DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

Planning, Programs, and
Project Management Division
Environmental Planning
and Compliance Branch

Decision Record

Individual Environmental Report #5
PERMANENT PROTECTION SYSTEM
FOR THE OUTFALL CANALS PROJECT
ON 17TH STREET, ORLEANS AVENUE, AND LONDON AVENUE CANALS,
JEFFERSON AND ORLEANS PARISHES, LOUISIANA

IER #5

Description of Proposed Action.

The proposed action consists of a new permanent pump station and closure (i.e. gates) at or near the mouth of each of the outfall canals operating in series with the existing Sewerage and Water Board of New Orleans (SWBNO) pump stations (PS). The pumping capacity at 17th Street would fall between the range of 10,500 and 12,500 cfs. The pumping capacity at Orleans Avenue would be 2,700 cfs. The pumping capacity at London Avenue would fall between the range of 8,000 and 9,000 cfs. Under normal conditions, the flow from the canals would discharge through open gates directly into Lake Pontchartrain without having to operate the new pumping station. During those events where the combination of storm surge from Lake Pontchartrain and flow from the existing SWBNO pump stations could create a condition where the safe water elevation in the canals is exceeded, the gates would be closed and the new pump stations operated. The existing SWBNO PS #3, #4, #6, and #7 would remain in service and operate concurrently or in series with the new pump stations and the outfall canals would continue to convey storm water from the SWBNO pump stations to the new pump stations. The new pump stations could be constructed with sill elevations from -27 to -43 NAVD 88 based on individual pump capacities of 1,500 cfs. If a lower capacity pump is used the sill depth may be more shallow. Heights of structures associated with the pump station will be minimized and not exceed a height of 45 feet.

The proposed action would leave in place the floodwalls that flank the outfall canals, and these floodwalls would remain an integral part of the city's internal flood protection system. The floodwalls on the protected side of the new pump stations would be maintained in their current condition and would not be reconstructed. Following operational testing and acceptance of each pump station, the existing ICS will be removed and the area restored to pre-construction conditions.

The new permanent pump station at the 17th Street Canal as proposed would be approximately 500 feet to 1,000 feet north of the Hammond Highway Bridge. The new permanent pump station at the Orleans Avenue Canal would be approximately 300 feet south of Lakeshore Drive. The new permanent pump station at the London Avenue Canal would be approximately 1000 feet south of Lakeshore Drive.

All three pump stations would likely include inlet and outlet works, trash screens, and a pump station building housing pumps, motors, and the gate structure. The new gate structure could consist of gates, gate guides, hoisting equipment, and an enclosure to protect the hoisting equipment.

Draft IER #5, which detailed the impacts of the proposed action, was released for public review on May 4, 2009. Stakeholders had until June 3, 2009 to comment on the document. Comments were received from four federal agencies and one tribal government. Public meetings pertaining to IER #5 occurred on 7 June, 12 June, 16 August, 25 September, 27 September, 1 November and 29 November 2007; 26 February, 1 July, and 22 October 2008; and 20 May 2009.

Factors Considered in Determination. CEMVN has assessed the impacts of the proposed action on significant resources in the project area, including Waters of the United States, hydrology, wildlife, threatened and endangered species, essential fish habitat, cultural resources, recreational resources, noise, air quality, aesthetics, traffic and transportation, land use, socioeconomic resources and environmental justice.

All jurisdictional wetlands were assessed in cooperation with the US Fish and Wildlife Service (USFWS) under National Environmental Policy Act, Fish and Wildlife Coordination Act, and Section 906 (b) WRDA 1986 requirements. The impacts for the proposed action are as follows:

Waters of the United States
Approximately 3.59 acres of waters of the U.S. would be permanently filled through construction of the pump stations. Approximately 3.29 acres of estuarine waters of the U.S. could be filled if breakwaters are built at the mouths of the 17th Street and Orleans Avenue canals.

Hydrology
Short term impacts during construction would affect water flow within the canal due to temporary construction features, but the canal would continue to function as a conduit to evacuate storm water both during and after construction.

Water Quality
Short term impacts from construction activities include increased turbidity, decreased dissolved oxygen, increased suspended sediments, slightly increased temperature and increased biological oxygen demand. After construction completion, breakwaters could cause erosion in nearby unprotected beaches during large storm events. Any increase in erosion would be monitored and become part of operation and maintenance procedures for the new station.

Wildlife
Impacts to wildlife species could include temporary impacts to local wildlife during construction activities, which would be temporary and localized during the duration of construction activities. Proposed areas are highly urbanized and as such do not support a diverse or valuable wildlife base.

Threatened and endangered species
In a 30 January 2009 letter (incorrectly dated 2007), US Fish and Wildlife Service concurred with CEMVN's determination that the proposed project is not likely to adversely affect threatened or endangered species under its jurisdiction or their habitat. Under formal Endangered Species Act Section 7 consultation, the National Marine Fisheries Service in a letter dated 17 April 2009 concurred with CEMVN analysis of the project's effects on Gulf sturgeon and Gulf sturgeon critical habitat which determined that prey abundance will be adversely affected by the project, but not to the extent that it would reduce the critical habitat's ability to support Gulf sturgeon conservation. NMFS considers the permanent loss of 3.3 acres of critical habitat as having insignificant effects on Gulf sturgeon. The agency further concluded that sea turtles under its jurisdiction would not be adversely impacted by the project.

Essential fish habitat
Temporary impacts to water turbidity, dissolved oxygen, and biological oxygen demand during construction and storm events could temporarily displace fish species. Approximately 3.3 acres of open water/mud bottom habitat in Lake Pontchartrain would be lost if breakwaters are built at the mouth of the 17th Street and Orleans Avenue canals. However, the breakwaters could result in a beneficial indirect impact by providing substrate for sessile organisms that provide food for other aquatic species.

Cultural resources
The State Historic Preservation Officer concurred with CEMVN's "no adverse effect" finding in a letter dated 10 November 2008.

Recreational resources
Depending on the final configuration of the pump station within the maximum footprint analyzed, several recreation areas could be impacted. These include West End Park, Coconut Beach Volleyball Complex, Bucktown Harbor, Lakeshore Park, and area greenspace. The use of some facilities could be temporarily restricted during construction such as Orleans Marina and the Municipal Yacht Harbor.

Noise
Under normal non-storm conditions, the pump stations would be virtually inaudible to nearby residences. During storm events, pump stations operating between 50 and 100 percent of capacity would be expected to exceed New Orleans noise ordinances of 70dBA daytime and 60 dBA at night. This would be a short term impact that would only occur when storm events forced the closure of the proposed gates and the pumps were run to evacuate stormwater from the

system. Mitigation measures could be required to reduce these impacts to acceptable levels and comply with the local noise ordinance if necessary.

Air quality
Emissions are not expected to exceed 100 tons per year of any criteria pollutant, would not be regionally significant, and would not contribute to a violation of air regulations. Emissions levels are considered to be de minimus

Traffic and transportation
Direct impacts would include temporary road closures and congestion in those areas where project construction is occurring. Roads directly impacted could include Hammond Highway, Pontchartrain Boulevard, West End Boulevard, I-10/I-610, Lakeshore Drive, Robert E. Lee Boulevard, Canal Street, Marconi Drive, Paris Avenue and Elysian Fields Avenue.

Aesthetics
The new pump stations would introduce industrial-type structures in largely residential and park settings. Efforts during the design phase would be made to incorporate elements that would allow the pump stations to blend with the local area to the greatest extent practicable.

Land use
Land use would change from residential/commercial development and greenspace to light industrial within the project footprint.

Socioeconomic resources
Short term impacts would include increase in the level of spending, labor, and capital expenditures during construction. Long term impacts could occur from the risk of storm surge and flooding to housing units and businesses in the project area would be reduced.

Environmental justice
The proposed action would not have disproportionate impacts on minority or low-income residents.

Hazardous, Toxic, and Radioactive Waste
CEMVN completed an American Society for Testing Materials (ASTM) E 1527-05 Phase I Environmental Site Assessment (ESA), limited Phase II ESA, and Phase I ESA Addendums. All Recognized Environmental Concerns would be avoided; the probability of encountering HTRW in the project area is low

Mitigation. No mitigation requirements were identified as a result of the proposed action.

Environmental Design Commitments. All comments made by US Fish and Wildlife Service have been incorporated into the IER under Section 6.2. If any unrecorded cultural resources are determined to exist within the proposed project site, then no work will proceed in the area containing these cultural resources until a CEMVN staff archeologist has been notified and final

coordination with the Louisiana State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer has been completed.

The solicitation package for procuring the design-build proposals for this project will include a number of design considerations intended to avoid or minimize the impacts of any proposed solution. These design parameters, listed below, were considered for the purposes of this document's impacts analysis. These include:

- Minimize impact to the overall footprint.
- Minimize impacts to wetlands and natural hydrological regime.
- Maintain a water flow capacity that is comparable to the canals capacity prior to construction.
- Avoid or minimize disturbance of contaminated sediments and other hazardous, toxic, or radioactive waste in the study area if they are found to be present.
- Minimize impact to recreation and green space.
- Construction of the pump stations, demolition of the existing ICS and operation of the stations will conform to the noise and vibration limitations of the New Orleans Municipal Code for Sound Attenuation. Mitigation measures could be required to reduce noise impacts to acceptable levels and comply with the local noise ordinance if necessary.
- Heights of structures associated with the pump station will be minimized and not exceed a height of 45 feet.
- Temporary construction easements will be returned to pre-construction conditions and consistent with the 100-year level of protection.
- All project features will be designed so that the visual and human-cultural values associated with the project are protected, preserved, maintained, or enhanced to the maximum extent practicable. Structures will be designed to blend with their physical surroundings, or where contrast is necessary and appropriate, that contrast will, insofar as possible, improve the environment to the greatest extent practicable.

Agency & Public Involvement. Various governmental agencies, non-governmental organizations, and stakeholders were engaged throughout the preparation of IER #5. Agency staff from US Fish and Wildlife Service, National Marine Fisheries Service, US Environmental Protection Agency, US Geologic Survey, National Park Service, Louisiana Department of Natural Resources, Louisiana Department of Environmental Quality, and the Louisiana Department of Wildlife and Fisheries were part of an interagency team that has and will continue to have input throughout the HSDRRS planning process (IER #5, Appendix C).

There have been over 100 public meetings since March 2007 about proposed HSDRRS work in the New Orleans area. Issues relating to draft IER #5 have been discussed at eleven of these meetings. CEMVN sends out public notices in local and national newspapers, news releases (routinely picked up by television and newspapers in stories and scrolls), e-mails, and mail notifications to stakeholders for each public meeting. In addition, www.nolaenvironmental.gov was set up to provide information to the public regarding proposed HSDRRS work. Below is a list of the comments received.

1. Public Comments submitted during the 30-day public comment period (found in IER #5, Appendix B)
    a. Mr. Roy Burnette: Email comment dated May 5, 2009
    b. Mr. Mike Dunn: Email comment dated May 9, 2009
    c. Ms. Ashley Montalbano: Comment letter dated May 11, 2009
    d. Anonymous: Email comment dated May 12, 2009
    e. Anonymous: Email comment dated May 13, 2009
    f. Anonymous: Email comment dated May 14, 2009
    g. Ms. Heather G. LaCombe: Email comment dated May 19, 2009
    h. Ms. Melanie Thompson: Email comment dated May 19, 2009
    i. Ms. Emily Atol: Email comment dated May 19, 2009
    j. Anonymous: Email comment dated May 19, 2009
    k. Ms. Sherri Thompson: Email comment dated May 20, 2009
    l. The Varisco family: Email comment dated May 20, 2009
    m. Dr. Adam Faschan, Ph.D., P.E.: Comment letter dated May 20, 2009
    n. Colette and Scott Sterbcow and families: Email comment dated May 20, 2009
    o. Mr. Peter Hickman: Email comment dated May 20, 2009
    p. Ms. Rhonda C. Zimmer: Comment letter dated May 20, 2009
    q. Mr. Mr. Mike Dunn: Email comment dated May 21, 2009
    r. Anonymous: Email comment dated May 21, 2009
    s. Carla and Rex Bubacz: Comment letter dated May 28, 2009
    t. Mr. Matt McBride: Email comment dated May 29, 2009
    u. New Orleans City Council: Comment letter and Resolution No. R-09-248 dated May 30, 2009
    v. Ms. Susan M. Garcia: Comment letter dated June 1, 2009
    w. Mr. Carlton Dufrechou, Lake Pontchartrain Basin Foundation: Comment letter dated June 2, 2009
    x. Mr. Lambert J. Hassinger, Jr., Lake Terrace Property Owners Association: Comment letter dated June 3, 2009
    y. Ms. Lisa Ludwig: Email comment dated June 3, 2009
    z. Ms. Patricia Fullmer: Email comment dated June 3, 2009
    aa. Mr. John M. Davis Jr, Lake Vista Property Owners Association: Email comment dated June 3, 2009
    bb. Save II Tony's Restaurant Petition, 119 signatures
    cc. Jefferson Parish Council: Resolution No. 111876
    dd. 42 phone messages regarding Coconut Beach (names and dates provided in Appendix B)
    ee. 780 email messages regarding Coconut Beach (names and dates provided in Appendix B)

2. Agency Comments (found in IER #5, Appendix D)
    a. National Marine Fisheries Service, Southeast Regional Office: Two comment letters dated May 12, 2009

b. U S Fish and Wildlife Service: Comment letter dated May 20, 2009
c. Louisiana Department of Environmental Quality: Email comment dated May 28, 2009

3. Tribal Government Comments (Found in IER #5, Appendix D)
   a. Choctaw Nation of Oklahoma: Comment letter dated May 26, 2009

Decision. In accordance with the Alternative Arrangements for NEPA Compliance, as published in the Federal Register on March 13, 2007, CEMVN has assessed the potential environmental impacts of the proposed action described in this IER, and performed a review of the above comments received for Draft IER #5, as well as public meetings held 7 June, 12 June, 16 August, 25 September, 27 September, 1 November and 29 November 2007; 26 February, 1 July, and 22 October 2008; and 20 May 2009. Furthermore, all practicable means to avoid or minimize adverse environmental effects have been incorporated into the recommended plan.

