the western terminus of the WBV Hurricane Storm Damage Risk Reduction System.
- IER # 17 – Company Canal Floodwall, Jefferson Parish, LA - Includes improvements extending from near the Company Canal to Segnette State Park, and would incorporate approximately 133,442 linear ft of floodwalls and fronting protection and modifications to two pump stations.

- IER # 18 – Government Furnished Borrow Material, Jefferson, Orleans, Plaquemines, St. Charles, and St. Bernard Parishes, Louisiana. On 21 February 2008, the CEMVN signed a Decision Record on IER # 18. 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.
- IER # 19 – Pre-Approved Contractor Furnished Borrow Material, Jefferson, Orleans, St. Bernard, Iberville, and Plaquemines Parishes, Louisiana, and Hancock County, Mississippi. On 14 February 2008, the CEMVN signed a Decision Record on IER # 19. 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.
- IER # 22 - 30 May 2008, the CEMVN signed a Decision Record on IER # 22 entitled “Government Furnished Borrow Material # 2, Jefferson and Plaquemines Parishes, Louisiana.” 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
- IER # 23 - 5 May 2008, the CEMVN signed a Decision Record on IER # 23 entitled “Pre-Approved Contractor Furnished Borrow Material # 2, St. Bernard, St. Charles, Plaquemines Parishes, Louisiana, and Hancock County, Mississippi.” The document was prepared to evaluate the potential impacts associated with the actions taken by commercial contractors while excavating borrow areas for use in construction of the HSDRRS
- IER # 26 - Pre-Approved Contractor Furnished Borrow Material, Jefferson, Plaquemines and St. John 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

#### **4.2.2 Additional Previously Authorized Projects - Jefferson Parish**

The following projects had been authorized prior to Hurricane Katrina or are in the planning stage as hurricane recovery projects and are located in Jefferson Parish.

- Sector-Gate/Cousins Pump Station - A 2,000 cfs pumping station is being constructed to direct interior drainage to a point south of the Lapalco flood gate. The Lapalco flood gate has been constructed in the Harvey Canal to halt potential flood waters from encroaching into the canal north of Lapalco Boulevard.
- Harvey Canal New Estelle to Cousins - An earthen level segment approximately 2.6 miles long will be built to + 10 ft.
- Old to New Estelle Pump Station Floodwall - The existing floodwall will be reconstructed as an earthen levee to an elevation of approximately 10 ft.
- V-Line East of the Vertex - This earthen levee reach will be raised to the authorized elevation of 10-ft along this 4.0 mile segment.
- Orleans Village to Highway 45 - This 3.4 mile earthen levee segment is being raised to the authorized elevation of 10 ft by adding about 1 to 1½ ft of earthen material from a levee district borrow pit.

- Westwego Floodwall - This 2,800 ft floodwall has been determined to be deficient and will be replaced or strengthened at a later date. Interim measures include a seepage cut-off wall at the two gas pipelines.
- Company Canal Floodwall - Approximately 1,600 ft of this concrete capped I-wall has been determined deficient. The project is currently under planning as a navigable gate and ancillary pump station to handle interior drainage.
- Bayou Segnette State Park - The flood protection along this 1.5 mile segment of I-wall/earthen levee has experienced separation at the floodgate transitions. Interim protection measures have been completed that will strengthen the system until permanent corrections can be installed.
- Lake Cataouatche Pump Station - Approximately 3.9 miles of the earthen levee from the pump station to Bayou Segnette State Park is under construction to raise the elevation to authorized levels. The levee district performed emergency repair work in 2005 and the USACE awarded a new contract in 2007.
- Pump Station to Highway 90 - Approximately 2.7 miles of earthen levee from the pump station to Highway 90 is currently being raised to authorized elevations. Approximately 3,500 ft of earthen levee from Lake Cataouatche Station 160+00 to Highway 90 will be stabilized by the installation of a tandem culvert to adjacent to the levee.

#### Recovery Projects

- Construct the Churchill Technology and Business Park.
- Stabilize Lafitte/Barataria shoreline.
- Dredge Barataria Basin Landbridge.
- Improvements to the Mississippi River Levee

#### **4.2.3 Additional Previously Authorized Projects - Orleans Parish (South of Mississippi River)**

The following projects had been authorized prior to Hurricane Katrina or are in the planning stage as hurricane recovery projects and are located in Orleans Parish, south of the Mississippi River.

- Algiers Canal - Fronting Protection and Modifications - This project involves the installation of fronting protection for the pumping station and modification to the existing facilities upgrade them to the 100-year level of risk reduction. The fronting protection will include the installation of sluice gates and modifications will include the construction of higher floodwalls at the discharge point.

#### Recovery Projects

- Restore wetlands through improved wastewater treatment.
- Stabilize New Orleans East Landbridge Highway 90 Bank.
- Relocate and expand Port of New Orleans terminals.
- MS River work

#### **4.2.4 Additional Previously Authorized Projects - Plaquemines Parish**

The following projects had been authorized prior to Hurricane Katrina or are in the planning stage as recovery projects and are located in Plaquemines Parish. The Plaquemines Parish includes long,

narrow strips of land on both sides of the Mississippi River between New Orleans and the Gulf of Mexico. The parish has a total of 169 miles of levees and floodwalls and 18 pump stations. A total of 150 miles of levees and floodwalls were damaged along with 18 pump stations. Currently there are 26 authorized projects to repair and rebuild levees and floodwalls damaged by Hurricane Katrina in Plaquemines Parish.

These include:

- New Orleans to Venice East Bank - Levee repairs
- Mississippi River Levee East Bank – Levee repairs
- Mississippi River Levee, City Price to Port Sulphur – Levee repairs
- Mississippi River Levee, Port Sulphur to Fort Jackson – Levee and floodwall repairs
- Mississippi River Levee, Fort Jackson to Venice – Levee repairs
- New Orleans to Venice Levee, Port Sulphur Area – Levee enlargement
- New Orleans to Venice Levee, Empire/Buras Area – Levee enlargement
- New Orleans to Venice Levee, Empire Floodgate – Floodgate repairs
- New Orleans to Venice Back Levee – Levee repairs
- New Orleans to Venice Levee, Buras Area – Levee enlargement
- New Orleans to Venice Back Levee – Levee repairs
- New Orleans to Venice Levee, West Back Levee – Floodwall repairs
- New Orleans to Venice Levee, West Back Levee – Scour and miscellaneous repairs
- Mississippi River Levee, Woodland – Levee repairs
- New Orleans to Venice Levee, Port Sulphur Area – Levee enlargement
- Mississippi River Levee, West Pointe A La Hache – Levee repairs
- Mississippi River Levee – Slope pavement repair Recovery Projects
- Plaquemines Parish non-Federal Levee
- Enhance LA 23 Highway for flood protection.
- Develop mixed-use town center in Belle Chasse.
- Extend Peters Road.
- Replace Belle Chasse Highway (LA 23) Tunnel

\*More borrow sites are being investigated.

## **4.2.5 Habitat Restoration, Stabilization, and Creation Projects**

### **4.2.5.1 Coastal Impact Assistance Program**

The Energy Policy Act of 2005 (Public Law 109-58) was signed into law by President Bush on 8 August 2005. Section 384 of the Act establishes the Coastal Impact Assistance Program (CIAP) which authorizes funds to be distributed to Outer Continental Shelf (OCS) oil and gas producing states to mitigate the impacts of OCS oil and gas activities. Pursuant to the Act, a producing state or coastal political subdivision can use all amounts received for projects and activities for the conservation, protection, or restoration of coastal areas, including wetlands and for mitigation of damage to fish, wildlife, or natural resources. Amounts awarded under the provisions of the Act can also be used to develop a comprehensive conservation management plan.

The state worked with the coastal parishes to prepare a draft Louisiana Coastal Impact Assistance Plan that identifies restoration, conservation, and infrastructure projects to be supported by the State and each coastal parish for the four years of CIAP funding. This plan included projects for the enhanced management of Mississippi River water and sediment, protection and restoration of critical land bridges, barrier shoreline restoration and protection, interior shoreline protection, marsh creation with dredged material and a coastal forest conservation initiative.

#### **4.2.5.2 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), which provided for the new 16-member panel, called the Coastal Protection and Restoration Authority, which is a broader version of the previous board that was named the Wetlands Conservation and Restoration Authority. In addition, Senate Bill No. 71 also provided for the establishment of the Coastal Protection and Restoration Fund, previously named the Wetlands Conservation and Restoration Fund. The Fund is used for coastal wetlands conservation, coastal restoration, hurricane and storm damage risk reduction, and infrastructure impacted by coastal wetland losses.

The Louisiana Coastal Protection and Restoration (LACPR) project, a joint project between the Coastal Protection and Restoration Authority and the CEMVN, 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 will address 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 protection. This project is a study that will produce a technical document with recommendations related to enhanced hurricane protection and restoration of coastal ecosystems.

Though congress authorized the USACE to conduct a study to be known as Louisiana Coastal Protection and Restoration (LACPR) to determine viable projects to be considered for providing a higher level of risk reduction (Category 5) and coastal restoration for southern Louisiana, the USACE is not authorized by Congress to incorporate adaptations for LACPR when planning and designing the 1 percent risk reduction projects. However, the USACE is carefully considering the impacts that could occur if Congress authorized a larger project.

Of the alternatives investigated to reduce risk during a 100-year storm event, the GIWW WCC alternative (the proposed action) has the greatest adaptability to accommodate an enlargement. The USACE proposes that the upgrade to the floodwall and earthen berm be constructed via water access as currently proposed. In addition, all upgrades to levee and floodwall stretches that border the eastern and northern side of the 404 (c) area would be shifted to the protected side of the risk reduction system and would not impact the 404 (c) area. It is also not likely that a Category 5 upgrade to the risk reduction system would require movement of the navigation gate(s) structure.

The GIWW A alternative which would bisect the 404 (c) area would require additional construction impacts to cross the 404 (c) area, potentially compounding the ecological and hydrologic impacts to the area.

If the Algiers gate alternative were constructed it would require further upgrades to the Harvey Canal and levees west of Harvey Canal, which would result in more business relocations, leaves Harvey Canal business on the flood side of the protection system, and has more direct environmental impacts. This would pose serious design considerations and costs given the

length of the system (45,720 LF or 9 miles), the instability of the western side of the Harvey Canal, and the amount of upgrades to floodgates and pump stations required to reach the prescribed elevations.

The parallel protection alternative poses even more serious design and cost issues. Upgrading approximately 27 miles of the risk reduction system would include the upgrades and impacts listed above for the Harvey Canal and upgrades for all of the levees, floodwalls, and floodgates along the Algiers Canal, and the Belle Chasse tunnel. If upgrading the current alignment along the Algiers and Harvey canals for the 1 percent storm risk reduction system requires the relocation of approximately 700 people and 55 businesses, upgrading the system for a Category 5 system would potentially directly impact 1,000s of people and hundreds of businesses.

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 Breaux Act, Coast 2050, the Louisiana Coastal Area (LCA) Ecosystem Restoration Plan, and the Coastal Impact Assistance Plan of 2005. Other programs include state restoration projects, Parish Coastal Wetlands Restoration Program, Vegetation Plantings, Section 204/1135, and WRDA.

The LCA Ecosystem Restoration Study (2004) was a comprehensive report that identified the most critical human and natural ecological needs of the coastal area. The study presented and evaluated conceptual alternatives for meeting the most critical needs; identified the kinds of restoration features that could be implemented in the near-term (within 5 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 and identified, assessed and recommended feasibility studies that should be undertaken within the next 5 years to 10 years to fully explore other potentially promising large-scale and long-term restoration concepts. The study concluded by presenting a strategy for addressing the long-term needs of coastal Louisiana restoration beyond the near-term focus of the LCA Plan.

### **4.3 SUMMARY OF CUMULATIVE IMPACTS**

The cumulative impact analysis is meant to establish a general magnitude and extent of cumulative impacts resulting from the proposed action in combination with other anticipated Federal, state and local public and private actions over the next 50 years. Construction of levees, gates, and pump stations for the HSDRRS in the WBV could cause direct impacts to marsh, wetland, upland, hydrology, terrestrial habitats, and to wildlife. 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 West Bank and Vicinity, and within the designated coastal zone for Louisiana were considered collectively (as appropriate) for the evaluation of cumulative impacts.

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, and onshore breakwaters throughout the region could cause direct wetland, upland, and terrestrial habitat loss. The beneficial use of dredged material for nearby wetlands could eventually offset some of the damages to wetlands from construction. However, construction damage as part of the 100-year hurricane and storm damage risk reduction projects to other quality habitats would be fully mitigated through formal mitigation planning.

Wetlands would be expected to show substantial cumulative impacts since much of the levee and floodwall work for the HSDRRS in the WBV could be expected in these land use areas. To resolve this issue, the USACE is generating mitigation IERs to serve all of the anticipated WBV work, with replacement wetlands expected to be placed in locations that best serve as wildlife habitat, and where hurricane surge can be positively affected.

The main hydrological impact from the HSDRRS on the WBV is that protected low-lying areas would experience reduced storm surge inundation, protecting life and property. Some temporary sedimentation could result during the construction period from fugitive sediments that escape the erosion and sedimentation control measures for each project. This sedimentation would be expected to be minor, and adjacent water quality should remain as it had been prior to project construction. No recognizable effect on salinity would be expected as water levels would remain as they are today and no large-scale flow diversions are anticipated.

Project feature augmentations for the Bayou aux Carpes CWA Section 404(c) area are being developed in conjunction with the NPS and the EPA. These augmentations would allow flows from nearby waterways into wetlands with minimal impact to existing natural channels. Depending on design and maintenance, project feature augmentations could improve existing habitat.

Impacts to wildlife and fisheries could occur because of construction activities, project feature augmentation work, and dredging but should return to pre-construction levels once those activities have ceased. The enhancements provided by the CEMVN could greatly benefit wetlands, wildlife, fisheries, and aquatic resources in the long-term.

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 areas attainment status.

Any impacts to utilities or community facilities would also be resolved upon completion of construction. Environmental Justice issues are protected by federal statute and, while a number of minority areas could be impacted, such as areas near the Woodland Highway Bridge adjacent to the Algiers Canal, cumulative effects are not expected since efforts will be used to minimize impacts through the use of flood-walls in areas where urban impacts could occur.

Cumulative impacts to the human population in the WBV would not be expected to be permanent. However, temporary impacts would be expected from noise and air pollution associated with construction activity, and from detours, road closures and increased traffic that could occur almost continuously for several years while HSDRRS improvements in the WBV are underway. It would be expected that temporary impacts would return to pre-construction conditions shortly after construction is completed on the HSDRRS.

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 WBV project would be improved to provide additional hurricane, storm, and flood damage protection, 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. Providing 100-year level of risk reduction within all reaches of the WBV allows for FEMA certification of that level of protection.

The proposed action would provide additional hurricane surge and flood damage reduction reducing the threat of inundation and providing a sense of security to residents. This would provide a benefit to all residents, regardless of income or race, increasing the feeling of well-being, providing optimism, reducing insurance rates, and allowing for redevelopment and development of the study area and region. It is expected that the accumulated projects would provide long-term and sustainable benefits to the communities within the WBV by reducing the risk of damage within flood-prone areas and by generating economic growth that could attract displaced residents and new workers, and encourage repopulation within metropolitan New Orleans.

The extent of private development that would add to cumulative impacts is difficult to anticipate due to the fluid investment situation brought about by Hurricane Katrina reclamation. Rebuilding efforts, including the region around the study area, are taking place throughout southeastern Louisiana, and along the Mississippi and Alabama Gulf Coast. In Louisiana, the Insurance Information Institute has estimated that the total insured losses from Hurricane Katrina are estimated at \$25.3 billion (Insurance Information Institute 2007). Although it is unknown how much will affect the region of the proposed action, a large-scale effort is underway in Plaquemines, Jefferson, and Orleans Parishes. Replacement of insured losses will be a major component of regional growth over the next decade and beyond.

In conclusion, although there are many ongoing and planned projects that would similarly impact resources in the West Bank and Vicinity 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.

There are no long-term HTRW cumulative impacts anticipated, since any HTRW issues encountered in any public or private projects would be expected to be addressed and resolved by the CPRA as they are encountered. No HTRW impacts are expected with the proposed action.

Table 16 shows the cumulative compensatory mitigation that would be completed by the CEMVN. This table will be updated as potential impacts are assessed in forthcoming IERs.

Cumulative impacts for the actions considered in all of the IERs will be incorporated into the CED.

**Table 16. HSDRRS Impacts and Compensatory Mitigation to be Completed**

IER	Parish		Non-wet BLH (acres)	Non-wet BLH AAHUs	BLH (acres)	BLH AAHUs	Swamp (acres)	Swamp AAHUs	Marsh (acres)	Marsh AAHUs	EFH (acres)
<b>1</b> LPV, La Branche Wetlands Levee	St. Charles	Protected Side	-	-	-	-	137	74	-	-	-
		Flood Side	-	-	11	8	144	111	-	-	-
<b>2</b> LPV, Western Return Floodwall	Jefferson, Orleans	Protected Side	-	-	-	-	-	-	17	9	-
		Flood Side	-	-	-	-	-	-	-	-	33
<b>3</b> LPV, Lakefront Levee	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	26
<b>14</b> WBV, Harvey to Westwego Levee	Jefferson	Protected Side	-	-	-	-	-	-	45	30	-
		Flood Side	-	-	-	-	30	17	45	19	-
<b>15</b> WBV, Lake Cataouatche Levee	Jefferson	Protected Side	-	-	24	6	-	-	-	-	-
		Flood Side	-	-	4	1	-	-	-	-	-
<b>18</b> GFBM	Jefferson, Plaquemines, St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>18</b> GFBM	Orleans	Protected Side	226	69	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>18</b> GFBM	St. Bernard	Protected Side	74	44	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>19</b> CFBM	Hancock County, MS; Iberville; Orleans; Plaquemines; St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>19</b> CFBM	Jefferson	Protected Side	7*	N/A	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>22</b> GFBM	Jefferson	Protected Side	158	90	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>22</b> GFBM	Plaquemines	Protected Side	87	29	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>23</b> CFBM	Hancock County, MS; Plaquemines; St. Bernard; St. Charles	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>26</b> CFBM	Hancock County, MS ; Jefferson, Plaquemines, St. John the Baptist	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
<b>Totals</b>		Protected Side	552	232	24	6	137	74	45	30	-
		Flood Side	-	-	15	9	174	128	36	28	59
		Both	552	232	39	15	281	185	17	9	59

\* Impacts not related to Federal action – already mitigated for through the 404 program (Section 404 of the Clean Water Act [33 USC 1344]).

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

AAHU – average annual habitat unit, BLH – bottomland hardwood, CFBM – contractor-furnished borrow material, GFBM – government-furnished borrow material

## CHAPTER 5 SELECTION RATIONALE

On the basis of the assessment of potential environmental impacts presented in this IER and the evaluation of project feasibility based on the engineering effectiveness, economic efficiency, and environmental and social acceptability criteria, the proposed action is selected and is environmentally preferred. None of the proposed actions preclude any future enhancements to the HSDRRS

The CEQ regulations for implementing NEPA require that the Record of Decision (ROD) for an environmental impact statement specify "the alternative or alternatives which were considered to be environmentally preferable" (40 CFR §1505.2(b)). This alternative has generally been interpreted to be the alternative that would promote the national environmental policy as expressed in NEPA's Section 101 (CEQ's "Forty Most-Asked Questions," 46 Federal Register, 18026, March 23, 1981). Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.

The planning objective of this proposed action is to provide 100-year level of risk reduction for the GIWW, Harvey, and Algiers Canals project area. Another planning objective is to minimizing environmental impacts while providing improvements that generate the most engineeringly feasible reduction in risk to the residents, communities, commercial interest, and industrial enterprises in and near the study area.

The WCC alternative was selected for construction because it simultaneously (1) minimizes impacts to residential, commercial, and industrial properties with no Environmental Justice issues, (2) minimizes the amount of storm frontage decreasing risk while improving reliability, and (3) minimizes overall environmental impacts (specifically to the EPA designated Bayou aux Carpes CWA Section 404(c) area) as compared to other alternatives.

In order to clearly demonstrate the selection rationale for the IER 12 project, provided below are evaluations of the preferred alternative alignment along with the three other alternative alignments. Each alternative was evaluated with respect to risk and reliability, adverse environmental impacts, and schedule. Tables detailing the alternative comparisons can be found in appendix K.

When the WCC alternative was evaluated with respect to system reliability, adverse environmental impacts, time and cost, it was determined the construction of this alternative alignment would dramatically increase system reliability. This proposed action reduces the primary line of defense by 25 miles and would be comparable in system reliability to GIWW A alternative, the other southern alignment, but would be much more reliable than the Algiers Gate or PP alternatives (see alternative descriptions below). The WCC alternative would have the fewest adverse environmental impacts. Even though proposing to impact the Bayou aux Carpes CWA Section 404(c) area, this proposed alignment would minimize all direct and indirect adverse impacts to both the natural and human environments. In addition, the proposed action would have a surge barrier in place, with reduced pumping capacity, by 2011, and would be more economical to construct than the AG or PP alternatives (appendix K).