The public interest will be best served by implementing the proposed action in IER #5 in accordance with the design commitments discussed above. CEMVN will prepare a Comprehensive Environmental Document (CED) that may contain additional information related to IER #5 that becomes available after the execution of the Final IER. The CED will provide a final mitigation plan, comprehensive cumulative impacts analysis, and any additional information that addresses outstanding data gaps in any of the IERs in accordance with the Federal Register notice dated March 13, 2007.

I have reviewed IER #5, and have considered agency comments and recommendations and comments received from the public during the scoping phase and comment periods. I find the recommended plan fully addresses the objectives as set forth by the Administration and Congress.

The plan is justified, in accordance with environmental statutes, and it is in the public interest to construct the actions as described in this document and the final IER #5, which is attached hereto and made a part hereof.

6-30-09
Date

Alvin B. Lee
Alvin B. Lee
Colonel, US Army
District Commander

FINAL INDIVIDUAL ENVIRONMENTAL REPORT

PERMANENT PROTECTION SYSTEM FOR THE OUTFALL CANALS PROJECT ON 17TH STREET, ORLEANS AVENUE, AND LONDON AVENUE CANALS

JEFFERSON AND ORLEANS PARISHES, LOUISIANA

IER #5

US Army Corps of Engineers®

June 2009

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Individual Environmental Report #5 (IER #5) to evaluate the potential impacts associated with the construction and maintenance of a permanent protection system for the 17th Street, Orleans Avenue, and London Avenue Canals. The proposed action discussed in this document is in the New Orleans metropolitan area in Jefferson and Orleans Parishes (figure 1).

IER #5 has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's (CEQ) Regulations (Title 40 of the *Code of Federal Regulations* [CFR] 1500-1508), as reflected in the USACE Engineering Regulation (ER) 200-2-2. The execution of an IER, in lieu of a traditional Environmental Assessment (EA) or Environmental Impact Statement (EIS), is provided for in ER 200-2-2, Environmental Quality (33 CFR §230) Procedures for Implementing the NEPA and pursuant to the CEQ NEPA Implementation Regulations (40 CFR §1506.11). The Alternative Arrangements can be accessed at www.nolaenvironmental.gov, and are herein incorporated by reference.

The CEMVN implemented Alternative Arrangements on 13 March 2007, under the provisions of the CEQ Regulations for Implementing the NEPA (40 CFR §1506.11). This process was implemented to expeditiously complete environmental analysis for any changes to the authorized system and the 100-year level of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS), formerly known as the Hurricane Protection System (HPS), authorized and funded by Congress and the George W. Bush Administration. The proposed actions are 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.

The draft IER was distributed for a 30-day public review and comment period on May 4, 2009. Comments were received during the public review and comment period from Federal resource agencies, state resource agencies, non-governmental organizations, and citizens (Appendices B and D). The CEMVN District Commander reviewed public and agency comments, and interagency correspondence. The District Commander's decision on the proposed action is documented in the IER Decision Record.

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to reduce the risk to the City of New Orleans and Jefferson Parish from storm surge-induced flooding through the 17th Street, Orleans Avenue, and London Avenue Outfall Canals, while not impeding the ability of the area's internal drainage system to function. Public Law 109-234 states for the USACE to "…modify the 17th Street, Orleans Avenue, and London Avenue drainage canals and install pumps and closure structures at or near the lakefront." The overall need of the HSDRRS project is to provide a comprehensive, integrated protection system that would prevent storm surge-induced flooding via the outfall canals and reduce the imminent and continuing threat to life, health, and property posed by flooding from hurricanes and other tropical storm events. The proposed action results from a defined need to reduce flood risk and storm damage to residences, businesses, and other infrastructure from storm-induced and tidally driven 100-year storm events in Lake

Figure 1. IER #5 Project Area

Pontchartrain. The purpose and need would be achieved by providing a 100-year level of hurricane protection. The completed HSDRRS would lower the risk of harm to citizens, and damage to infrastructure during a storm event. The safety of people in the region is the highest priority of the CEMVN.

The term *100-year level of risk reduction*, as it is used throughout this document, refers to a level of 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 each year.

1.2 AUTHORITY FOR THE PROPOSED ACTION

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

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

The Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental - 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 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 H.R. 2206 (pg. 41-44) Title IV, Chapter 3, Flood Control and Coastal Emergencies, (5th Supplemental), General Provisions, Sec. 4302.

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.

- **Flood Control, Mississippi River and Tributaries (1927)**. This report published as House Document No. 90, 70th Congress, 1st Session, submitted 18 December 1927, resulted in authorization of a project by the Flood Control Act of 1928. The project provided comprehensive flood control for the lower Mississippi Valley below Cairo, Illinois. The Flood Control Act of 1944 authorized the USACE to construct, operate, and maintain water

resources development projects. The Flood Control Acts have had an important impact on water and land resources in the proposed project area.

- **Final Environmental Statement, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project (1974)**. The purpose of this report was to describe the protective features and identify the environmental effects of the LPV hurricane protection project. This project was authorized by the Flood Control Act of 1965 (Public Law 89-298), approved 27 October 1965, and described in House Document No. 231, 89th Congress, 1st Session. The proposed action for this hurricane protection project consisted of a barrier at the east end of Lake Pontchartrain to prevent storm surge from entering the lake. The barrier consisted of three major structural complexes at the Rigolets, Chef Menteur Pass, and Seabrook. Adverse environmental effects associated with this project included loss of marsh and wetlands, a decrease in the amount of secondary production of organic material in Lake Pontchartrain, and loss of wildlife habitat.

- **17th Street Canal Drainage Basin Study (1983)**. This report provided the first in-depth study of the 17th Street Canal Drainage Basin comprising 7,860 acres of Orleans Parish and 2,550 acres of Jefferson Parish. Recommended improvements to the drainage system included increasing the capacity of Pumping Station #6 by 50 percent; widening and deepening the outfall canal along its entire length; increasing the capacity of the 17th Street Canal between Pumping Station #6 and Jefferson Highway; increasing the capacity of Pumping Station #1, improving the Palmetto, Hoey's, and Geisenheimer canals; and doubling the capacity of the existing gravity systems.

- **Reevaluation Study, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project (1984)**. The purpose of this study was to review the ongoing LPV Hurricane Protection Project to determine if the plan of improvement (barrier plan) originally proposed was still the most feasible method to achieve hurricane protection for the Metropolitan New Orleans area, and if not, what modifications to the plan were necessary to provide the most feasible hurricane protection project. This study was conducted in response to a 1977 Federal court injunction which stopped construction of portions of the project on the basis that the 1974 final EIS for the project was inadequate. The court directed that the EIS be rectified to include adequate development and analysis of alternatives to the proposed action. This study determined that the high-level plan was the most feasible plan for providing hurricane protection. The high-level plan design concept consisted of raising and strengthening levees and floodwalls.

- **Bayou St. John Gate Structure Study (1986)**. This study evaluated and compared three alternate gate structures providing flood protection closure across Bayou St. John, approximately 650 feet south of the centerline of Lakeshore Drive. The types of gate structures evaluated were sector, miter, and flap gates. In addition, improvements to approximately 530 feet of existing levee along the banks of the bayou and the subsequent removal of the existing flood control structure in Bayou St. John at Robert E. Lee Boulevard were investigated. The sector gate was recommended as the best alternative to control water flow in Bayou St. John and flood protection closure at the bayou.

- **Environmental Assessment (EA) #76, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project, Orleans Avenue Outfall Canal (1988)**. This EA was prepared to evaluate two alternatives of providing hurricane protection to the Orleans Avenue Canal. The USACE recommended a *butterfly valve* structure at or near the lakefront end of the canal, while the Orleans Levee Board preferred to construct a system of parallel protection by raising the existing levees adjacent to the canal. It was concluded that impacts to fish and wildlife resources, recreation, threatened and endangered species, cultural resources,

aesthetics, noise, and community cohesion would be minimal with either plan. A Finding of No Significant Impact (FONSI) was signed 25 July 1988.

- **EA #79, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project, London Avenue Outfall Canal (1988)**. This EA was prepared to evaluate two alternatives of providing hurricane protection to the London Avenue Canal. The USACE recommended a *butterfly valve* structure at or near the lakefront end of the canal, while the Orleans Levee Board preferred to construct a system of parallel protection by raising the existing levees adjacent to the canal. It was concluded that impacts to fish and wildlife resources, recreation, threatened and endangered species, cultural resources, aesthetics, noise, and community cohesion would be minimal with either plan. A FONSI was signed on 17 October 1988.

- **EA #102, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project, 17th Street Outfall Canal (1990)**. This EA was prepared to evaluate two alternatives of providing hurricane protection to the 17th Street Canal. The two alternatives were a *butterfly valve* structure and construction of a system of parallel protection by raising the existing levees adjacent to the canal. The USACE recommended the parallel protection plan. It was concluded that impacts to fish and wildlife resources, recreation, threatened and endangered species, cultural resources, aesthetics, noise, and community cohesion would be minimal with either plan. A FONSI was signed on 12 March 1990.

- **EA #279, Lake Pontchartrain Lakefront, Breakwaters, Pump Stations 2 and 3 (1998)**. This EA evaluated the impacts associated with providing fronting protection for outfall canals and pump stations. It was determined that the action would not significantly impact resources in the immediate area. A FONSI was signed on 30 October 1998.

- **Project Information Report, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project, Orleans Parish, Orleans East Bank (2006)**. The purpose of this project information report was to identify requirements to remove storm water at the three outfall canals (17th Street, Orleans Avenue, and London Avenue). It was recommended that the total capacity of the temporary pumps, at the interim closure structures, be increased from 6,000 cubic feet per second (cfs) to 7,700 cfs at the 17th Street Canal closure structure and be decreased from 5,600 cfs to 5,000 cfs at the London Avenue Canal closure structure. These recommendations would not result in significant environmental impacts.

- **EA #433, Response to Hurricanes Katrina and Rita in Louisiana (2006)**. This EA was prepared to evaluate the potential impacts associated with the response actions taken by the USACE as a result of Hurricanes Katrina and Rita. Response actions included de-watering flooded areas, repair of levee breaches, construction of temporary gravel access roads, repair of pump stations, and construction of temporary pumps. Evaluation of potential impacts was conducted for the following significant resources: water quality, wetlands, fisheries, wildlife, threatened and endangered species, essential fish habitat, air quality, uplands, prime/unique farmland, and cultural resources. A FONSI was signed on 24 July 2006.

- **Final Report of Alternatives Analysis of the Interim Drainage Maintenance Opportunities for Orleans East Bank Project (2006)**. The purpose of this Alternatives Analysis Report was to identify interim alternatives to the emergency temporary pumping at the temporary closure structures for each of the three outfall canals (17th Street, Orleans Avenue, and London Avenue). Twenty projects that provide additional drainage capacity in the project area were identified and evaluated. Various combinations of these projects were developed and further evaluated as alternatives to provide the capacity required at each outfall canal by gate closures during storm surge events. No recommendations were included in this report.