When the GIWW A alternative was evaluated with respect to system reliability, adverse environmental impacts, time and cost, the GIWW A alternative had comparable system

reliability, schedule and cost to the proposed action (WCC); however, the adverse environmental impacts for the GIWW A alternative would be much greater than the proposed action. Although alternatives would impact the Bayou aux Carpes CWA Section 404(c) area, the tidal exchange structure floodwall in GIWW A proposes to bifurcate the Bayou aux Carpes CWA Section 404(c) area and could potentially result in irreparable direct and indirect impacts to the unique area (i.e., potential degradation or loss of floatant marsh located in the northern region of the 404c area). In addition, this GIWW A alternative could preclude the possibility of including a portion of the Bayou aux Carpes CWA Section 404(c) area in the adjacent JLNHPP, whereas the proposed action would create a more manageable situation for the NPS. While the WCC alternative also proposes a floodwall structure within the 404c area, construction would be confined to a narrow footprint within a previously disturbed dredge material bank along the west bank of the GIWW. The GIWW A alternative would also have a surge barrier in place, with reduced pumping capacity, by 2011, and would be much more economic to construct than the AG or PP alternatives (appendix K).

When the AG alternative was evaluated for system reliability, adverse environmental impacts, schedule and cost, it was determined this alternative would be less reliable than the proposed action (WCC) and GIWW A alternative but more reliable than the PP alternative. The AG alternative would reduce the primary line of defense by 18 miles. Though this alternative proposes to reduce the extent of parallel protection in the system along the Algiers Canal, there would still be areas with parallel protection serving as the primary line of defense along the Harvey Canal industrial reach. In addition, the line of parallel protection along the Harvey Canal industrial reach is situated behind the businesses and would not serve as a flood barrier to those industrial areas. The proposed action (WCC) would create a primary line of defense that would also reduce risk to those industrial areas and prevent flooding of the businesses. Construction of the proposed action would place the existing floodwalls and levees along the Harvey and Algiers canals as the secondary line of defense in the event of canal flooding due to system over topping. In addition, upgrading levee stretches west of the Harvey Canal would greatly increase the levee footprint and would impact both the human and natural environment. Adverse environmental impacts for this alternative would be greater than those of the proposed action (WCC). See the alternative comparison tables (appendix K) for specific details on system reliability, environment and schedule.

When the PP alternative was evaluated with respect to system reliability, adverse environmental impacts, schedule and cost, it was determined this alternative would have the lowest system reliability, have the most adverse socioeconomic impacts, have significant environmental impacts, require the most time to construct and be least economic. This alternative that keeps the approximately 27 miles of existing risk reduction system as the primary line of defense would be the least reliable because this alignment contains numerous potential failure points. In addition to reduced reliability, upgrading the current alignment would require large scale residential and commercial relocations and would have serious environmental implications (i.e. HTRW issues discussed in section 3.5). See the alternative comparison tables (appendix K) for specific details on system reliability, environment and schedule.

In summary of the documentation provided in this IER regarding the process of developing this unique project, the WCC alternative, which would alter the current system alignment, is the USACE'S proposed action for this segment of the HSDRRS because this alternative would provide the most reliable, time sensitive, and cost effective solution with the least adverse environmental impacts. Though this alternative would have unavoidable impacts to the Bayou aux Carpes CWA Section 404(c) area, the USACE would employ final design efforts would utilize all feasible engineering and

construction practices to reduce impacts to these nationally significant wetlands. In order to minimize the footprint of the surge barrier component to no greater than 4,200 LF by 100 LF along the western side of the GIWW within the Bayou aux Carpes CWA Section 404(c) area, the USACE would investigate and utilize innovative techniques to design and build a structure that incorporates a floodwall and earthen berm rather than an earthen levee. The USACE would also locate the GIWW floodgate(s) as close to the Harvey and Algiers canals confluence as engineeringly feasible in order to minimize impacts to the 404c area. To further ensure the minimization of adverse impacts within the 404c area, construction of the floodwall and earthen berm / access road would occur from the GIWW side of the construction area. In addition, project feature augmentations, such as allowing Old Estelle effluent into the 404c area by gapping the spoil bank and removing the shell plug at Bayou aux Carpes, are being studied and would be incorporated if the results of the environmental studies demonstrate that this proposed action would augment the USACE actions to minimize effects to the 404c wetland habitat. Additional project feature augmentations, such as the gapping of other canal banks in the 404c area are also being studied and would be incorporated into the project if it is found that the features further minimize impacts as a result of the USACE proposed action.

The USACE would mitigate for all unavoidable adverse impacts to the Bayou aux Carpes CWA Section 404(c) area on site within the Bayou aux Carpes CWA Section 404(c) area and/or JLNHPP. Mitigation projects would be designed and implemented concurrently with the design and construction of the floodwall and earthen berm / access road. Full mitigation within this unique environment may require mitigation in addition to acres indicated by the Wetland Value Assessment. The USACE further agrees to work in collaboration with the Interagency team to monitor the area to ensure mitigation is successful in reaching its targeted goal and to utilize adaptive management efforts to ensure the project feature augmentations are assisting to minimize adverse impact within the 404c area. The total funding required for the entire HSDRRS, \$16.8 billion dollars, has been appropriated by Congress. This funding includes funds for the design and construction of all HSDRRS mitigation measures and project feature augmentations. The USACE would ensure that all impacts due to upgrading structures currently outlining the Bayou aux Carpes CWA Section 404(c) area would occur on the protected side and would not impact the 404c area. Lastly, the WCC proposed action would have the greatest adaptability to accommodate an enlargement associated with future system upgrades such as the Louisiana Coastal Protection and Restoration.

The proposed action would primarily utilize new ROW directly adjacent to existing ROW corridors. Utilizing existing ROW corridors limits habitat fragmentation and generally concentrates the areas of direct environmental impact, which in turn limits the potential indirect negative impacts that may occur. Wetland acreage would be directly impacted by the proposed action; however, there are no wetland areas that would be indirectly hydrologically isolated.

There are no current problems that would prohibit the construction of the proposed action. The project is in compliance with the Coastal Zone Management Plan and 401 Certification requirements. It is consistent with the Dispute Resolution Objectives of the USACE. The proposed action would provide the opportunity for future enhancement of the hurricane protection system, should this be desired.

## **CHAPTER 6 COORDINATION AND CONSULTATION**

### **6.1 PUBLIC INVOLVEMENT**

Extensive public involvement has been sought in preparing this IER. The projects analyzed in this IER were publicly disclosed and described in the Federal Register on 13 March 2007 and on the website [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov). Scoping for this project was initiated on 12 March 2007 through placing advertisements and public notices in USA Today and The New Orleans Times-Picayune. Nine public scoping meetings were held throughout the New Orleans Metropolitan area to explain scope and process of the Alternative Arrangements for implementing NEPA between 27 March 2007 and 12 April 2007, after which a 30-day scoping period was open for public comment submission. Additionally, the CEMVN is hosting monthly public meetings to keep the stakeholders advised of project status. The public is able to provide verbal comments during the meetings and written comments after each meeting in person, by mail, and via [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov).

Specific to IER # 12 and the borrow areas for the project, the following public meetings were held to discuss scoping, planning, alternatives, project issues, and scheduling:

1. 5 June 2007, at Holy Cross College in Algiers
2. 17 July 2007, at the Belle Chasse Auditorium in Belle Chasse
3. 19 September 2007, at the Westwego City Hall in Westwego
4. 23 October 2007, at the Belle Chasse Auditorium in Belle Chasse
5. 23 November 2007, at the Westwego Community Center in Westwego
6. 13 March 2008, at Holy Cross College in Algiers
7. 22 May 2008, at Holy Cross College in Algiers
8. 21 August 2008, at Holy Cross College in Algiers
9. 9 December 2008, at Harvey Fire Station in Harvey
10. 16 December 2008, at Mi-Swaco in Harvey

At these meetings, USACE presentations were made on the project and comments were received from the general public and local officials. The key concerns that were expressed during these meetings include the following:

- Get the project work done now
- Scheduling of the IER # 12 project work.
- Vulnerability along Peters Road from Boomtown to Lapalco Boulevard.
- Taking residences and businesses.

- Minimizing impacts to the 404c Bayou aux Carpes site.
- Providing augmentations to enhance the hydrology of the Bayou aux Carpes site.
- Analyzing potential hydrological and ecological impacts to the Bayou aux Carpes site.
- Interim protection until the entire levee system is up to 100-year level of risk reduction.
- Relationship between 100-year risk reduction and categories of storms (1-to-5) with respect to the level of risk reduction that needs to be provided (“we need Category 5 Protection”).
- Criteria for 100-year risk reduction and recent storm data incorporation into the criteria and models.
- Lack of better models to address coastal restoration and wetlands preservation.

In addition to public meetings, local governmental and non-governmental stakeholders were identified:

- Congressional Delegations
- Louisiana Governor’s Office
- Coastal Protection and Restoration Authority
- Louisiana Department of Transportation and Development
- Jefferson Parish
- Orleans Parish
- Plaquemines Parish
- Southeast Louisiana Flood Protection Authority – West
- West Jefferson Levee District
- New Orleans Mayor’s Office
- US Coast Guard
- Federal Principles Group
- Harvey Canal Industrial Association
- Navigation Industry
- Belle Chasse Naval Air Station
- Non-Governmental Organizations (NGO)

A recurring stakeholder group meeting was established to discuss HSDRRS work on the Harvey Canal and Algiers Canal and to enhance understanding of issues and/or impacts of the proposed action. The stakeholder group met at the CEMVN office on the following dates:

- 29 May 2008
- 26 June 2008
- 30 July 2008
- 2 October 2008
- 20 November 2008

NGO meetings were held to give updates on IER # 12 milestones and to receive input on alternative development, alternative selection, and proposed action impacts.

Although the primary purpose of the GIWW West Closure Complex is to provide the 100-year level of risk reduction, it is located within the GIWW, a major inland waterway serving the gulf coast and the nation. An average of 30 commercial barge tows pass thru this location on the GIWW each day with cargoes vital to the nation's economy. Interests of the navigation industry have been considered since the inception of this project.

Extensive coordination and collaboration with the navigation industry including the USCG, Gulf Intracoastal Waterway user groups, and other navigation interests began over two years ago and continues today via regular stakeholder meetings, working group meetings, and telephone and e-mail correspondence with the executive director of the Gulf Intracoastal Canal Association (GICA).

Through coordination with GICA, tow boat pilots have been and continue to be involved with the ongoing SHIPS simulator, a simulator tool used to verify the ability of navigation interest to safely pass thru the gate structures. As design options are refined, continued involvement of the industry pilots will be necessary to ensure the navigation safety aspects of the project. Additional refinements will include the optimization of structure features, final gate opening width, final gate location, alignment aids and the development of emergency mooring features.

Additionally, the operating plan for the West Closure Complex including the operation of the navigation gates will be developed during construction with primary emphasis on hurricane risk reduction and consideration of the importance of the navigation channel to the barge industry and the nation.

Since this project includes unavoidable adverse impacts to jurisdictional wetlands under Section 404 of the Clean Water Act, a 404(b)(1) public notice was made available to the public and other interested parties on the [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) website. The 404(b)(1) public notice will be advertised for the 30-day period concurrent to the public review of this IER # 12.

After extensive collaborative efforts with the EPA, the NPS and other Federal and state resource agencies, the CEMVN formally requested a modification to the Bayou aux Carpes CWA Section 404(c) Final Determination on 4 November 2008 (See appendix K) in order to move forward with construction of the WCC, specifically the floodwall proposed to be constructed within the 404c area. A draft of this IER was distributed to

the EPA, NPS, and USFWS prior to this public comment period to ensure all environmental concerns associated with this project are clearly laid out and thoroughly explained for the public.

This draft IER # 12 has been distributed for a 30-day public review and comment period. In addition to the public meetings regarding the proposed action, a joint public hearing is being scheduled in cooperation with the EPA. Any comments received during this public hearing would be considered part of the official record.

After the 30-day comment period for the IER, and public hearing, the CEMVN 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 CEMVN 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 would be prepared and published for an additional 30-day public review and comment period. After the expiration of the public comment period, the CEMVN Commander would make a decision on the proposed action. The decision would be documented in an IER Decision Record.

At this time, the EPA is preparing to publish a Federal Register notice of the CEMVN Request for Modification of the Bayou aux Carpes CWA Section 404(c) Final Determination and announce the joint public hearing within the Federal Register. An EPA comment period for the public to be able to submit their concerns regarding the proposed Modification to the Bayou aux Carpes CWA Section 404(c) Final Determination and impacts within Bayou aux Carpes CWA Section 404(c) area will run after this notice. The CEMVN/EPA public hearing will be held following both the CEMVN and EPA comment periods in 2009. The CEMVN letter to the EPA formally requesting a modification to the Bayou aux Carpes CWA 404 (c) Final Determination can be accessed at [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) and in appendix K.

After the EPA public comment period for the 404(c) Final Determination Modification Request and the CEMVN/EPA public hearing, the EPA will review all comments received concerning the 404(c) Final Determination during the review period and make a determination if they rise to the level of being substantive in nature. If the EPA decides to modify the Bayou aux Carpes CWA Section 404 (c) Final Determination, a Federal Register notice will be published and the modification would be effective 30 days following that notice. After the EPA issues the Final Determination modification, the CEMVN Protection and Restoration Branch Chief will make a finding that the proposed action complies with the Section 404(b)(1) guidelines, pursuant to the CEMVN Section 404(b)(1) Evaluation, which will be released for public comment concurrent with this draft IER # 12.

## **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 (see section 6.3 for Interagency and 404c coordination information). 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 Louisiana Department of Environmental Quality (LADEQ) reviewed the proposed action. CEMVN received Water Quality Certification by letter dated 16 December 2008.

A Section 404(b)(1) evaluation is being released for public comment concurrently with this draft IER # 12.

The U.S. Fish and Wildlife Service (USFWS) reviewed the proposed action to see if it would affect any threatened and endangered (T&E) species under its jurisdiction, or their critical habitat. The USFWS concurred with the CEMVN in a letter dated 25 June 2008 that the proposed action would not have adverse impacts on T&E species under its jurisdiction (appendix D).

Consultation with National Oceanic and Atmospheric Administration (NOAA) NMFS was initiated to ensure compliance with Section 305 of the Magnuson-Stevens Fishery Conservation and Management Act and the Fish and Wildlife Coordination Act. NMFS concurred on 7 October 2008 with the CEMVN that the proposed action would not have adverse impacts on T&E species under its jurisdiction.

The Louisiana Department of Natural Resources (LADNR) reviewed the proposed action for consistency with the Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The proposed action was found to be consistent with the LCRP, as per a letter dated 17 December 2008 (appendix E).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the Louisiana State Historic Preservation Office (LASHPO) and Native American tribes. LASHPO reviewed the proposed action and determined that it would not adversely affect any cultural resources in a letter dated 1 August 2008 (appendix H). Federally recognized tribes that have an interest in the region were given the opportunity to review the proposed action (appendix J).

The USFWS reviewed the proposed action in accordance with the Fish and Wildlife Coordination Act and prepared a draft Coordination Act Report for IER # 12 dated 24 December 2008. The USFWS also provided programmatic recommendations, in the "Draft Fish and Wildlife Coordination Act Report for the Individual Environmental

Reports (IER), Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4)” in November 2007. The uncertainties in the design of several projects prohibited a complete evaluation of the impacts to fish and wildlife species and the reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.). Therefore, a subsequent final supplemental report would be provided by the USFWS at a later date. The draft (programmatic) Fish and Wildlife Coordination Act Report for the IERs dated November 2007 can be accessed through the [www.nolaenvironmental.gov](http://www.nolaenvironmental.gov) website.

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

- Recommendation 1: To the greatest extent possible, situate flood protection so that destruction of wetlands and non-wet BLHs are avoided or minimized.
- CEMVN Response 1: The project would utilize the existing ROW footprint as much as practicable and minimize impacts to wetlands.
- Recommendation 2: Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.
- CEMVN Response 2: Concur.
- 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.
- 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 would 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 (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal Sponsor to provide certification of sufficient funding for the entire project. Further,

mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 6: Further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the USFWS, NMFS, LADWF, EPA, 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 contact for the agencies overseeing public lands potentially impacted by project features are: Kenneth Litzenberger, Project Leader for the USFWS' Southeast National Wildlife Refuges, and Jack Bohannon (985) 822-2000, Refuge Manager for the Bayou Sauvage National Wildlife Refuge (NWR), Office of State Parks contact Mr. John Lavin at 1-888-677-1400, National Park Service (NPS) contact Superintendent David Luchsinger, (504) 589-3882, extension 137 (david\_luchsinger@nps.gov), or Chief of Resource Management David Muth (504) 589-3882, extension 128 (david\_muth@nps.gov) and for the 404c area contact the previously mentioned NPS personnel and Ms. Barbara Keeler (214) 665-6698 with the EPA.

CEMVN Response 7: The project would utilize the existing ROW footprint as much as practicable and would avoid adverse impacts as practicable to JLNHPP and the 404c area.

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

CEMVN Response 8: Concur.

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

they should be contacted early in the planning phase regarding such requirements.

CEMVN Response 9: Concur.

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

CEMVN Response 10: Concur.

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

CEMVN Response 11: Concur.

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

CEMVN Response 12: Concur.

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: Concur.

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: Concur.

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: Concur.

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: Concur

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: Concur.

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 fisheries organisms to pass through multiple structures (i.e., structures behind structures) to access an area.

CEMVN Response 21: Concur.

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 detention 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: Concur.

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

CEMVN Response 23: Concur.

Recommendation 24: Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the CEMVN shall provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

CEMVN Response 24: Construction of the project features are cost shared between the Government and the non-Federal sponsor. However, 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, EPA, and LADNR.

CEMVN Response 25: Mitigation for the impacts caused by this project would 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 three years by the managing agency and provided to the CEMVN, USFWS, NMFS, EPA, 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.

The USFWS' project-specific recommendations in their draft FWCA report, by letter dated 24 December 2008, and CEMVN's response to the recommendations, are listed below:

Recommendation 1: To the greatest extent possible, design and position flood protection features so that destruction of wetlands and non-wet BLHs are avoided or minimized.

CEMVN Response 1: The CEMVN will take all measures to ensure all risk reduction features are constructed within pre-existing ROW before acquiring additional ROW within adjacent wetlands and non-wet BLHs. In addition, the engineering and design of the new construction risk reduction components within the proposed action will incorporate innovative techniques to construct a floodwall along a navigable waterway, and the gate structure will be placed within the GIWW as close to the Harvey and Algiers confluence as practicable (considering navigation hazards) to

reduce the floodwall length and further environmental impacts in the Bayou aux Carpes CWA Section 404(c) area.

- Recommendation 2: The USACE shall fully compensate for any unavoidable losses of wetland habitat or non-wet BLHs caused by project features.
- CEMVN Response 2: The CEMVN will fully mitigate for any unavoidable losses of wetlands or non-wet BLHs incurred due to the proposed action. In addition, any unavoidable adverse impacts within the Bayou aux Carpes CWA Section 404(c) area will be fully mitigated within the 404c area or the adjacent JLNHPP. Project feature augmentations to offset unavoidable adverse impacts are under investigation and would be implemented in addition to mitigation to ensure full compensation for wetland impacts within the Bayou aux Carpes CWA Section 404(c) area.
- Recommendation 3: Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.
- CEMVN Response 3: Acknowledged. The CEMVN selected against the GIWW A alternative to avoid enclosing nearly 500 acres of wetlands within the Bayou aux Carpes CWA Section 404(c)
- Recommendation 4: Material removed during project construction (i.e., dredging Algiers Canal, repositioning the WBV, levee landward to accommodate the GIWW gate, and dredging along the GIWW bank line to install the flow control structure) should be tested to determine suitability as borrow material for levee construction and the presence of contaminants. The USACE should continue to coordinate with the natural resource agencies to determine the best use of that material.
- CEMVN Response 4: The CEMVN has had the Algiers dredge material tested for borrow suitability and contaminants and may beneficially use the material within the JLNHPP. The CEMVN will continue to coordinate with the natural resource agencies to determine the best use of the remaining dredge material.
- Recommendation 5: A maintenance dredging management plan for material dredged from the Algiers Canal should be developed for the life of the project.
- CEMVN Response 5: Concur.
- Recommendation 6: The USACE should avoid impacts to the Bayou aux Carpes CWA Section 404(c) area, if feasible. If not feasible the USACE should continue coordination with the NPS and EPA regarding any proposed project feature that may impact that area. Points of

contacts for the agencies potentially impacted by project features are: National Park Service (NPS), contact Superintendent David Luchsinger, (504) 589-3882 extension 137 ([david\\_luchsinger@nps.gov](mailto:david_luchsinger@nps.gov)) or Chief of Resource Management David Muth (504) 589-3882 extension 128, ([david\\_muth@nps.gov](mailto:david_muth@nps.gov)) and Ms. Barbara Keeler (214) 665-6698 with the EPA.