- **Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System – Interior Drainage and Pumping (2006)**. This Interagency Performance Evaluation Task Force (IPET) report contained the background, overview, and summary of performance during Hurricane Katrina for the interior drainage system and the pump stations. It was determined that the drainage canals and interior drainage system performed well during the storm but were overwhelmed by the overtopping and breaching of levees and floodwalls due to the large water volume and flood elevations reached.

- **Conceptual Design Report for Permanent Flood Gates and Pump Stations, 17th Street, Orleans Avenue, and London Avenue (2006)**. The objective of this effort was a conceptual development of two pump station alternatives along with site selection analysis for locations proposed at or near the lakefront of each of the 17th Street, Orleans Avenue, and London Avenue Canals, including the development of overall general site plans for the pump stations and ancillary facilities required to support the new permanent pump stations. A total of nine pump station sites were considered (three at each canal). No recommendations were included in this report.

- **Site Selection Analysis for Permanent Flood Gates and Pump Stations, 17th Street, Orleans Avenue, and London Avenue (2007)**. The objective of this effort was a site selection analysis for the permanent pump station locations proposed at or near the lakefront of each of the 17th Street, Orleans Avenue, and London Avenue Canals. A total of 10 pump station sites were evaluated: three at 17th Street, three at Orleans Avenue, and four at London Avenue. No recommendations were included in this report.

- **Technical Site Selection Workshop Draft Final Report, Phase 2 Conceptual Design Services for Permanent Pump Stations and Canal Closures at Outfalls (2008)**. The objective of this effort was to develop pros and cons of potential alternative sites for the 17th Street, Orleans Avenue, and London Avenue permanent flood gates and pump stations in New Orleans and document the selection of a technically preferred site for each canal.

- **Decision-Making Chronology for the Lake Pontchartrain and Vicinity Hurricane Protection Project (2007)**. This report was prepared to document and examine the decision-making process for the LPV Hurricane Protection Project. Chapter 4 (Design Decisions for the Outfall Canals) focuses on the project design decisions for the 17th Street, Orleans Avenue, and London Avenue Canals, including incorporation of the outfall canals into the Hurricane Protection Project.

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

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

- **IER #11, Improved Protection on the Inner Harbor Navigation Canal, Tier 1, Orleans and St. Bernard Parishes, Louisiana (2008)**. The document was prepared to evaluate potential impacts associated with building navigable and structural barriers to prevent storm surge from entering the Inner Harbor Navigation Canal from Lake Pontchartrain and/or the

Gulf Intracoastal Waterway-Mississippi River Gulf Outlet-Lake Borgne complex. This document also cites specific prior reports for MRGO projects and Coastal Wetlands Planning Protection Restoration projects. Two Tier 2 documents discussing alignment alternatives and designs of the navigable and structural barriers, and the impacts associated with exact footprints, are being completed. On 14 March 2008, the CEMVN signed a Decision Record on IER # 11 (Tier 1).

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

- **Integrated Final Report to Congress and Legislative Environmental Impact Statement for the Mississippi River Gulf Outlet Deep Draft De-Authorization Study (2008)**. On 5 June 2008, a Chief's Report on the Deep-Draft De-Authorization Study was transferred to Congress. This action deauthorized the channel and construction of a plug has been initiated near Bayou La Loutre.

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

- **IER #26, Pre-Approved Contractor Furnished Borrow Material # 3, Jefferson, Plaquemines, and St. John the Baptist Parishes, Louisiana and Hancock County, Mississippi (2008)**. 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 20 October 2008, the CEMVN signed a Decision Record on IER # 26.

- **IER #11, Improved Protection on the Inner Harbor Navigation Canal, Tier 2 Borgne Orleans and St. Bernard Parishes, Louisiana (2008).** The document was prepared to evaluate the potential impacts associated with constructing a surge barrier on Lake Borgne. One additional Tier 2 document discussing alignment alternatives and designs of the navigable and structural barriers, and the impacts associated with exact footprints at Lake Pontchartrain and the IHNC, are being completed. On 21 October 2008, the CEMVN signed a Decision Record on IER #11.

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

- **IER #12, GIWW, Harvey, and Algiers Levees and Floodwalls, Jefferson, Orleans, and Plaquemines Parishes, Louisiana (2009)**. The document was prepared to evaluate potential impacts associated with the proposed construction and upgrades of levees, floodwalls, floodgates, and pumping station(s) within a portion of the WBV HSDRRS. On 18 February 2009, the CEMVN signed a Decision Record on IER # 12.

- **IER #4, Lake Pontchartrain and Vicinity, Orleans East Bank, New Orleans Lakefront Levee, West of Inner Harbor Navigation Canal to Eastbank of 17th Street Canal,**

- **IER #10, Lake Pontchartrain and Vicinity, Chalmette Loop Levee, St. Bernard Parish, Louisiana (2009).** The document evaluates the potential impacts associated with raising earthen levees with the addition of T-walls within the Chalmette Loop levee system. On 26 May 2009, the CEMVN signed a Decision Record for IER #10.

- **IER #7, Lake Pontchartrain and Vicinity, Lakefront to Michoud Canal Levees, Orleans Parish Louisiana (2009).** The document evaluates the potential impacts associated with raising the levees in New Orleans East, east of Paris Road, to the 100-year level of risk reduction. On 19 May 2009, the CEMVN signed a Decision Record for IER #7.

1.4 INTEGRATION WITH OTHER INDIVIDUAL ENVIRONMENTAL REPORTS

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

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

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

1.5 PUBLIC CONCERNS

The foremost public concern is reducing risk of hurricane, storm, and flood damage for businesses and residences, and enhancing public safety during major storm events in the Greater New Orleans metropolitan area. From a series of public meetings held between March 2007 and October 2008, public comments submitted via mail, e-mail and phone, workshops, and newspaper articles, the public has raised several concerns regarding the problems and issues with hurricane risk reduction in the New Orleans metro polder (table 1). These concerns include taking of property or homes, air and noise pollution, aesthetics, design and operation of the proposed alternatives, and internal drainage.

The public has voiced its support, or lack thereof, for nearly all of the alternatives, with no clear public consensus on which alternative should be selected. For example, some citizens believe that improved parallel protection could avoid the need for intrusive pump stations while providing adequate flood protection. Some citizens, as well as potential non-federal sponsors, have voiced opposition to new pump stations which would operate in series with existing New

Orleans Sewerage and Water Board pump stations on the outfall canals, citing increased operation, maintenance and coordination issues associated with the operation of two or more pump stations on each canal. Some citizens have voiced support for certain alternatives which have been eliminated from further consideration in this IER, such as the Barrier Plan, Pressurized Box Culverts and pumping to the Mississippi River via Hoey's Canal. Others have urged the USACE to consider the long-term operation and maintenance costs of the alternatives in addition to the up-front construction costs of each alternative in selecting a proposed action.

Table 1: Summary of Written or E-mailed Public Comments as of March 31, 2009

	17th St.	Orleans Ave.	London Ave.	General	Total
North of Robert E. Lee	3	64	12	78	**157**
South of Robert E. Lee	0	89	1	0	**90**
General Comments	10	16	5	55	**86**
Petitions					
Flood Protection Coalition				407	**407**
Place Pumps At UNO			5		**5**
Save Coconut Beach	4				**4**
Pump to the River				798	**798**
Low Rise Pumps		72			**72**
LVPOA Petition				41	**41**
Save II Tony's	2153				**2153**
Totals	**2170**	**241**	**23**	**1379**	**3813**

Note: This table is not all inclusive and does not include all of the scoping, non-governmental organization, and public meeting comments from the 25 meetings held discussing IER 5 since March 2007.

Certain comments have taken the form of questions regarding design criteria and assumptions used for storm surge modeling. Some citizens have questioned the USACE's standard use of the "50-year project life" in designing this project, and have asked that a longer project life be incorporated into the design.

Numerous comments have been received regarding the location of any future pump stations. The taking of homes or property has been a major issue for those residents who live in the vicinity of the three outfall canals, because of the concern that the homes that have been rebuilt, or are in the process of rebuilding, will be taken for the construction of the permanent protection system. Other citizens have voiced concern over pump stations in the vicinity of their property, even if their property is not physically taken for the construction of the pump station. Some citizens have requested that the stations be located as far from their neighborhoods as possible, in areas where the fewest people would be directly or indirectly impacted, or as far from the lakefront as possible to minimize visual impacts, whereas other citizens have requested that the stations be placed at the mouths of the canals despite any impact to homes, businesses, recreation, or neighborhood aesthetics. Many residents are awaiting a decision from the CEMVN as to which alternative will be selected to decide if they will rebuild their home or move from the area. In addition, a petition with 2,153 signatures has been submitted to the USACE to not take the II Tony's restaurant, whereas others have commented at public meetings to not take Coconut Beach Volleyball Complex, and the Yacht Harbor near the mouth of the 17th Street Canal. Several landowners of Mariners Cove condominium complex have expressed

concern that the USACE should take the entire complex in addition to the units taken during the Task Force Guardian effort. Landowners just to the south of the proposed action on the 17th Street Canal have verbally voiced concerns of a loss in property values, due to the possible aesthetics associated with building a new pump station. The University of New Orleans has voiced opposition to any plan which would take university property. Some have opposition to any plan which would interrupt future development of the areas near the mouths of the outfall canals, such as the West End area on the 17th Street Canal or redevelopment of historic areas such as Bucktown.

Residents along the outfall canals in the vicinity of the interim closure structures (ICS) have voiced concerns regarding air and noise pollution, the aesthetics, and perception of a loss of property values. These concerns focus mainly on the construction of the ICS and wind-driven dust that has drifted onto adjacent properties and roadways. Residents have requested that during construction of the permanent protection system, measures be implemented to reduce air and noise pollution in the vicinity of all three outfall canals. Residents and business owners have questioned the frequency and duration of the use of the pumps, indicating a concern over the diesel fumes associated with pump use. Some have suggested that electric engines be used in lieu of diesel engines to reduce such impacts. Residents have also voiced the opinion that every effort should be made to keep area bridges open during construction to minimize impacts on neighborhood traffic patterns. While some citizens are concerned about the construction noise, traffic and air quality impacts, other citizens have urged the USACE to operate on a 24-hour work schedule for this project to provide permanent 100-year protection for the city as quickly as possible. The Chancellor of the University of New Orleans has requested that impacts to the UNO campus be avoided. Residents in the area north of Robert E. Lee have requested that the USACE avoid impacts in their area by locating a pump station south of Robert E. Lee Boulevard.

Comments regarding aesthetics and design of the permanent protection system have focused on constructing structures that will not diminish the value of the neighborhoods or negatively impact the quality of life for the residents of these neighborhoods and users of adjacent public green space. Residents would like a design that would be consistent with the current surroundings, and have urged the USACE to limit the height of the pump stations. Other citizens have noted that safety and risk reduction should be a primary concern, and aesthetics should be considered as a secondary concern. To this end, for example, citizens have suggested that the stations and any ancillary equipment should be built to a height that ensures they are floodproofed.

Some citizens have shared the USACE's desire to encourage innovation in the design and engineering of this project, asking the USACE to solicit innovative ideas from private industry and the Netherlands. Because this project is being designed and constructed through a Design-Build contract vehicle, exact design details are not known at this time. Some members of the public have noted that this lack of design detail makes it difficult for the public to comment on the proposed action and alternatives. Other members have voiced concern that the public would not be adequately engaged in the design process given that the design details will be developed after the conclusion of the NEPA process. To ensure that the public is involved in the design and engineering process for this project, some citizens have suggested that the USACE establish an independent peer review committee to evaluate USACE decisions and a Citizens' Design and Construction Committee to review design and construction planning. The public has asked for assurance that their comments are being considered in the USACE's decision-making process.

1.6 DATA GAPS AND UNCERTAINTY

Because of the paramount importance of providing improved hurricane protection to the recovery of communities and the need for a timely response, as well as the need to capitalize upon innovative solutions, the CEMVN is proposing to use a design-build delivery approach for

the project analyzed in this IER. Due to the design-build nature of this project, the final site and structure designs have not been completed. The design-build contractors proposing on this project would be provided with the selected alternative, general engineering information, and a boundary-specific site location or footprint, which they would use as a basis to submit their design of the proposed action. As a result of this design-build approach, specific design details of the proposed action, construction activities, and O&M are not currently available. For the CEMVN to achieve the purpose and need of the project and to allow for optimization of technology, construction methods, and exact footprint within the boundary specified site location, this IER analyzes the environmental impacts that are related to the construction action. Specific information on construction materials, or other such design details would be developed as the design process matures. Any dimensions or description of site features are approximate, based on a typical conceptual design of a pump station which could handle the capacity of each outfall canal.