- CEMVN Response 6: Acknowledged. The CEMVN selected against the GIWW A alternative to avoid bifurcating the Bayou aux Carpes CWA Section 404(c) area and the irreparable direct and indirect impacts that could have occurred within the area due to implementing the alternative. In addition, the CEMVN will continue to coordinate with the EPA and NPS with regards to any risk reduction component or project feature augmentation that may impact the 404c area.
- Recommendation 7: Hydrologic, nutrient, and contaminant modeling should be conducted to determine the best arrangement of environmental augmentation features (i.e., location of gaps and water control structures), if any, in the Bayou aux Carpes CWA Section 404(c) area.
- CEMVN Response 7: The CEMVN has initiated hydrologic modeling efforts for the Bayou aux Carpes CWA Section 404(c) area to determine appropriated locations to gap spoils banks to allow for uniform sheet flow and appropriate water velocities that would resemble natural storm runoff and tidal exchange. Environmental surveys are ongoing to determine baseline data for water quality and water and soil conditions. Once the baseline conditions have been determined, the CEMVN along with the Interagency team will determine the best arrangement of project feature augmentations, if any, within the 404c area.
- Recommendation 8: Environmental augmentation features developed through the EPA 404c modification procedures should be incorporated as project features, and the IER should be supplemented to address any additional augmentation features proposed through that process.
- CEMVN Response 8: Concur.
- Recommendation 9: If hydraulic modeling demonstrates that environmental augmentation features are beneficial, operational plans to maximize freshwater detention or redirect freshwater flows into the Bayou aux Carpes CWA Section 404(c) area should be coordinated with the natural resource agencies, especially EPA and NPS. To accommodate changing goals and restoration

needs, water control structures should be designed to incorporate operational flexibility through an adaptive management program.

CEMVN Response 9: Concur.

Recommendation 10: 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 and augmentation features. If the local project-sponsor is unable to fulfill the financial requirements for maintenance of the shoreline protection features, the USACE should provide the necessary funding to ensure maintenance obligations are met on behalf of the public interest.

CEMVN Response 10: USACE Project Partnering Agreements (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal Sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 11: To facilitate that adaptive management program, the USACE in coordination with the natural resource agencies, should develop a monitoring plan. That monitoring plan should address hydrologic, nutrient, and contaminant changes throughout the system. The performance and funding of the monitoring of mitigation and augmentation features 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 USACE should provide the necessary funding to ensure that local cost share obligations are met on behalf of the public interest.

CEMVN Response 11: USACE Project Partnering Agreements (PPA) do not contain language mandating the availability of funds for specific project features, but require the non-Federal Sponsor to provide certification of sufficient funding for the entire project. Further, mitigation components are considered a feature of the entire project. The non-Federal Sponsor is responsible for Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) of all project features in accordance with the OMRR&R manual that the USACE provides upon completion of the project.

Recommendation 12: Because of the sensitivity and significance of the Bayou aux Carpes CWA Section 404(c) area every effort should be made to minimize impacts during construction of the floodwall and

navigational gate. Construction activities within the Bayou aux Carpes CWA Section 404(c) area should adhere to the following guidelines to avoid adverse impacts to the Bayou aux Carpes CWA Section 404(c) area:

- A. Construction should be performed from the water side (i.e., Bayou Barataria/GIWW side) rather than from the 404c side;
- B. Construction of the floodwall within the Bayou aux Carpes CWA Section 404(c) area should be constructed within a 100-ft corridor width from the GIWW into the 404c area. No additional area within the 404c area would be required for the floodwall or any other construction;
- C. The USACE should investigate and utilize innovative techniques to design and build a structure with the narrowest footprint possible; and,
- D. Should existing oil and gas pipeline ROWs require relocation, impacts associated with those relocations should be avoided and minimized to the greatest extent possible.

CEMVN Response 12: The CEMVN concurs with the recommendations listed in this comment (A-D). In addition, to further minimize impact to the Bayou aux Carpes CWA Section 404(c) area, the CEMVN will minimize the length of the floodwall by moving the GIWW closure complex close to the Harvey and Algiers canals confluence as practicable (considering navigation hazards). The floodwall footprint will impact an area approximately 4200 ft in length by 100 ft in width.

Recommendation 13: If a proposed project feature is changed significantly or is not implemented within one year of the date of this report, we recommend that the USACE reinitiate coordination with each office to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their habitat.

CEMVN Response 13: Concur.

Recommendation 14: Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagles during the nesting season (i.e., 16 February through 31 October for wading bird nesting colonies, and October through mid-May for bald eagles).

CEMVN Response 14: Concur.

Recommendation 15: To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 ft of a rookery should be restricted to the non-

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

CEMVN Response 15: Concur.

Recommendation 16: If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: <http://www.USFWS.gov/southeast/es/baldeagle>. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

CEMVN Response 16: Concur.

Recommendation 17: 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 17: Concur.

Recommendation 18: 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 USACE should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

CEMVN Response 18: Construction of the project features are cost shared between the Government and the non-Federal sponsor. However, costs for operation, maintenance, repair, replacement, and rehabilitation will be the responsibility of the non-Federal sponsor.

Recommendation 19: 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, LADWF, EPA, NPS, and LADNR. The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

CEMVN Response 19: The CEMVN concurs with this recommendation. In addition to reports associated with further detailed plans of project features, the CEMVN will coordinate with the Service, NMFS, LADWF, EPA, NPS, and LADNR for further detailed planning and implementation of project feature augmentations, i.e., spoil bank gapping throughout the Bayou aux Carpe 404c area and

finalizing monitoring and mitigation plans for the Bayou aux Carpes CWA Section 404(c) area.

Recommendation 20: If mitigation lands are purchased for inclusion within Federally or State managed lands, those lands must meet certain requirements; therefore the land manager of that management area should be contacted early in the planning phase regarding such requirements.

CEMVN Response 20: Concur.

Recommendation 21: If applicable, a General Plan should be developed by the USACE, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA for mitigation lands.

CEMVN Response 21: Concur.

Recommendation 22: Flood protection water control structures in any watercourse should maintain pre-project cross section in width and depth to the maximum extent practicable.

CEMVN Response 22: Concur.

Recommendation 23: Any flood protection water control structure sited in a canal, bayou, or navigation channel that 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 23: The CEMVN proposes to construct a closure complex within the GIWW to allow for navigation and current reduction. This complex would include a 150-ft to 300-ft main channel gate, a 75-ft to 150-ft bypass channel closure gate, and a 20,000+ cfs pump station. Hydrologic modeling, navigation simulation modeling, and engineering design efforts are still underway to determine the exact location of the closure complex. This comment will be considered during the final engineering and design efforts.

Recommendation 24: Flood protection water control structures should remain completely open except during storm events, unless otherwise determined by the natural resource agencies.

CEMVN Response 24: Concur. This comment will be considered during the final engineering and design efforts for the 150-ft to 300-ft navigation / gate(s), the 75-ft to 150-ft bypass channel closure gate, and pump station to be constructed within the GIWW.

Recommendation 25: 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, and coordination should continue with the natural resource

agencies to ensure fish passage features are incorporated to the fullest extent practicable.

CEMVN Response 25: Concur. This comment will be considered during the final engineering and design efforts for the the 150-ft to 300-ft navigation / gate(s), the 75-ft to 150-ft bypass channel closure gate, and pump station to be constructed within the GIWW.

Recommendation 26: 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 26: Concur. This comment will be considered during the final engineering and design efforts for the 150-ft to 300-ft navigation / gate(s), the 75-ft to 150-ft bypass channel closure gate, and pump station to be constructed within the GIWW.

Recommendation 27: 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 should be selected that would maintain sufficient flow to prevent siltation.

CEMVN Response 27: Concur.

Recommendation 28: 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 28: Concur. This comment will be considered during the final engineering and design efforts for the 150-ft to 300-ft navigation / gate(s), the 75-ft to 150-ft bypass channel closure gate, and pump station to be constructed within the GIWW.

Recommendation 29: Any proposed change in mitigation or augmentation features or plans should be coordinated in advance with the Service, NMFS, LADWF, EPA, and LADNR.

CEMVN Response 29: Concur.

Recommendation 30: A report documenting the status of mitigation implementation and maintenance should be prepared every three years by the managing agency and provided to the USACE, the Service, NMFS, EPA, LADNR, and LADWF. That report should also describe future management activities, and identify any proposed changes to the existing management plan.

CEMVN Response 30: Concur.

### **6.3 INTERAGENCY AND SECTION 404c COORDINATION**

In addition to public meetings regarding the alternative selection process, the CEMVN has worked with both governmental and non-governmental organizations during the preliminary stages of project development. The CEMVN acknowledged that this project would require innovative thinking from both the engineering and environmental stand point. Official meetings to present the CEMVN's most up-to-date information regarding system reliability, time, cost, and environmental impacts were conducted for the sole purpose of collaborating with the Interagency team (EPA, LADEQ, LADNR, NOAA/NMFS, LADWF, and USFWS) prior to finalizing project designs and prior to submitting a formal request for modification of the Bayou aux Carpes CWA Section 404(c) Final Determination to ensure the minimization of adverse and environmental impacts within the WBV IER # 12 project area.

Initially, the CEMVN PDT, in cooperation with Federal and state resource agencies and interested members of the public, identified possible alignments in the area. All the alternatives were then evaluated according to various criteria, and all non-reasonable alternatives, i.e., those alternatives with overwhelming engineering challenges, were eliminated. In general, assessing all possible alignments demonstrated two things: system reliability increases as the actual length of the surge barrier decreases (deeming a further south, more streamlined alignment as most reliable) and this further southern alignment, which offers the most system reliability and protection, proposes to impact the Bayou aux Carpes CWA Section 404(c) area.

There were five surviving alternatives brought forward from a preliminary alternative evaluation process conducted in early 2007. Two of those five alternatives were further analyzed and then eliminated due to non-constructability. The three surviving alternatives were then brought forward and further evaluated according to system reliability, environmental impacts, schedule and cost. These three surviving alternatives and the evaluation process were presented to the Interagency team to solicit input.