These data gaps affect the impacts analysis of some resource areas, including traffic and transportation, aesthetics, air and noise, and socioeconomics. The construction of the proposed project could have impacts on home values in the immediate vicinity of the pump station, either raising or lowering the value of these homes. However, the degree of such an impact cannot be empirically predicted, nor would it be compensable. These resource areas cannot be precisely analyzed without knowledge of specific engineering details; therefore, the impacts analysis was completed utilizing information currently available based upon a maximum footprint scenario for each pump station location. During the design-build process, measures would be taken to minimize impacts to the environment, residents, and commercial interests so that the final site design could actually be smaller than the maximum footprint scenario and have fewer impacts when completed.

A study to determine the impacts related to the transportation of construction materials for HSDRRS is underway. It is the CEMVN's goal to publish an interim report on the transportation impacts followed up by a comprehensive write-up of the transportation impacts in the CED.

2.0 ALTERNATIVES

2.1 ALTERNATIVES DEVELOPMENT AND PRELIMINARY SCREENING CRITERIA

NEPA requires that a "No Action" alternative be analyzed to determine the environmental consequences of not undertaking the action(s) or project(s) proposed, and thereby providing a framework for measuring the benefits and adverse effects of other alternatives. Likewise, Section 73 of the WRDA of 1974 (PL 93-251) requires Federal agencies to give consideration to nonstructural measures to reduce or prevent flood damage. The CEMVN Project Delivery Team (PDT) considered a no action alternative and non-structural measures in this IER, discussed in sections 2.4.1 and 2.5.1, respectively.

In addition to these mandated alternatives, a range of reasonable alternatives to meet the purpose of achieving the 100-year level of risk reduction was formulated through input by the CEMVN PDT, Value Engineering Team, engineering and design consultants, as well as local government agencies, the public, stakeholders, and resource agencies. The "action" alternatives formulated are composed of numerous standard engineering designs, innovative engineering designs, ideas submitted by the public, and revisiting previously analyzed designs.

Numerous input opportunities were used during the alternative development and evaluation process, including the following:

- Public meetings (24 July 2007; 16 August 2007; 25 September 2007; 29 November 2007; 26 February 2008; 1 July 2008; and 22 October 2008) – Regularly scheduled public meetings have been held within the project area to inform residents and stakeholders of the status of the project and to solicit input regarding alternatives and potential locations of new structures.

- Partnering Sessions (11-12 January 2007; 17 July 2007; 31 July 2007; and 30 July 2008) – These sessions were held to allow participants and additional stakeholders who would potentially participate in a Project Partnership Agreement (PPA) or participate in the O&M of the project to provide input and recommendations in the alternative evaluation process.

- Best Technical Solution Workshop/Senior Review Panel (27-28 June 2007) – A group of experts in water resources, geotechnical design, hydraulics, and pump station design attended this workshop to propose and evaluate potential solutions for the permanent protection of the three outfall canals. During this workshop, 26 possible technical solutions were developed and then evaluated on the basis of a set of criteria that included constructability, reliability/risk, operability/efficiency, cost effectiveness, environmental impacts, public acceptance, and time to build.

- Alternatives Selection Workshop (22-23 January 2008) – This workshop was held with non-Federal sponsors and various neighborhood association representatives to allow for input regarding a range of alternatives.

- Homeowner association meetings – Several meetings have been held with the CEMVN at the request of local homeowner associations and other property owners to allow the local residents to comment and provide input on the alternatives and potential locations of new structures.

- One on one discussions with various interested parties and stakeholder groups has occurred throughout the analysis period of this project.

- Public comments submitted to the CEMVN via e-mail, standard mail, and phone calls.

Once a full range of reasonable alternatives was established, a preliminary screening was conducted to identify alternatives that would proceed through further analysis. The criteria used to make this decision included engineering effectiveness, economic efficiency, environmental and social acceptability, and meeting the purpose and need of the project. Those alternatives that did not adequately meet these criteria were considered infeasible and eliminated from further study in this IER.

2.2 DESCRIPTION OF THE ALTERNATIVES

The CEMVN intends to employ an integrated, comprehensive, and systems-based approach to hurricane and storm damage reduction in raising the HSDRRS to the 100-year level of risk reduction. Two types of alternatives were initially evaluated in this IER, one to achieve the purpose and need of the project by providing storm damage risk reduction, and one to provide system enhancements and improved efficiency (additional features). The additional features alternatives consist of potential improvements to the interior drainage system, including diverting flow to other systems, storage, subdividing the drainage basins, and adding small pump stations. As stand-alone projects, the additional features alternatives would not meet the purpose and need of the project to provide risk reduction from a 100-year tropical storm surge event and were not carried forward for further evaluation in this IER. Only those reasonable alternatives that would meet the purpose and need of the project were carried forward for detailed evaluation in this IER. Every alternative that passed the preliminary screening was evaluated for each of the three

outfall canals. This approach allows for individual analysis of each outfall canal, as well as considering the outfall canals 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 are meant to describe the general engineering features and ability to prevent storm surge-induced flooding through the outfall canals. Layout alternative locations for pump stations at or near the mouth of the outfall canals are presented as a maximum footprint scenario and measures would be taken during design and construction to minimize effects to the maximum extent practicable on the environment, residential, and commercial interests so that the final design could actually be smaller than presented and have fewer impacts when completed.

2.3 PROPOSED ACTION

The proposed action consists of a new permanent pump station and closure (i.e. gates) at or near the mouth of each of the outfall canals operating in series with the existing Sewerage and Water Board of New Orleans (SWBNO) pump stations (PS). The pumping capacity at 17th Street would fall between the range of 10,500 and 12,500 cfs. The pumping capacity at Orleans Avenue would be 2,700 cfs. The pumping capacity at London Avenue would fall between the range of 8,000 and 9,000 cfs. Under normal conditions, the flow from the canals would discharge through open gates directly into Lake Pontchartrain without having to operate the new pumping station. During those events where the combination of storm surge from Lake Pontchartrain and flow from the existing SWBNO pump stations could create a condition where the safe water elevation in the canals is exceeded, the gates would be closed and the new pump stations operated. The existing SWBNO PS #3, #4, #6, and #7 would remain in service and operate concurrently or in series with the new pump stations and the outfall canals would continue to convey storm water from the SWBNO pump stations to the new pump stations. The new pump stations could be constructed with sill elevations from -27 to -43 NAVD 88 based on individual pump capacities of 1,500 cfs. If a lower capacity pump is used the sill depth may be more shallow. The proposed action would leave in place the floodwalls that flank the outfall canals, and these floodwalls would remain an integral part of the city's internal flood protection system. The floodwalls on the protected side of the new pump stations would be maintained in their current condition and would not be reconstructed. Following operational testing and acceptance of each pump station, the existing ICS will be removed and the area restored to pre-construction conditions. The estimated construction time frame for the proposed action at all three outfall canals is four years.

A conceptual study of the proposed action is presented in Conceptual Design Report for Permanent Flood Gates and Pump Stations (GEC 2006a). In this study, multiple layout alternative locations were developed for the new pump station and closure for each outfall canal. The proposed action also includes the selection of only one alternative site location for each outfall canal. The descriptions below provide a conceptual design of a pump station and closure structure that could be constructed at each of the outfall canals' proposed locations based upon the technical data and analysis available at this time.

The proposed action is to build three pumps stations at locations described below utilizing a design-build process. Numerous opportunities for public input and comment have occurred and would continue during the design phase of each pump station to allow for opportunities for the USACE to consider and incorporate the local vision of what the pump stations will look like. The solicitation package for procuring the design-build proposals for this project will include a number of design considerations intended to avoid or minimize the impacts of any proposed solution. These design parameters, listed below, were considered for the purposes of this document's impacts analysis. These include:

- Minimize impact to the overall footprint.

- Minimize impacts to wetlands and natural hydrological regime.
- Maintain a water flow capacity that is comparable to the canals capacity prior to construction.
- Avoid or minimize disturbance of contaminated sediments and other hazardous, toxic, or radioactive waste in the study area if they are found to be present.
- Minimize impact to recreation and green space.
- Construction of the pump stations, demolition of the existing ICS and operation of the stations will conform to the noise and vibration limitations of the New Orleans Municipal Code for Sound Attenuation.
- Heights of structures associated with the pump station will be minimized and not exceed a height of 45 feet.
- Temporary construction easements will be returned to pre-construction conditions and consistent with the 100-year level of protection.
- All project features will be designed so that the visual and human-cultural values associated with the project are protected, preserved, maintained, or enhanced to the maximum extent possible. Structures will be designed to blend with their physical surroundings, or where contrast is necessary and appropriate, that contrast will, insofar as possible, improve the environment.

The schedule for procurement of the design-build project is as follows:

Sources Sought: 1st Quarter 2009
Industry Day: 1st Quarter 2009
Synopsis: 3rd Quarter 2009
Phase 1 Request for Proposals: 3rd Quarter 2009
Phase 2 Request for Proposals: 4th Quarter 2009
Award: 2nd Quarter 2010

2.3.1 17th Street Canal

Three layout alternatives (A, B, and C) were evaluated for the location of the new pump station, and gate at or near the lakefront in the vicinity of the mouth of the 17th Street Canal, with layout alternative A selected as the proposed action (figure 2). Layout alternatives B and C are described in section 2.4.2.1.

The new permanent pump station at the 17th Street Canal as proposed could be approximately 450 feet long by 200 feet wide and include inlet and outlet works, trash screens, and a pump station building housing pumps, motors, and the gate structure. The new gate structure could consist of gates, gate guides, hoisting equipment, and an enclosure to protect the hoisting equipment. The pump station could be approximately 500 feet to 1,000 feet north of the Hammond Highway Bridge to avoid the need for any modifications to that flood-proofed bridge, but the exact location and design will not be known until the design-build plan is selected by the USACE. The new pump station and closure structure would tie-in with the existing storm water drainage system and with other HSDRRS projects.

The new pump station could impinge on both banks of the canal, which would require permanent right-of-way (ROW) acquisition of approximately 37 acres of water and land, potentially directly affecting four residential structures and commercial property on the east bank and commercial property on the west bank. In addition, a temporary construction easement of approximately 4 acres could be required on the east and west banks of the canal, including the area near the Hurricane Katrina breach repair. Demolition and removal of the existing ICS would be required once construction of the new pump station and closure structure is completed. The entire area identified as “Maximum Extent of Permanent Impacts” on figure 2 could be impacted as a result of this proposed action. During design and construction of the new pump station, reasonable

measures would be implemented to minimize the impacts to residential and commercial interests, such that the final site design could actually be smaller and have fewer impacts on these areas when completed.

A generator building and fuel storage tank farm complex could be constructed in support of the new pump station. This complex could include parking, general staging and storage space, and local storm drainage features. Utilities would include potable water service, sanitary sewer and natural gas, all connected to the new pump station from existing utilities available in the area. Finish grade for the pump station complex would be constructed above the 100-year flood level elevation.

Figure 2. 17th Street Canal Proposed Action, Layout Alternative A

Channel transitions could be required north and south of the new pump station on both sides of the canal banks. The channel transition north of the pump station could be constructed as reinforced concrete retaining walls. South of the pump station, only the east bank of the canal could require a retaining wall transition. Earthwork activities under the proposed action could be exclusively excavation, which could result in soil removal from the site.

Because the proposed location of the new pump station is near the lake, erosion protection would be required, which could consist of a strip of riprap protection in the bottom of the canal north and south of the new pump station. A breakwater in Lake Pontchartrain, approximately 104 feet wide by 600 feet long, could be constructed to an elevation of +15.5 ft North American Vertical Datum (NAVD) 88 to protect the new pump station. In this area the lake bottom elevation is -8.5 ft and the typical water elevation is 1.0 ft. The 17th Street Canal breakwater could require approximately 30,000 cubic yards of stone. To construct the breakwater, all access would be from the land and no dredging of Lake Pontchartrain would be required.

2.3.2 Orleans Avenue Canal

Four layout alternatives (A, B, C, and D) were evaluated for the location of the new pump station and gate at or near the lakefront in the vicinity of the mouth of the Orleans Avenue Canal, with layout alternative B selected as the proposed action (figure 3). Layout alternatives A, C, and D are discussed in section 2.4.2.2.