The CEMVN worked closely with the EPA due to possible project impacts to the Bayou aux Carpes CWA Section 404(c) area (section 3.1.7). Section 404c authorizes the EPA to prohibit, restrict, or deny the discharge of dredged or fill material at defined sites in waters of the United States (including wetlands) whenever it determines, after notice and opportunity for public hearing, that use of such sites for disposal would have an unacceptable, adverse impact on one or more of various resources, including fisheries, wildlife, municipal water supplies, or recreational areas.

In collaboration with the Interagency team the CEMVN PDT revisited and substantially revised a previous alternative from the original proposed southern alignment that would maintain system reliability and additionally would minimize adverse environmental impacts to the Bayou aux Carpes CWA Section 404(c) area. This fourth alternative (WCC) was then evaluated against the same four criteria.

On 14 May 2008, the CEMVN met with the EPA and other Federal and state resource agencies to bring forward the fourth alternative, the WCC. This meeting consisted of a detailed presentation followed by extensive conversation among CEMVN and Federal and state resource agencies to ensure all concerns were incorporated and unclear issues were thoroughly explained. The EPA and other Federal and state resource agencies were in disagreement of the environmental scores given to each alternative, and asked to have an environmental significant resources evaluation conducted in which they could offer insight.

A meeting was then conducted on 26 May 2008 so that the Interagency team could further collaborate and provide input on the appropriate format and scoring for environmental impacts, i.e., offer a professional opinion on environmental issues, such as direct and indirect impacts, in order to accurately score the alternatives with regards to environmental impacts. The alternative environmental scores determined within that meeting were then strongly considered by the PDT during the IER # 12 Alternative Evaluation Process.

Another meeting was conducted on 30 June 2008 to present to the Mr. Lawrence E. Starfield, EPA Region 6 Deputy Regional Administrator, Mr. Bill Honker, EPA Region 6 Deputy Director, Water Quality Protection Division, Deputy Director, Ms. Barbara Keeler, EPA Region 6 Coastal & Wetlands Planning Coordinator, Mr. David Luchsinger, Superintendent of JLNHPP, National Park Service, and Mr. David Muth, National Park Service the necessity to modify the existing system alignment and the need to construct a segment of the system within the Bayou aux Carpes CWA Section 404(c) area. The meeting consisted of a morning presentation that discussed the project area, followed by a helicopter fly over of the WBV project and other areas with structures similar to those in the proposed action. Following the helicopter flyover, a full interagency team meeting was held during which a presentation was given to the EPA Region 6 director that discussed the WCC alternative. All in attendance were then asked to provide input. The 30 June 2008 meeting was a successful partnering session in which the EPA and other resource agencies brought forward issues that may have seemed unclear and needed to be addressed, and brought forward concerns that the agency wanted addressed in writing (i.e. issues regarding the need to modify the alignment, engineering and design specifics, site specific mitigation, etc).

Following the 30 June 2008 meeting, the CEMVN worked closely with the EPA and the Interagency team to address all issues and concerns associated with the proposed action, specifically work within the 404c area. To ensure the process was completely transparent and that no issues were left unresolved, the CEMVN submitted to EPA multiple draft letters addressing their concerns. The CEMVN continued to conduct Interagency team meetings the first Monday of each month, to continue to provide updates to the resource agencies and to solicit input on various projects, including IER # 12.

On 3 November 2008, the CEMVN met with the Interagency team and agreed on stipulations for claiming mitigation credits for IER # 12 impacts via beneficial use of dredged material from Algiers Canal. Baseline data needs and assessment parameters for Bayou aux Carpes CWA Section 404(c) area impacts were outlined. A consensus on the priority of potential project feature augmentations for the Bayou aux Carpes CWA Section 404(c) area was reached. Mitigating on-site was discussed, and the agencies' preference for invasive species control was documented. Finally, a monitoring plan for the Bayou aux Carpes CWA Section 404(c) area was outlined featuring quarterly water quality sampling and surveys for floatant characteristics, eagles, wading birds, species of concern, and indicator vegetation (including Cypress).

Major comments and discussion during the 3 November 2008 meeting centered on potential borrow suitability of WCC excavated material; recommendations for monitoring during a 50-year period; and clarification that the current agreements on augmentations and mitigation are subject to modification by the interagency team after feasibility, benefits, and relation to project implementation is determined.

Please see appendix K for detailed documentation of the:

- Need to modify the original HSDRRS alignment;
- Need to modify the Bayou aux Carpes CWA Section 404(c) Final Determination;
- Measures taken to ensure the avoidance and/or minimization of all adverse impacts to the Bayou aux Carpes CWA Section 404(c) area;
- Planning and design considerations to avoid additional impacts from any reasonable foreseeable future flood protection measures (i.e., the Louisiana Coastal Protection and Restoration (LACPR) Study);
- Plans for monitoring the Bayou aux Carpes site to insure impacts from the CEMVN construction are not detrimental to the unique habitat.
- Plans for adequate site specific mitigation for all unavoidable adverse impacts to the Bayou aux Carpes CWA Section 404(c) area;
- Review of projected wetland impacts as per USACE 404 (b)(1) guidelines and the EPA 404 (b)(1) and 404c procedures found in 40 CFR Parts 230 & 231; and

After months of collaboration, a final version of the letter that addressed the EPA concerns and contained the requested level of detail was completed. A formal request for modification of the Bayou aux Carpes CWA Section 404(c) Final Determination was then issued to Mr. Lawrence E. Starfield, EPA Region 6 Deputy Regional Administrator on 4 November 2008.

The CEMVN is still working very closely with the EPA and Interagency team as the IER 12 and modification of the 404c Final Determination process progresses. The EPA and Interagency team has provided integral input that assisted the CEMVN throughout this alternative evaluation process and will continue to provide input that is crucial to minimizing adverse environmental impacts throughout the duration of this IER # 12 project.

## **CHAPTER 7 MITIGATION AND MONITORING**

### **7.1 Mitigation**

Mitigation for unavoidable impacts to the human and natural environment described in this and other IERs will be addressed in a separate mitigation IER as per the alternative NEPA arrangements implemented in March 2007. 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 be available for a 30-day public review and comment period.

Mitigation would be required for wetlands impacted by the proposed action (WCC). A total of 329 acres of compensatory mitigation would be required, due to new construction and upgrades to existing levees and structures within the proposed action alignment. Approximately 255 acres of impacted wetland acreage is forested and 74.9 acres is swamp (table 7b). Impacted forested wetland acreage would require in-kind mitigation.

The V-line levee upgrade and pipeline relocation along the western border of the Bayou aux Carpes CWA Section 404(c) area would impact approximately 27.5 acres of wetlands (including impacts within approximately 12 acres of existing ROW and 17 acres of new required ROW). Additionally, 9.6 acres of wetland habitat would be impacted within the EPA 404c Bayou aux Carpes site and would require special mitigation arrangements. Mitigation would not be required for project feature augmentation work.

Dredged material from the Algiers Canal could be used beneficially as a mitigation project at the JLNHPP “Geocrib” site in Lake Salvador. Approximately 28 acres of wetland could be created with the dredged material if the Geocrib was filled and planted. The created wetlands would count as credit for HSDRRS wetlands impact mitigation.

Mitigation procedures and requirements regarding impacts within the 404c area are being coordinated with the EPA, USFWS, and the National Park Service. Mitigation for all unavoidable adverse impacts to the Bayou aux Carpes CWA Section 404(c) area would occur within the Bayou aux Carpes CWA Section 404(c) area and/or JLNHPP as per agreement with the resource agencies. Initial agency preferred mitigation for the Bayou aux Carpes site includes Chinese tallow tree removal and marsh creation in JLNHPP, but additional coordination is required to determine the best possible mitigation actions. Mitigation projects would be designed and implemented concurrently with the design and construction of the project. Full mitigation within this unique environment may require mitigation in addition to the basic average annual habitat unit method as determined by Wetland Value Assessment (WVA) models used by the USACE in cooperation with the resources agencies (see table 7b). Project feature augmentations would be considered by the mitigation team as they develop a full plan to compensate for any unavoidable impacts. The CEMVN has agreed to work in collaboration with state and Federal agencies to ensure a successful mitigation effort

Direct impacts to bottomland hardwood and swamp habitat were quantified by acreage and habitat quality (i.e., average annual habitat units or AAHUs). The USFWS used the Louisiana Department of Natural Resources Habitat Assessment Methodology (HAM) to quantify the impacts of proposed project features on upland and wetland bottomland hardwood habitat and used the WVA methodology quantify the impacts on swamp habitat. The habitat assessment models for bottomland hardwoods within the Louisiana Coastal Zone utilized in this evaluation were modified from those developed in the USFWS Habitat Evaluation Procedures (HEP). For each habitat type, those models define an assemblage of variables considered important to the suitability of an area to support a diversity of fish and wildlife species. The HAM, however, is a community-level evaluation instead of the species-based approach used with HEP. The WVA is used to evaluate proposed CWPPRA projects, and is similar to the USFWS HEP, in that habitat quality and quantity (acreage) are measured for baseline conditions, and predicted for future without-project and future with-project conditions. As with HEP, the WVA provides a quantitative estimate of project-related impacts to fish and wildlife resources; however, the WVA is based on separate models for fresh/intermediate marsh, brackish marsh, and saline marsh. Further explanation

of how impacts/benefits are assessed with the HAM and WVA and an explanation of the assumptions affecting habitat suitability (i.e., quality) index (HSI) values for each target year for impacts to bottomland hardwood and swamp habitat are available for review at the USFWS Lafayette, Louisiana, field office.

Interagency field trips were conducted to obtain raw field data for the IER # 12 project on 7 July 2007, 8 August 2007, and 10 October 2007. The methodology being utilized in determining appropriate mitigation, which would include no net loss of wetland values, is the WVA that was developed by the Environmental Work Group for the Coastal Wetlands Planning, Protection, and Restoration Act to evaluate projects proposed to be constructed pursuant to that Act. The WVA computes the AAHUs lost by project implementation. The AAHUs (table 6) are converted to acres needed to meet the nation's no-net-loss of wetlands policy once the mitigation site is selected. Approximately 1.9 AAHUs of BLH, 177.3 AAHUs of altered BLH, and 38.5 AAHUs of cypress-tupelo swamp have been computed by the interagency team as the AAHUs that would be unavoidably impacted as a result of the construction of the proposed action (appendix D).

Distinct habitats are represented within the boundaries of proposed construction area within the IER # 12 project area, namely floatant marsh, BLH forests, and cypress-tupelo swamps. Proposed actions within the existing ROW avoid and minimize wetland impacts to the greatest extent practicable. Existing ROW areas are generally previously impacted, mowed, and maintained grassy areas that provide minimal food or shelter for fish and wildlife resources. Because the 100-year level of risk reduction would require new construction and upgrades to existing footprints to ensure engineering effectiveness and safety, some impacts to BLH and swamp areas are unavoidable.

Though mitigation for unavoidable adverse impacts due to the proposed action presented within this IER is only briefly discussed, mitigation for unavoidable impacts to the human and natural environment described in this and other IERs will be addressed in a separate mitigation IER as per the alternative NEPA arrangements implemented in March 2007. 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 chapter 1 of this IER, be available for a 30-day public review and comment period.

A complementary comprehensive mitigation IER or IERs will be prepared documenting and compiling these unavoidable impacts and those for all other proposed actions within the HSDRRS that are being analyzed through other IERs. Mitigation planning is being carried out for groups of IERs, rather than within each IER, so that large mitigation efforts could be taken rather than several smaller efforts, increasing the relative economic and ecological benefits of the mitigation effort.

The forthcoming mitigation IER will implement compensatory mitigation as early as possible. All mitigation activities will be consistent with standards and policies established in appropriate Federal and state laws, and the CEMVN policies and regulations.

Table 16 shows the cumulative compensatory mitigation requirements identified by the CEMVN so far. This table will be updated as potential impacts are assessed in forthcoming IERs.

## 7.2 Monitoring Plan

The project feature augmentations recommended by the EPA include, in order of priority:

- Gapping the dredge material bank along the southern side of the Estelle outfall canal to provide even sheet flow into the Bayou aux Carpes CWA Section 404(c) area
- Modifying the dredge material bank along the Southern Natural Gas Pipeline Canal to provide hydrological exchange
- Modifying the shell plug at Bayou aux Carpes to provide hydrological exchange
- Closing the Southern Natural Gas Pipeline Canal
- Gapping or grading down drill hole access canal banks
- Gapping or grading down oil well access roads

To determine which project augmentations would be most beneficial to the Bayou aux Carpes CWA Section 404(c) area an interagency study effort is being completed to establish existing soil and water-quality conditions in the Bayou aux Carpes CWA Section 404(c) wetlands, as well as prevailing patterns of inundation within and adjacent to the 404c area. The wetlands in the Bayou aux Carpes CWA Section 404(c) area are currently isolated from direct inflow of storm water runoff and natural tidal exchange in some locations because of levees and dredge material banks. Upon completion of the interagency study storm water runoff may be directed from the Old Estelle Pump Station through and across the wetlands and some tidal exchange may be permitted in certain areas to restore the natural hydrology. It is unknown what impact this change in water quality and hydrology may have on the wetlands. The wetlands consist of floating marshes, with a predominately organic substrate, and forested wetlands, some of which occur within the floating marshes (see the Bayou aux Carpes CWA Section 404(c) area description in section 3.2.2).

Studies are underway at the USACE Engineering Research and Development Center (ERDC) in Vicksburg, Mississippi, the Vicksburg USACE District, and at the United States Geological Survey in Baton Rouge, Louisiana to determine the best possible design to allow for maximized benefit of this work in the Bayou aux Carpes CWA Section 404(c) area. Hydrologic and environmental surveys are ongoing within and adjacent to the 404c to determine the appropriate areas for the proposed dredge material bank gapping within the Old Estelle discharge canal and dredge material bank gapping in other canals and for the removal of plugs or portions of the plugs in Bayou aux Carpes and other canals. In addition, the surveys will determine the appropriate water flow velocities within the Bayou aux Carpes CWA Section 404(c) area so creating the gaps and removal of canal plugs can be properly designed. Additional design work would take into consideration the appropriate nutrient loading levels. These studies will be integrated into the efforts of the Interagency resource team that was formed early in the analysis phase to ensure that the national interest placed on the Bayou aux Carpes site meets the wisest and best use of the area. All actions would be fully coordinated with the EPA and the interagency team and the public before being implemented.

The monitoring of preexisting conditions has three components:

#### Floating marsh:

Pore water quality will be documented at four locations, near and at some distance from the project area (Figure 14). The two northern most sites are located approximately 50 yards to 100 yards off the dredge material bank. At each marsh sampling site, pore water will be sampled at 15 cm and 45 cm depth for a suite of parameters including low-level nutrients including dissolved inorganic N, ions and dissolved organic carbon. Samples will be taken quarterly, in November of 2008, and in February, late April and August/September 2009.

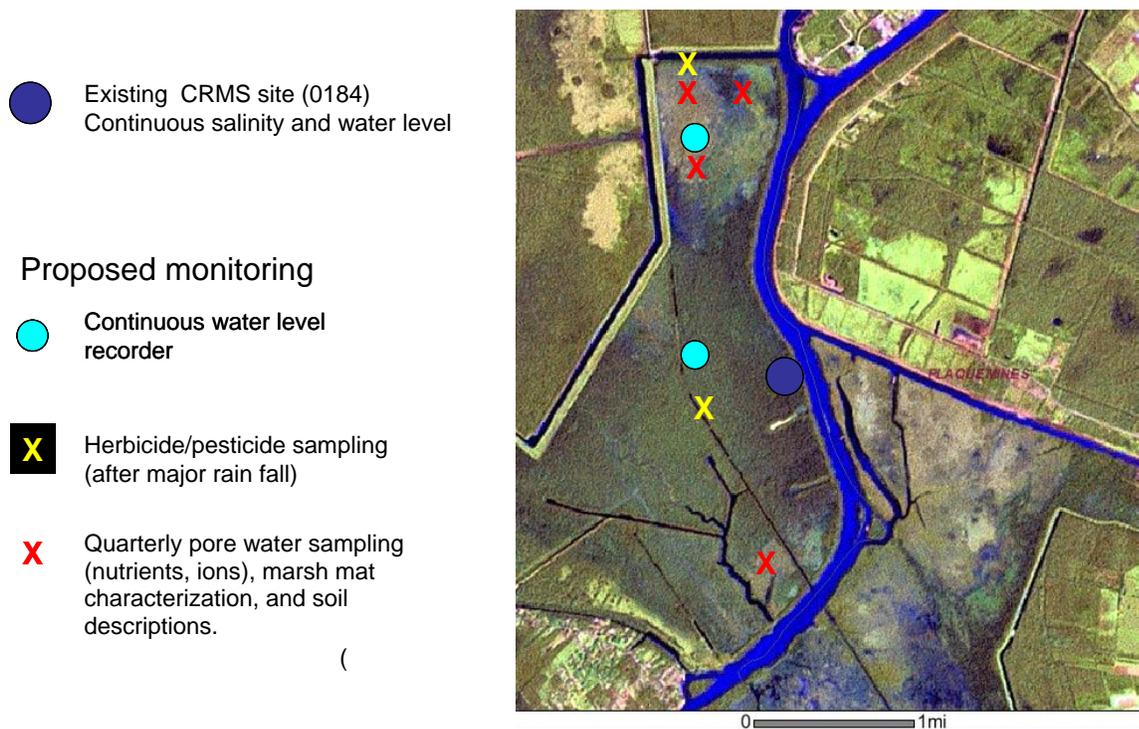
At these same sites, soil quality (degree of decomposition) will be documented at 5 cm and 15 cm depth (root zone) using the NRCS fiber analysis (see Swarzenski and others, 2005; Figure 14). In addition, soils will be cored with a McAuly auger to a clay layer or 2 meters (whichever is nearer the surface), to evaluate the thickness of the peat layer. Floating marsh type will be determined following the Sasser et al (1996) classification.

#### Estelle Pumping Station

At the pumping station, one sample of surface water will be collected for analysis of a suite of herbicides, including fipronil and atrazine (Figure 14). Similarly, a surface water-quality sample will be taken in the main canal. These samples will be collected 1-2 days after a major rainfall event.

#### Inundation, hydraulic gradient

Two stations continuously measuring water level will be established on the property, as per figure 14. An attempt to establish hydraulic gradients will be made by matching up peaks in the water surface during major inundation events, and hydraulic gradients established based on floor elevation.



**Figure 14. Proposed water quality monitoring stations within the Bayou aux Carpes CWA Section 404(c) area.**

The data collected throughout these ongoing studies would be compared to similar, pristine, nearby marshes, and would also provide baseline data against which to evaluate future change.

Once the baseline data set is completed and the results are presented to the Interagency team, the CEMVN in cooperation with the EPA, NPS, USFWS and other members of the Interagency team would determine which project feature augmentations would be beneficial to the 404c area. The ongoing studies to determine the existing hydrology and water and soil conditions within the Bayou aux Carpes CWA Section 404(c) area are considered to be adequate to determine which augmentations would be beneficial. Those beneficial project feature augmentations would then be implemented in partnership with the EPA and the NPS. Though these data are not available within this document, the data and project augmentation implementation plans will be disclosed in future environmental reports prior to any decision being made by the CEMVN District Engineer.

In addition to the ongoing environmental studies, the Interagency team also suggested cypress tree surveys along with eagle, wading bird, and other indicator species surveys should be conducted to indicate habitat quality. Baseline Bald Cypress and wildlife data would also be required. The cypress tree and wild life surveys are under consideration, and survey plans, including specific indicator species, survey frequency, etc., would be determined by the CEMVN in collaboration with the Interagency team and disclosed in future environmental reports.

Following construction of any of the proposed project augmentations and mitigation efforts, water quality, soil and water conditions, along with wildlife monitoring would continue throughout the life of the project. If at anytime throughout the implementation of the proposed project augmentation, monitoring efforts reveal a feature augmentation having adverse environmental impacts, appropriate steps would be taken by the CEMVN, the EPA, and NPS to diminish the adverse impacts and remove the feature augmentation if required (i.e., closing the gaps in the Old Estelle outfall canal and opening the gate structure at the end of the canal). Monitoring data and results on the constructed project feature augmentations would be disclosed in future environmental reports.

## **CHAPTER 8 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS**

Construction of the proposed action would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described below.

Environmental compliance for the proposed action would be achieved upon coordination of this IER with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NMFS confirmation that the proposed action would not be likely to adversely affect any T&E species, or completion of Endangered Species Act Section 7 consultation (appendix D and E); LADNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LCRP (appendix E); coordination with the LASHPO (appendix H); receipt and acceptance or resolution of all FWCA recommendations (appendix I); and receipt and acceptance or resolution of all (Louisiana Department of Environmental Quality) LADEQ comments on the water quality and air quality impact analysis documented in the IER.