The new permanent pump station at the Orleans Avenue Canal as proposed could be approximately 150 feet long by 150 feet wide and include inlet and outlet works, trash screens, and a pump station building housing pumps, motors, and the gate structure. The new gate structure could consist of gates, gate guides, hoisting equipment, and an enclosure to protect the hoisting equipment. The new pump station could be in the existing canal, as close to the Lakeshore Drive Bridge as possible without creating the need for modifications to that bridge. Thus, the new pump station could be approximately 300 feet south of Lakeshore Drive. This location provides for convenient connection of existing lakefront levees to the new pump station features. The new pump station and closure structure would tie-in with the existing storm water drainage system and with other HSDRRS projects.

A generator building and fuel storage tank farm complex could be constructed in support of the new pump station. This complex could also include parking, general staging and storage space, and local storm drainage features. Utilities would include potable water service, sanitary sewer and natural gas, all connected to the new pump station from existing utilities available in the area. Finish grade for the pump station complex would be constructed above the 100-year flood level elevation.

Permanent ROW acquisition of approximately 21 acres of water and land could occur almost exclusively on the west bank of this proposed layout and could include areas that are primarily publicly-owned green space, rather than privately owned homes. Two non-residential structures could potentially be affected by the proposed layout. A temporary construction easement of approximately 6 acres would be expected. The ICS south of this site would be removed after the pump station construction is complete. The entire area identified as “Maximum Extent of Permanent Impacts” on figure 3 could be impacted as a result of this proposed action. During design and construction of the new pump station, reasonable measures would be implemented to minimize the impacts to this area, such that the final site design could actually be smaller and have fewer impacts on the area when completed.

Because of the lakeshore location of this pump station, a substantial volume of erosion protection would be required; also, a strip of riprap protection would be placed along the bottom of the canal, both immediately north and south of the new pump station. A breakwater in Lake

Figure 3. Orleans Avenue Canal Proposed Action, Layout Alternative B

Pontchartrain, approximately 116 feet wide by 700 feet long could be constructed to an elevation of +15.5 NAVD 88. In this area the lake bottom elevation is -11.5 feet and the typical water elevation is 1.0 feet. The Orleans Avenue Canal breakwater could require approximately 43,400 cubic yards of stone. To construct the breakwater, all access would be from the land and no dredging of Lake Pontchartrain would be required.

2.3.3 London Avenue Canal

Five layout alternatives (A, B, C, D, and E) were evaluated for the location of the new pump station and gate at or near the lakefront in the vicinity of the mouth of the London Avenue Canal, with layout alternative C selected as the proposed action (figure 4). Layout alternatives A, B, D, and E are discussed in section 2.4.2.3.

The new permanent pump station at the London Avenue Canal as proposed could be approximately 350 feet long by 160 feet wide and include inlet and outlet works, trash screens, and a pump station building housing pumps, motors, and the gate structure. The new gate structure could consist of gates, gate guides, hoisting equipment, and an enclosure to protect the hoisting equipment. The pump station could likely be primarily situated on the east canal bank. This alternative would provide for convenient connection of existing levees to the new pump station structure. The outfall canal levees north of the new pump station would be raised to the 100-year level of risk reduction height and connect to and be continuous with the existing Lake Pontchartrain levee system. The new pump station and closure structure would tie-in with the existing storm water drainage system and with other HSDRRS projects.

Permanent ROW acquisition of approximately 21 acres of water and land could occur on the east and west banks of the canal, and could include areas that are primarily publicly-owned green space, rather than privately-owned homes. ROW acquisition of some University of New Orleans (UNO) property could potentially be required. A temporary construction easement of approximately 6 acres could be necessary near the west side of the ICS. The ICS would be removed after the new pump station construction is complete. The entire area identified as "Maximum Extent of Permanent Impacts" on figure 4 could be impacted as a result of this proposed action. During design and construction of the new pump station, reasonable measures would be implemented to minimize the impacts to this area, such that the final site design could actually be smaller and have fewer impacts on the area when completed.

Constructed in support of the new pump station could be a generator building and fuel storage tank farm complex. This complex could also include parking, general staging and storage space, and local storm drainage features. Utilities would include potable water service, sanitary sewer and natural gas, all connected to the new pump station from existing utilities available in the area. Finish grade for the pump station complex would be constructed above the 100-year flood level elevation.

A relatively small volume of erosion protection would be required in and around the pump station. Specifically, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the pump station. Given the inland location of this pump station, a breakwater in Lake Pontchartrain would not be necessary to protect the pump discharge from wave effects during pumping operations.

Figure 4. London Avenue Canal Proposed Action, Layout Alternative C

2.4 ALTERNATIVES TO THE PROPOSED ACTION

2.4.1 No Action Alternative

The CEQ regulations require inclusion of the no action alternative, which serves as a baseline against which the impacts of the proposed action and alternatives can be evaluated.

The no action alternative would consist of replacing the existing parallel protection along each canal by raising the height of the outfall canal floodwalls along the entire lengths of the canals to the level of risk reduction originally authorized in the 1984 Supplement to the EIS, while incorporating the post-Katrina engineering design criteria that is now standard for all levee and floodwall construction and improvements (USACE 2007a). This height, which would range from 15 feet to 18 feet, was originally designed to protect against the "Standard Project Hurricane (SPH)". The SPH was defined as the "most severe hurricane that can be reasonably expected to occur from a combination of meteorological and hydrological events reasonably characteristic of the area" (USACE 1984). The previously authorized level of risk reduction under the no action alternative would be lower than the 100-year level of risk reduction.

In addition, the ICS would remain in place until the new parallel protection system was constructed. Current ICS pumping capacity at the 17th Street (8,800 cfs-9,200 cfs), Orleans Avenue (2,200 cfs), and London Avenue Canals (5,000 cfs-5,200 cfs) would not be increased. The pumping capacity of the ICS is adequate to meet the 100-year level of flood protection, but because the ICS was constructed for a short-term life cycle, it would not be adequate as a long-term solution to meet the purpose and need of the project. In addition, the existing SWBNO PS #3, #4, #6, and #7 would not be modified to increase head capacity.

2.4.2 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

This alternative is the same as the proposed action but evaluates other layout alternative locations for the new permanent pump stations and gates at or near the mouth of the outfall canals. The estimated construction time frame for this alternative is four years.

2.4.2.1 17th Street Canal

2.4.2.1.1 Layout Alternative B

The primary benefit of layout alternative B (figure 5) would be a savings in the construction duration by preserving and modifying some components of the ICS into the permanent functional structure, which could slightly reduce the size of the required pump station. The new pump station could be just west of the existing canal, angled slightly west of the canal centerline. Under this alternative, the new pump station would be farther south than the proposed action (layout alternative A). Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

The west canal bank would be proposed for ROW acquisition, to preserve the more densely developed residential property on the east bank, as well as to take advantage of the significantly shorter distance from pump station-to-lake discharge. This layout alternative would require ROW acquisition of approximately 34 acres of active commercial property and potentially 15 non-residential structures, including much of the Bucktown area. It would also require the demolition and replacement of the recently completed Hammond Highway Bridge, and it could impact property on the west bank, which the U.S. Coast Guard (USCG) actively uses. A temporary construction easement could be expected on the east side of the canal, south of

Figure 5. 17th Street Canal Layout Alternative B

Hammond Highway, near the Hurricane Katrina breach repair. The ICS would be removed after the new pump station construction is complete. This layout alternative provides less of an opportunity for site design optimization to avoid impacts to commercial interests and taking of property when compared with layout alternative A.

Erosion protection, including riprap and a possible breakwater structure, would be similar as described for the 17th Street Canal proposed action in section 2.3.1.

2.4.2.1.2 *Layout Alternative C*

Under layout alternative C, the new pump station would be built in the existing canal, as near the Hammond Highway Bridge as possible without creating the need for any replacement of that flood-proofed bridge (figure 6). As a result, the pump station could be approximately 700 feet south of Hammond Highway. The new pump station would be farther south when compared to the proposed action (layout alternative A). The outfall canal levees north of the new pump station and the flood-proofed section of the Hammond Highway Bridge would be raised to the 100-year level of risk reduction height and connect to and be continuous with the existing Lake Pontchartrain levee system. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

The new pump station would require ROW acquisition of approximately 17 acres and potentially 50 residential structures, which would be acquired on the east side of the canal, rather than on the west, to preserve residences undamaged on the west bank versus those that were damaged on the east canal bank. A temporary construction easement of approximately 0.5 acres could be necessary along a relatively narrow strip of the canal west bank. The ICS would be removed after the new pump station construction is complete. During design of the new pump station, measures could be implemented to minimize the impacts to residential and commercial interests, so that the final site design could actually be smaller and have fewer impacts when completed. This layout alternative would not provide a high level of optimization when compared to the proposed action (layout alternative A) because even with optimization a number of residences would still need to be taken on the east side of the canal in order to construct the new pump station.

Given the inland location of this pump station, a relatively small volume of erosion protection armoring would be required; specifically, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the new pump station. A breakwater in Lake Pontchartrain would not be necessary to protect the pump discharge from wave effects during pump operation.

Figure 6. 17th Street Canal Layout Alternative C

2.4.2.2 Orleans Avenue Canal

2.4.2.2.1 Layout Alternative A

Under this layout alternative, the new pump station could be approximately 500 feet north of the Lakeshore Drive Bridge, essentially constructed entirely in Lake Pontchartrain (figure 7). The new pump station would be farther north when compared to the proposed action (layout alternative B). This location could require some modifications to extend the existing lakefront levee line out into Lake Pontchartrain, including the modification of the Lakeshore Drive Bridge. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

ROW acquisition of approximately 28 acres could potentially be required primarily for shore-support features, such as the fuel tank farm complex. The ROW acquisition could include areas that are primarily publicly owned green space, including up to two non-residential structures, rather than privately owned homes. In addition, a temporary construction easement of approximately 6 acres could be required. The location would require substantial earthwork to create the site. The ICS would be removed after the new pump station construction is complete.

The near-shore location of the new pump station could require the construction of a breakwater, approximately 200 feet wide by 900 feet long, in Lake Pontchartrain. A substantial volume of erosion protection armoring could be required, primarily around the banks of the pump station facility and the breakwater structure. Also, a strip of riprap protection would be placed along the bottom of the canal, both immediately north and south of the new pump station.

2.4.2.2.2 Layout Alternative C

Under this layout alternative, the pump station could likely be situated primarily on the east canal bank, immediately adjacent to the ICS structure (figure 8). The new pump station would be farther south than the proposed action (layout alternative B). This location would provide for convenient connection of existing lakefront levees to the new pump station features. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

Permanent ROW acquisition of approximately 19 acres of property, potentially including 4 non-residential structures, along the canal banks (currently used as green space) would be required. A temporary construction easement of approximately 6 acres could be necessary along an area near the west side of the ICS. The outfall canal levees north of the new pump station would be raised to the 100-year level of risk reduction height and would connect to and be continuous with the existing Lake Pontchartrain levee system. Channel transitions could be required both immediately north and south of the new pump station. However, because of site geometry, transitions could likely be required only on the east bank of the canal. The ICS would be removed after the new pump station construction is complete.

A relatively small volume of erosion protection armoring would be required in and around the new pump station. Specifically, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the pump station. The inland pump station location shields the pump discharge from wave effects; therefore a breakwater structure would not be required.

Figure 7. Orleans Avenue Canal Layout Alternative A

Figure 8. Orleans Avenue Canal Layout Alternative C

2.4.2.2.3 Layout Alternative D

Under layout alternative D, the new pump station could be in the existing canal, as close to the Robert E. Lee Boulevard Bridge as possible without creating the need for any removal and replacement of that flood-proofed bridge (figure 9). As a result, the pump station could be approximately 300 feet south of Robert E. Lee Boulevard. The new pump station would be farther south than the proposed action (layout alternative B). Levees would be extended back to the pump station from the lakefront system to maintain the integrity of the lakefront hurricane protection system facing Lake Pontchartrain. The outfall canal levees north of the site, including the flood-proofed section of the Robert E. Lee Boulevard Bridge, would be raised to 100-year level of risk reduction height. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

This layout alternative would require ROW acquisition of approximately 35 acres of property, including property in City Park, which is selected to be acquired on the east side, rather than on the west, to preserve the residential area on the west bank. A temporary construction easement of approximately 4 acres would be necessary along a relatively small area near Marconi Drive and Robert E. Lee Boulevard for construction activities. Upon completion of the new pump station, the ICS south of Lakeshore Drive would be demolished. Erosion protection would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 2.3.2.

2.4.2.3 London Avenue Canal

2.4.2.3.1 Layout Alternative A

Under layout alternative A, the new pump station would be north of the Lakeshore Drive Bridge, essentially constructed entirely in Lake Pontchartrain, and positioned on the linear extension of the existing canal (figure 10). The new pump station could be approximately 500 feet north of Lakeshore Drive. The new pump station would be farther north than the proposed action (layout alternative C). This location would require some modifications, including the removal and replacement of the Lakeshore Drive Bridge, to extend the existing lakefront levee line out into Lake Pontchartrain. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

ROW acquisition of approximately 28 acres could be required primarily for shore-support features, such as the fuel tank farm complex, and could include areas that are primarily publicly owned green space, rather than privately owned homes. In addition, a temporary construction easement of approximately 14.5 acres could be required. The ICS south of this location would be removed after construction of the new pump station is complete.

The near-shore location of the new pump station could require the construction of a breakwater, approximately 200 feet wide by 900 feet long, in Lake Pontchartrain. A substantial volume of erosion protection armoring could be required, primarily around the banks of the pump station facility and the breakwater structure. Also, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the new pump station.

Figure 9. Orleans Avenue Canal Layout Alternative D

Figure 10. London Avenue Canal Layout Alternative A

2.4.2.3.2 Layout Alternative B

Under layout alternative B, the new pump station could be in the existing canal, as close to the Lakeshore Drive Bridge as possible without creating the need to modify that bridge (figure 11). Thus, the new pump station could be approximately 400 feet south of Lakeshore Drive. The new pump station would be farther north than the proposed action (layout alternative C). This location provides for convenient connection of existing lakefront levees to the new pump station features. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

ROW acquisition of approximately 25 acres would be required on both the east and west banks of the canal and could include areas that are primarily publicly owned green space, rather than privately owned homes. A temporary construction easement of approximately 14.5 acres could be necessary on both the north and south sides of Lakeshore Drive. The ICS would be removed after the new pump station construction is complete.

The lakeshore location of this pump station could require the construction of a breakwater, approximately 160 feet wide by 950 feet long, in Lake Pontchartrain. Also, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the new pump station.

2.4.2.3.3 Layout Alternative D

Under layout alternative D, the pump station could likely be situated primarily on the east canal bank, immediately adjacent to the ICS, to obtain cost savings by converting some components of the ICS to permanent structures, which correspondingly reduces the pump station size (figure 12). The new pump station would be farther south than the proposed action (layout alternative C). This alternative would also provide for convenient connection of existing levees to the new pump station structure. The outfall canal levees north of the site would be raised to 100-year level of risk reduction height. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that could support operation of the new pump station.

Permanent ROW acquisition of approximately 31 acres would occur almost exclusively on the east bank of this proposed location and would include UNO property. A temporary construction easement of approximately 3 acres could be necessary along a relatively small area in the vicinity of the west end of the ICS. The east bank could be selected for the support area facilities to avoid the residential development on the west bank. The ICS would be removed after the new pump station construction is complete.

A relatively small volume of erosion protection armoring would be required in and around this pump station. Specifically, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the new pump station. Given the inland location of this pump station, a breakwater in Lake Pontchartrain would not be expected to be necessary to protect the pump discharge from wave effects.

Figure 11. London Avenue Canal Layout Alternative B

Figure 12. London Avenue Canal Layout Alternative D

2.4.2.3.4 Layout Alternative E

Under layout alternative E, the pump station would likely be situated primarily on the east canal bank, immediately adjacent to the ICS (figure 13). The new pump station would be farther south than the proposed action (layout alternative C). This alternative would also provide for convenient connection of existing levees to the new pump station structure. The outfall canal levees north of the site would be raised to 100-year level of risk reduction height. Similar to the proposed action, this layout alternative could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station.

Permanent ROW acquisition of approximately 26 acres would occur almost exclusively on the east bank of the proposed location and would include UNO property. A temporary construction easement of approximately 6 acres would be assumed to be necessary along an area in the vicinity of the west side of the ICS. The ICS would be removed after the new pump station construction is complete.

Channel transitions could be required both immediately north and south of the new pump station. However, because of site geometry, both north and south transitions could likely be required only on the east bank of the canal. Transition structures could be constructed using concrete retaining walls.

A relatively small volume of erosion protection armoring would be required in and around the new pump station. Specifically, a strip of riprap protection could be placed along the bottom of the canal, both immediately north and south of the pump station. The inland pump station location shields the pump station from wave effects; therefore a breakwater structure would not be required.

Figure 13. London Avenue Canal Layout Alternative E

2.4.3 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

This alternative is similar to the proposed action described in section 2.4.1 and the layout alternatives described in section 2.4.2, but under this alternative the new permanent pump station would be constructed without gates and operate any time the existing SWBNO pump stations discharge water into the outfall canals. In essence, these pump stations would operate every time there is a rain event and function as part of the City of New Orleans internal drainage system. The water surface elevation in the outfall canals between the new and existing SWBNO pump stations would be controlled entirely by pumping. The layout alternatives for each outfall canal would be the same as described in sections 2.4.1 and 2.4.2; therefore a detailed description is not necessary in this section.

2.4.4 Permanent Pump Stations at the Mouths of the Outfall Canals

This alternative consists of constructing new permanent pump stations at or near the mouths of the outfall canals and necessary canal modifications that would allow gravity-flow of storm water to the new pump station. The existing SWBNO pump stations (#3, #4, #6, and #7) would be taken out of commission and no longer convey storm water to the lakefront. The entire length of the outfall canals would be redesigned and deepened to allow the water that is currently pumped by the existing SWBNO pump stations to gravity-flow to the new pump stations. Gates are not required for this alternative, and the new pumping stations would operate anytime storm water flows in the canals. This would be expected to occur for most rain events. With the canals deepened, the existing floodwalls that flank the outfall canals would no longer remain an integral part of the city's internal flood protection system and would not require any improvements.

A conceptual study of this alternative is presented in *Conceptual Design Report for Permanent Flood Gates and Pump Stations* (GEC 2006a). In this study, multiple pump station layout alternative locations were developed for each outfall canal. A discussion of each of these layout alternatives is presented below.

2.4.4.1 17th Street Canal

The 17th Street Canal new permanent pump station would be similar to the proposed action for the 17th Street Canal described in section 2.3.1. Similar to the proposed action, these layout alternatives would include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station. Unlike the proposed action presented in section 2.3.1, which would require localized earthwork only at the pump station facility, all layout alternatives would require canal excavation along the entire length of the 17th Street Canal. This alternative would maintain canal construction within the existing canal ROW. No additional permanent ROW acquisition would be required under this alternative when compared to the proposed action. Bridge modifications may be required at each of the four bridge crossings along the deepened canal.

2.4.4.1.1 Layout Alternative A

The location of the new pump station would be nearly identical to layout alternative A presented as the proposed action in section 2.3.1 (figure 2). The primary difference when compared to the proposed action would be from the additional work associated with canal deepening. Erosion protection would be similar as presented for the proposed action.

Permanent ROW acquisition would increase under this layout alternative when compared to the proposed action presented in section 2.3.1 and figure 2. Specifically, this layout alternative would require more property within the maximum footprint because of the increased size of the generator building and tank farm complex on the east bank.

2.4.4.1.2 Layout Alternative B

The location of the new pump station would be nearly identical to layout alternative B presented in section 2.4.2.1.1 (figure 5). Differences to this layout alternative result from the effects of the additional work associated with canal deepening and correspondingly deeper pump station inlet elevation.

2.4.4.1.3 Layout Alternative C

The location of the new pump station would be identical to layout alternative C presented in section 2.4.2.1.2. Differences to this layout alternative would result from the effects of the additional work associated with canal deepening (figure 6).

Permanent ROW acquisition would remain almost exclusively on the east bank and would require more property within the maximum footprint than layout alternative C, presented in section 2.4.2.1.2, because of larger facilities. A temporary construction easement could be necessary along a relatively narrow strip of the canal west bank. This layout would require the demolition and removal of damaged residential structures on the east bank and existing levee in an amount slightly increased over layout alternative C presented in section 2.4.2.1.2.

2.4.4.2 Orleans Avenue Canal

The Orleans Avenue Canal new permanent pump station would be similar to the proposed action for the Orleans Avenue Canal in Section 2.3.2. Similar to the proposed action, these layout alternatives could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station. Unlike the proposed action presented in section 2.3.1, which would require localized earthwork only at the pump station facility, all layout alternatives would require canal excavation along the entire length of the Orleans Avenue Canal. This alternative maintains canal construction within the existing canal ROW. No additional permanent ROW acquisition would be required under this alternative when compared to the proposed action. Bridge modifications may be required at each of the five bridge crossings along the deepened canal.

2.4.4.2.1 Layout Alternative A

The location of the new pump station would be identical to layout alternative A presented in section 2.4.2.2.1 (figure 7). Changes to this layout alternative would result from the effects of the additional work associated with canal deepening.

ROW acquisition under this layout alternative would be largely unchanged from layout alternative A presented in section 2.4.2.2.1, because of the minimal overall need for shore-based support structures and the location of the pump station within Lake Pontchartrain.

2.4.4.2.2 Layout Alternative B

The location of the new pump station would be nearly identical to layout alternative B presented as the proposed action in section 2.3.2 (figure 3). Differences to this layout alternative result from the effects of the additional work associated with canal deepening.

ROW acquisition and erosion protection requirements would be basically the same as the proposed action presented in section 2.3.2.

Unlike layout alternative B presented as the proposed action in section 2.3.2, which would require localized earthwork only at the pump station facility, this layout alternative would require substantial canal excavation along the entire length of the Orleans Avenue Canal. This approach

would maintain canal construction within the existing canal ROW. Erosion protection requirements would be basically the same as layout alternative B presented in section 2.3.2.

2.4.4.2.3 Layout Alternative C

As under layout alternative C presented in section 2.4.2.2.2, the new pump station would be on the east canal bank, immediately adjacent to the ICS (figure 8). This alternative would provide for convenient connection of existing levees to the new pump station structure.

Permanent ROW acquisition, temporary construction easement acquisition, and demolition requirements would be basically the same as layout alternative C presented in section 2.4.2.2.2.

Erosion protection armoring would be basically the same as layout alternative C presented in section 2.4.2.2.2.

2.4.4.2.4 Layout Alternative D

The location of the new pump station would be identical to layout alternative D presented in section 2.4.2.2.3 (figure 9). Differences to this layout alternative result from the effects of the additional work associated with canal deepening. The outfall canal levees north of the new pump station would be raised to the 100-year level of risk reduction height and would connect to and be continuous with the existing Lake Pontchartrain levee system.

Permanent ROW acquisition and erosion protection would be basically the same as from Layout Alternative D presented in section 2.4.2.2.3.

Unlike layout alternative D presented in section 2.4.2.2.3, which would require localized earthwork only at the pump station facility, this layout alternative would require substantial canal excavation along the entire length of the Orleans Avenue Canal. This approach would maintain canal construction within the existing canal ROW. Erosion protection requirements would be basically the same as layout alternative D presented in section 2.4.2.2.3.

2.4.4.3 London Avenue Canal

The London Avenue Canal new permanent pump station would be similar as described for the proposed action for the London Avenue Canal in section 2.3.3. Similar to the proposed action, these layout alternatives could include inlet and outlet works, trash screens, a pump station building housing pumps and motors, a generator building, fuel tank farm complex, and utilities that would support operation of the new pump station. Unlike the proposed action presented in section 2.3.1, which would require localized earthwork only at the pump station facility, all layout alternatives would require canal excavation along the entire length of the London Avenue Canal. This alternative maintains canal construction within the existing canal ROW. No additional permanent ROW acquisition would be required under this alternative when compared to the proposed action. Bridge modifications may be required at each of the eight bridge crossings along the deepened canal.

2.4.4.3.1 Layout Alternative A

The location of the new pump station would be identical to layout alternative A presented in section 2.4.2.3.1 (figure 10). Differences to this layout alternative result from the effects of the additional work associated with canal deepening.

ROW acquisition, temporary construction easements, demolition requirements, and erosion protection would be basically the same as layout alternative A presented in section 2.4.2.3.1.

2.4.4.3.2 Layout Alternative B

The location of the new pump station would be nearly identical to layout alternative B presented in section 2.4.2.3.2 (figure 11). Differences to this layout alternative result from the effects of the deeper canal and correspondingly deeper pump station inlet elevation.

ROW acquisition, temporary construction easements, demolition requirements, and erosion protection would be basically the same as layout alternative B presented in section 2.4.2.3.2.

Unlike layout alternative B presented in section 2.4.2.3.2, which would require localized earthwork only at the pump station facility, this layout alternative would require substantial canal excavation along the entire length of the London Avenue Canal. This approach would maintain canal construction within the existing canal ROW.

2.4.4.3.3 Layout Alternative C

The location of the new pump station would be identical to layout alternative C presented as the proposed action in section 2.3.3 (figure 4). Differences to this layout alternative result from the effects of the additional work associated with canal deepening.