Executive Order (E.O.) 11988. E.O. 11988, Floodplain Management, addresses minimizing or avoiding adverse impacts associated with the base floodplain unless there are no practicable alternatives. It also involves giving public notice of proposed actions that may affect the base floodplain. The proposed action would not accelerate development of the floodplain for the following reasons: development of the study area is more closely related to access routes and the need for affordable housing space than flooding potential and conditions conducive for development were established initially when the area was leveed and forced drainage was initiated in the middle 1960s.

Executive Order 11990. E.O. 11990, Protection of Wetlands, has been important in project planning. It is acknowledged that a portion of the area enclosed by the existing levee consists of wetlands. However, by following the existing alignments and working in developed areas, there would be direct adverse impacts to wetlands for this project. Any increased size of the interior borrow/drainage canal as a result of levee enlargement would result in increased capacity; however, this would have essentially no indirect effect on the rate of drainage from the basin. Increased pumping station capacities are not a part of this action.

Consistency with Coastal Zone Management (CZM) Program. The CEMVN has determined that construction and maintenance of 100-year level of risk reduction along the WBV, Westwego to Harvey Levee Project is consistent, to the maximum extent practicable, with the guidelines of the State of Louisiana's approved Coastal Zone

Management Program. A CZM consistency determination, C20080483, was dated 17 December 2008. The consistency letter of approval from the LADNR completes the consistency requirements.

Clean Air Act. The original 1970 CAA authorized EPA to establish NAAQS to limit levels of pollutants in the air. The EPA has promulgated NAAQS for six criterion pollutants: sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), ozone, lead, and particulate matter (PM-10). All areas of the United States must maintain ambient levels of these pollutants below the ceilings established by the NAAQS; any area that does not meet these standards is considered a "non-attainment" area (NAA). The 1990 Amendments require that the boundaries of serious, severe, or extreme ozone or CO non-attainment areas located within MSAs or Consolidated Metropolitan Statistical Areas (CMSAs) be expanded to include the entire MSA or CMSA unless the governor makes certain findings and the Administrator of the EPA concurs. Consequently, all urban counties included in an affected MSA or CMSA, regardless of their attainment status, would become part of the NAA. The project is located primarily in Jefferson Parish, which is classified as an attainment area; therefore NAAQS are not applicable to this project.

Clean Water Act. The Clean Water Act (CWA; 33 U.S.C. 1251-1387; Act of 30 June 1972, as amended) is a very broad statute with the goal of maintaining and restoring waters of the United States. The CWA authorizes water quality and pollution research, provides grants for sewage treatment facilities, sets pollution discharge and water quality standards, addresses oil and hazardous substances liability, and establishes permit programs for water quality, point source pollutant discharges, ocean pollution discharges, and dredging or filling of wetlands. The intent of the CWA's §404 program and its §404(b)(1) "Guidelines" is to prevent destruction of aquatic ecosystems including wetlands, unless the action would not individually or cumulatively adversely affect the ecosystem. For the purposes of IER # 12, all potential dredge material will be tested to determine contamination levels (appendix L).

Section 404(b)(1) guidelines were used to evaluate the discharge of dredged or fill material for adverse impacts to the aquatic ecosystem. The following actions would be taken to minimize the potential for adverse environmental impacts. The existing levee alignment would be followed in construction of the proposed levee. All sloped areas would be seeded. Non-forested wetlands, consisting of mown levee grasses or grazed pasture, were not mitigated because of their low value to fish and wildlife resources. The proposed project complies with the requirements of the guidelines. The LADEQ Water Quality Certification letter, WQC 080825-02/AI 160206/CER 20080001, dated 16 December 2008, completes the certification process.

Endangered Species Act. The Endangered Species Act (ESA; 16 U.S.C. 1531-1543; Pub. L. 93-205, as amended) was enacted in 1973 for the purpose of providing for the conservation of species which are in danger of extinction throughout all or a significant portion of their range. "Species" is defined by the ESA to mean either a species, a subspecies, or, for vertebrates (*i.e.*, fish, reptiles, mammals, etc.) only, a distinct population. No threatened or endangered species or their critical habitat would be impacted by the proposed action. The USFWS concurred with our determination in their letter dated 26 November 2007.

Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act (16 U.S.C. 661-666c; Act of 10 March 1934, as amended) requires that wildlife, including fish, receive equal consideration and be coordinated with other aspects of water resource development. This is accomplished by requiring consultation with the USFWS and

NMFS whenever modifications are proposed to a body of water and a Federal permit or license is required. This consultation determines the possible harm to fish and wildlife resources, as well as the measures that are needed to prevent the damage to and loss of these resources and to develop and improve the resources, in connection with water resource development. NMFS submits comments and recommendations to Federal licensing and permitting agencies and to Federal agencies conducting construction projects on the potential harm to living marine resources caused by the proposed water development projects, and submits recommendations to prevent harm. The USFWS provided the “Draft Fish and Wildlife Coordination Act Report for the Individual Environmental Reports (IER), Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4)” in November 2007. To fulfill the responsibilities of the Fish and Wildlife Coordination Act, the USFWS will provide a post-authorization final supplemental 2(b) report to the draft programmatic report. A draft project-specific Coordination Act Report was received from USFWS by letter dated 27 October 2008. A final report would be prepared after the 30-day public review period and all comments regarding USFWS trust resources have been resolved, and before a final IER has been completed.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act of 1918 (MBTA) is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico, and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possessing, transporting, and importing of migratory birds, their eggs, parts, and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent over-utilization. Section 704 of the MBTA states that the Secretary of the Interior is authorized and directed to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take. The MBTA prohibits the take, possession, import, export, transport, sale, purchase, barter, or offer for sale, purchase or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR §21.11). The USFWS addressed compliance with this Act in the “Draft Fish and Wildlife Coordination Act Report for the Individual Environmental Reports (IER), Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4)” in November 2007. To fulfill the responsibilities of the Fish and Wildlife Coordination Act, the USFWS will provide a post-authorization final supplemental 2(b) report to the draft programmatic report.

National Environmental Policy Act. The National Environmental Policy Act (NEPA; 42 U.S.C. 4321-4347; Pub. L. 91-190, as amended) requires Federal agencies to analyze the potential effects of a proposed Federal action that would significantly affect historical, cultural, or natural aspects of the environment. It specifically requires agencies to use a systematic, interdisciplinary approach in planning and decision-making, to insure that environmental values may be given appropriate consideration, and to provide detailed statements on the environmental impacts of proposed actions including: (1) any adverse impacts; (2) alternatives to the proposed action; and (3) the relationship between short-term uses and long-term productivity. The agencies use the results of this analysis in their decision-making process. The preparation of this IER is a part of complying with NEPA.

National Historic Preservation Act. Congress established the most comprehensive national policy on historic preservation with the passage of the National Historic Preservation Act of 1966 (NHPA). In this Act, historic preservation was defined to

include "the protection, rehabilitation, restoration and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or culture." The Act led to the creation of the National Register of Historic Places, a file of cultural resources of national, regional, state, and local significance. The act also established the Advisory Council on Historic Preservation (the Council), an independent Federal agency responsible for administering the protective provisions of the act. The major provisions of the NHPA are Sections 106 and 110. Both sections aim to ensure that historic properties are appropriately considered in planning Federal initiatives and actions. Section 106 is a specific, issue-related mandate to which Federal agencies must adhere. It is a reactive mechanism that is driven by a Federal action. Section 110, in contrast, sets out broad Federal agency responsibilities with respect to historic properties. It is a proactive mechanism with emphasis on ongoing management of historic preservation sites and activities at Federal facilities. Coordination of this project with SHPO fulfills the requirements to comply with the NHPA, and the SHPO letter dated 01 August 2008 concludes this process.

## **CHAPTER 9 CONCLUSIONS**

### **9.1 INTERIM DECISION**

The primary elements of the proposed action consist of:

1. Degrading the existing levee on the east bank of the GIWW and building a new levee to the 100-yr level of risk reduction to the protected side. Relocating Bayou Road to travel on the protected side of the new levee.
2. The construction of a closure complex and a by-pass channel on the GIWW.
3. The construction of a 20,000 cfs or greater pump station on the GIWW.
4. 4,200 ft of levee/floodwall construction along the WCC bordering the EPA 404c area.
5. 100-year risk reduction effort involving a floodwall along the northern boundary of the Estelle discharge canal, at the Estelle pump station and a closure structure where the Estelle Outfall Canal meets Harvey Canal.
6. 100-year risk reduction effort involving a protected side shift built levee on the east bank of the V-line canal.
7. Use of 700,000 cubic yards of dredge material beneficially as a mitigation effort in the JLNHPP.
8. Evaluating project feature augmentations, and the monitoring plan, for benefits and feasibility to enhance the Bayou aux Carpes CWA Section 404(c) area.

The CEMVN has assessed the environmental impacts of the proposed action and has determined that the proposed action would have the following impacts:

1. Permanent impacts to 329 total acres of wetland (9.6 acres of the EPA 404c wetland).
2. Permanent impacts to the Bayou aux Carpes CWA Section 404(c) area due to habitat loss, and possible hydrological impacts due to construction.
3. Potential beneficial impacts to the 404c area due to the implementation of project feature augmentations to offset any hydrological impacts.
4. Impacts to fisheries and aquatic organisms in the EPA 404c area and other wetland habitat areas due to construction.
5. Temporary impacts to wildlife due to habitat loss including BLH wetland habitat and the EPA 404c acreage (9.6 acres).
6. Temporary and localized impacts to air quality and noise during the construction phase of the project due to heavy equipment use and transport of materials.

7. Impacts to aesthetics and viewsheds due to the location of project elements on the GIWW.
8. Socioeconomic impacts are largely beneficial, though temporary transportation route impacts are expected.
9. Temporary impacts to navigation during construction would be expected. This includes barge traffic being rerouted through a closure complex on the GIWW. Use of the 225 ft gate would minimize permanent impacts to navigation.

## 9.2 PREPARED BY

The point of contact and responsible manager for the preparation of this IER is Getrisc Coulson, CEMVN. The address of the preparers is: U.S. Army Corps of Engineers, New Orleans District; Planning, Programs, and Project Management Division, CEMVN-PM; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Table 17 provides detailed list of the preparers for the various sections and topics in this IER.

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## CHAPTER 10 APPENDICES

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- Appendix C: Members of Interagency Environmental Team
- Appendix D: USFWS T&E Concurrence
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- Appendix J: Alternative Design Detail Sheets
- Appendix K: EPA Bayou aux Carpes CWA Section 404(c) Alternative Development
- Appendix L: Algiers Canal Dredge Plan
- Appendix M: IER # 12 Study Area - Recognized Environmental Conditions