ROW acquisition, temporary construction easements, demolition requirements, and erosion protection required for this layout alternative would be basically the same as Layout Alternative C presented in section 2.3.3.

2.4.4.3.4 Layout Alternative D

The location of the new pump station would be identical to layout alternative D presented in section 2.4.2.3.3 (figure 12). Differences to this layout alternative result from the effects of the deeper canal.

Permanent ROW acquisition, temporary construction easements, demolition, and erosion protection would be basically the same as layout alternative D presented in section 2.4.2.3.3.

2.4.4.3.5 Layout Alternative E

The location of the new pump station would be identical to layout alternative E presented in section 2.4.2.3.4 (figure 13). Differences to this alternative result from the effects of the deeper canal.

Permanent ROW acquisition, temporary construction easements, demotion requirements, and erosion protection would be basically the same as layout alternative E presented in section 2.4.2.3.4.

2.4.5 Parallel Protection

2.4.5.1 Concrete-Lined Canals

The 17th Street, Orleans Avenue, and London Avenue Canals existing floodwalls could be upgraded to the 100-year level of flood risk reduction height and the canals would be deepened and lined with concrete, followed by removal of the ICS. Lining the canals with concrete would prevent underseepage of water from the canals. It is recognized that the existing SWBNO PS #3, #4, #6, and #7 cannot pump against storm surge elevations in Lake Pontchartrain.

Concrete-lining the canal could provide a means of restoring parallel protection and improving the flow characteristics of the channel. The stability of the soil does not allow the use of an earthen embankment, similar to what is currently used, because of real estate concerns. To construct the earthen embankment to support higher walls, the footprint of the embankment

would need to be increased. Because of the lack of available public ROW abutting the canals, the increased footprint could either have an impact on private properties or impinge on the cross section of the canal. Lining the canal would primarily be a way for the deepened canal to remain within the confines of the existing ROW. The liner allows steeper slopes to be used without compromising slope stability. This alternative could stay within the existing ROW, but the existing floodwalls would be upgraded to a higher elevation to meet the 100-year level of risk reduction requirement. This canal lining configuration could serve as a single and complete method to satisfy the parallel protection required.

To qualify as a single and complete method to stabilize and secure the parallel protection, the approach must be designed to accommodate the highest water level expected and not rely on other system components to protect the surrounding neighborhoods from a storm surge. For the purpose of this alternative, the top of the new floodwall would be equal to the 100-year flood level of risk reduction. This parallel protection would act as a barrier between the surrounding community and Lake Pontchartrain, as well as a conduit for the pump stations to discharge water to exit the outfall canals.

Two concepts have been investigated to concrete-line the canals: (a) Canal Liner Box and (b) Canal Liner Contour (Black & Veatch 2006). The Canal Liner Box concept is a reinforced box culvert constructed in place via a multistep construction sequence that allows the canal to remain in service throughout the construction process (figure 14). This concept could include constructing a sheet pile box to serve as a cofferdam inside the canal to allow for construction and installation activities inside the box. Construction and installation work could include excavating and disposing of soil; installing reinforcing bar and forms; pouring concrete for the footing and wall; tremie concrete installation for liner floor; and demolishing existing floodwalls.

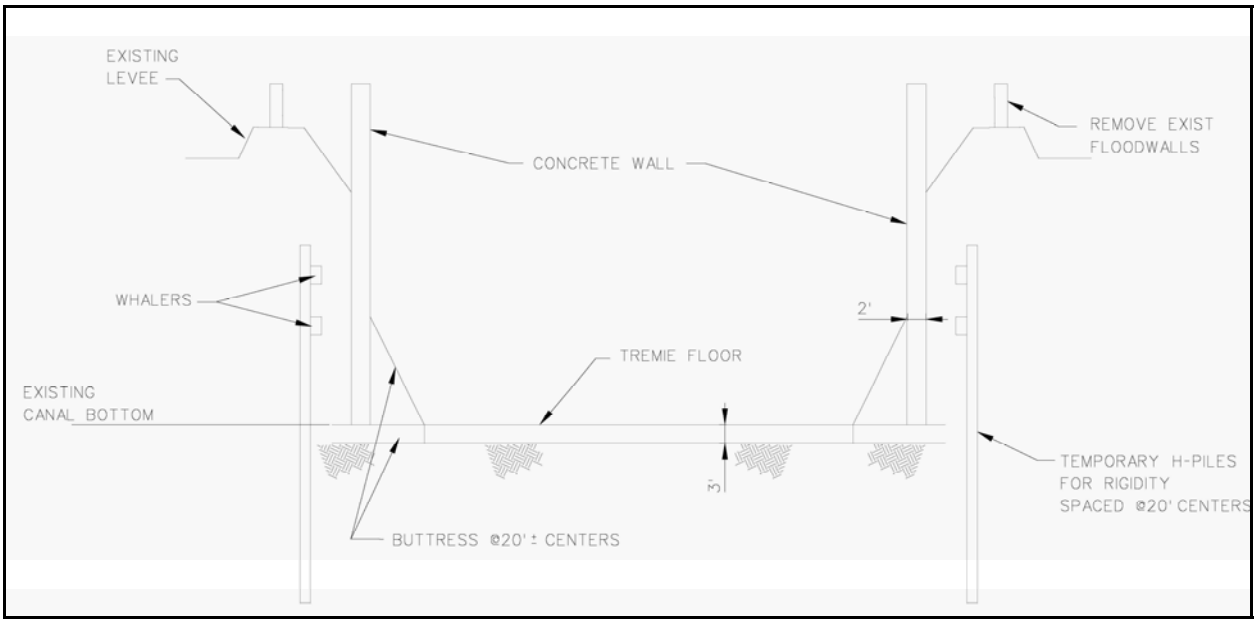


Figure 14. Canal Liner Box Concept

The Canal Liner Contour concept is a reinforced floodwall connected to a liner contoured to the bottom of the existing canal via a multistep construction sequence that could allow the canal to remain in service throughout the construction process (figure 15). This concept could include constructing a temporary sheet pile wall to isolate sections of the existing floodwall to allow for

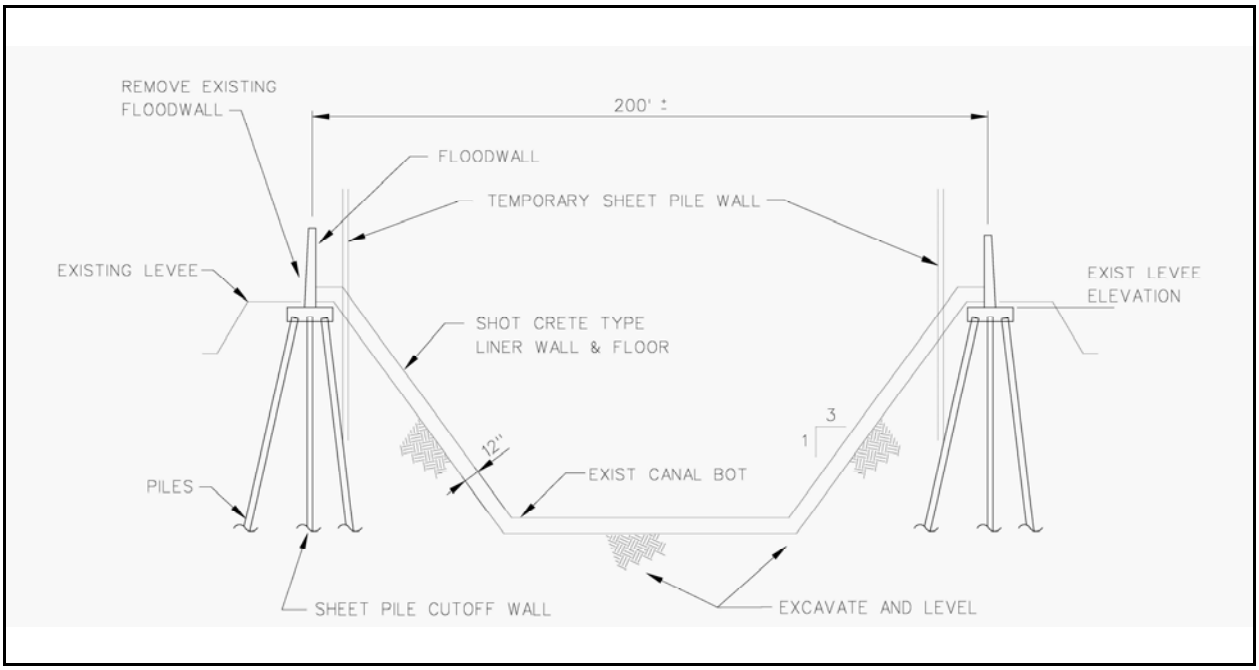


Figure 15. Canal Liner Contour Concept

construction activities for floodwall installation. Construction and installation work could include demolishing existing floodwalls; excavating and disposing of soil; installing battered piles, reinforcing bar, and forms; pouring concrete floodwall and footing; and installing temporary breachable dams and dry weather pump to maintain canal flows.

Other components of parallel protection include replacing floodwalls, fronting protection for SWBNO PS #7, and flood proofing the Robert E. Lee Boulevard Bridge over the London Avenue Canal. The Robert E. Lee Bridge was scheduled to be replaced with a flood-proofed bridge before Hurricane Katrina under the LPV Hurricane Protection Project. This bridge is the only bridge remaining that was not flood-proofed.

It has been estimated to take less than five years to complete construction of this project.

2.4.5.2 Improve Parallel Protection

2.4.5.2.1 Replace I-walls with T-walls

Under this alternative, the ICS would be removed, and parallel protection would be modified to the 100-year level of flood risk reduction along the entire length of all three outfall canals. This would require construction activities along 13,500 feet of the 17th Street Canal, 11,000 feet of the Orleans Avenue Canal, and 15,000 feet of the London Avenue Canal. This would require replacing all I-walls with T-walls and could require raising all T-walls and levees to the 100-year level of flood protection. Existing SWBNO PS #3, #4, #6, and #7 would be flood proofed. Modification or replacement of bridges that cross the outfall canals could be required. It is recognized that the existing SWBNO PS #3, #4, #6, and #7 cannot pump against storm surge elevations in Lake Pontchartrain.

2.4.5.2.2 ICS Gates with Parallel Protection

This alternative could improve the outfall canals' parallel protection to the 100-year level of flood risk reduction between Lake Pontchartrain and the existing SWBNO PS #3, #4, #6, and #7,

as in section 2.4.5.2.1, and leave the ICS gates in place. This could require replacing all I-walls with T-walls and could require raising all T-walls and levees to the 100-year level of flood protection along the entire length of all three outfall canals. This would require construction activities along 13,500 feet of the 17th Street Canal, 11,000 feet of the Orleans Avenue Canal, and 15,000 feet of the London Avenue Canal. Under this alternative, the parallel protection system would provide flood damage reduction, and the ICS gates would be closed only if failure of the parallel protection system was imminent. At Orleans Avenue, fronting protection would be required at SWBNO PS #7 to resist the 100-year flood water elevation in the canal. At London Avenue, flood proofing the Robert E. Lee Bridge would be required.

2.4.6 Convert ICS to Permanent System

This alternative could modify the existing ICS to upgrade them to permanent systems and to have a life cycle equal to the 50 year project life (figure 16). General modifications to upgrade the ICS to permanent structures could include increased operability, a safe room for operators, maintainability, accessibility, corrosion protection, lightning protection, longevity and replacement of components, standby power, controls, aesthetic considerations, and other issues (Black & Veatch 2007a).

These modifications could include activities such as: removing the existing pumps and power units, installing new pumps and power units, providing protection (pump station building) for the equipment from wind-blown debris, providing valves on the existing discharge pipes, replacing the existing gates, and providing corrosion protection on exposed steel material.

This alternative could be considered an environmentally preferred alternative because the footprint of the structures has already been affected; therefore, there would be minimal additional effects on the biological or physical environment.

Modifications to the ICS that are specific to each canal are discussed in sections 2.4.6.1–2.4.6.3.

2.4.6.1 17th Street Canal

This alternative could increase the pumping capacity at the 17th Street Canal and Lake Pontchartrain by adding a pumping station, an intake basin at the east side of the canal, and additional discharge capacity to the 17th Street Canal. It would be necessary to construct a concrete intake basin to the northwest of the canal direction flow that would extend immediately south of the Hammond Highway Bridge, with the pump arrays discharging into the lake. A bridge would be built over the proposed canal near Hammond Highway. The floodwall along the 17th Street Canal would be removed and reconstructed at the proposed intake. Some developed property could be acquired for the construction of the intake basin. Construction of pump station housing would include vertical pumps. Additional formed suction intake pumps, along with discharge pipes and a pump platform with a protective enclosure, could also be added.

The recommended capacity to minimize impacts on interior storm water elevations would require an additional pumping capacity of approximately 2,500 cfs in the 17th Street Canal.

It is estimated that construction would take 48 months.

Figure 16. Locations of Interim Closure Structures

2.4.6.2 Orleans Avenue Canal

At Orleans Avenue, a pump station with a capacity equal to SWBNO PS #7 could be constructed just east of the gate structure. The pump station could consist of vertical pumps. Additional form suction intake pumps, along with discharge pipes and a pump platform and a protective enclosure, could also be added. Intake and outfall basins would be built on either side of the pump station to feed water to the pumps. A platform extension would be installed to provide an access road to the existing gate structure installed in the canal. The pump station could be designed to provide for future expansion, and the levee would be relocated to accommodate the expanded pump station.

The existing capacity of the SWBNO PS #7 is 2,690 cfs. An additional pumping capacity of approximately 500 cfs to 1,200 cfs could be needed in Orleans Avenue Canal over the ICS capacity.

It is estimated that construction would take 30 months.

2.4.6.3 London Avenue Canal

The goal of this alternative would be to increase the conveyance capacity of the London Avenue Canal by adding an intake basin and pumps to the east side of the London Avenue Canal to discharge into the lake when the floodgates are closed.

This alternative could include installing a pump station on the east bank of the London Avenue Canal. Part of the existing cofferdam would be removed to construct this pump station. An intake and an outfall basin would be built on either side of the pump station to feed water to the pumps. The pump station could be constructed to provide for future expansion. The levee would be relocated to accommodate the pump station. Total pumping capacity could be equal to SWBNO PS # 3 and #4 combined. Additional formed suction intake pumps, along with discharge pipes and a pump platform with a protective enclosure, would also be added. This could allow for the existing temporary pumps to be removed.

The existing capacity of the SWBNO PS #3 and #4 is 7,980 cfs. An additional pumping capacity of approximately 2,500 cfs to 3,500 cfs could be needed in London Avenue Canal over the ICS capacity.

It is estimated that construction would take 48 months.

2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

2.5.1 Nonstructural Alternative

As described in Engineer Regulation (ER) 1105-2-100 (USACE 2000), Section 73 of the WRDA of 1974 requires consideration of nonstructural alternatives in flood reduction studies. These alternatives can be considered independently or in combination with structural measures. Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding. Damage reduction from nonstructural measures is accomplished by changing the use made of the floodplains or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocating structures, flood warning and preparedness systems, and regulating floodplain uses.

Orleans Parish has a flood warning system and evacuation plan in place, and regulation of floodplain uses is addressed by the National Flood Insurance Program; therefore, only flood

proofing and relocating structures would be considered nonstructural alternatives. The flood proofing measure to be evaluated would be raising structures in place per Federal Emergency Management Agency (FEMA) guidelines. The relocation of structures is defined as a buyout or permanent physical relocation.

2.5.1.1 Flood Proofing

Flood proofing would require elevating all residential and commercial properties subject to flooding above the expected levels of flooding in the Orleans east and Jefferson basins. This alternative also considers elevating roadways, public buildings, and some aspects of infrastructure that need to continue operations during and after storm events. Residential structures would be elevated according to FEMA guidelines issued on 12 April 2006 (FEMA 2006). With this guidance, FEMA issued base flood elevations and building elevation guidelines for hurricane-affected areas in Orleans Parish, Louisiana.

In the levee areas of sub-basins "a" to "h" of the Parish (figure 17), FEMA recommends the following: new construction and substantially damaged homes and businesses within a designated FEMA floodplain should be elevated to either the advisory Base Flood Elevation shown on the Preliminary Flood Insurance Rate Map or at least 3 feet above the highest adjacent existing ground elevation at the building site, whichever is higher; and new construction and substantially damaged homes and businesses not in a designated FEMA floodplain should be elevated at least 3 feet above the highest adjacent existing ground elevation at the building site.

This guidance is similar to the National Flood Insurance Program rules for areas protected by levees being restored to provide 1-percent-annual-chance base flood protection. FEMA has stated that the 3-feet-minimum elevation requirement is a reasonable standard given current levels of protection, the temporary nature of the risk, and commitments to restore the system. The reason for raising homes 3 feet is to provide for protection as floodwaters flow from high ground to low ground.

The average cost of elevating a residential structure has been estimated at $95 per square foot (USACE 2007b). This estimate includes the cost of administration, design, inspection, costing, project management, and all other costs associated with elevating the structure, as well as the costs of the occupants being relocated to temporary housing during the elevation activities. According to the Greater New Orleans Community Data Center (GNOCDC 2007), in 2000 there were 147,772 housing units in the Lakeview, Gentilly, Bywater, Mid-City, French Quarter/Central Business District, Central City/Garden District, and Uptown/Carrollton neighborhoods. These are the Orleans Parish neighborhoods that were directly impacted by floodwaters resulting from breaches in the 17th Street and London Avenue Canals. The $95 per square foot average cost results in a cost of $152,000 to raise a 1,600-square-foot-residence above the expected level of flooding. Using these assumptions, the cost to elevate all the residences in the vicinity of the outfall canals in Orleans Parish would be approximately $22.5 billion. Similar costs in Jefferson Parish would be expected.

Other costs associated with the flood proofing alternative would include elevating non-residential buildings, roads and railroads, and other infrastructure. Information is not available on the costs associated with elevating commercial, industrial, or public buildings because these structures are non-homogenous, which would require information be developed for each individual structure. It can be reasonably assumed that the costs of elevating other infrastructure would be double the costs of elevating residential structures.

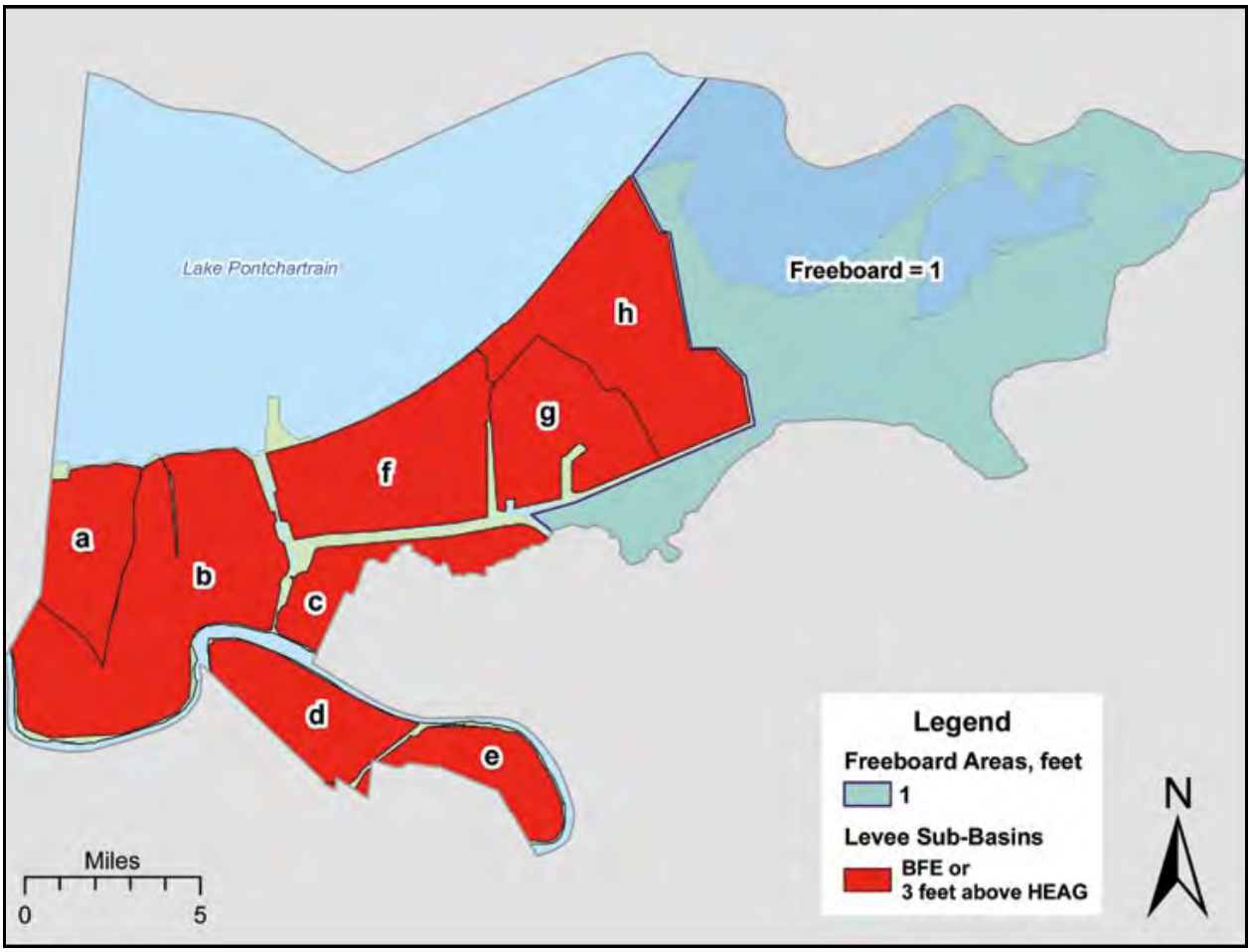


Figure 17. Orleans Parish Sub-Basins
(FEMA 2006)

Elevating the existing transportation network would be equivalent to converting all roadways and railroads to bridges. The costs to repair roadways and railroads damaged by a storm event appear to be more economical than conversion to a bridge network. Repair costs to the roadway network in Orleans Parish have been estimated at $891.2 million for each storm event that exceeds the level of flood protection. Railroad repair costs in Orleans Parish for each storm event that exceeds the level of flood protection has been estimated at $60.2 million. Information is not available on the costs associated with elevating other infrastructure, such as airport facilities, electrical distribution and transmission grids, gas distribution lines, drainage, sewerage and water distribution facilities, communication networks, public transit, and waterborne navigation facilities. However, the cost associated with elevating all flood-prone infrastructure would exceed the costs of other structural alternatives.

Reason for Elimination: This alternative would be considered only complementary to the alternatives that reduce flooding risks. In addition, the costs associated with implementing this alternative could exceed appropriations for the authorized project. The total estimated costs as outlined above for elevating all flood-damaged properties in the study area could likely approach, if not exceed, $50 billion, which greatly exceeds the funds appropriated by Congress to achieve the purpose and need of the entire 100-year HPS. However, because these costs are based on the number of homes flooded as a result of Hurricane Katrina, this cost clearly overestimates the cost to raise those homes susceptible to flooding from the 100-year storm.

Nonetheless, even if the cost of this alternative were reduced by 50 percent to account for the differences between pre-Katrina and post-Katrina population estimates and the difference between flooding potential from a Katrina-like event and a 100-year event, this cost would still greatly exceed funds appropriated for the entire 100-year HPS.

2.5.1.2 Real Estate Acquisition and Relocation

Public acquisition of properties in areas subject to flooding can also reduce the damages from extreme rain events and tropical storms. Acquisition of these properties as part of a Federal project and for projects where there is Federal financial assistance in any part of project costs would be subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 United States Code (U.S.C.) Section 4601, et seq., as amended (the Relocation Assistance Act). Accordingly, the displacement of individuals, families, businesses, farms, and nonprofit organizations would have to be organized and a system established to minimize the impacts on displaced persons.

There are several options that could be offered for the acquisition and relocation alternative: selling the site and home or commercial structure to the local sponsor for demolition, selling the site to the local sponsor and relocating the structure to a comparable site outside the area of flooding, or relocating the displaced persons to a comparable home or business outside the area of flooding. In addition to compensation for real property, displaced persons could be eligible for expenses for moving themselves and their personal or business-related property, costs of property lost as a result of moving or discontinuing a business, expenses in searching for a replacement business, and necessary expenses for reestablishing a displaced farm, nonprofit organization, or small business at its new location.

Reason for Elimination: The reasons for elimination are similar to the impacts described for the flood proofing alternative in section 2.5.1.1.

2.5.2 Lake Pontchartrain Barrier Plan

A Lake Pontchartrain Barrier at or near the Rigolets could reduce the storm surge in Lake Pontchartrain by cutting off the lake from the Gulf of Mexico. This plan has been investigated previously as a part of the *Final Environmental Impact Statement, Lake Pontchartrain, Louisiana, and Vicinity, Hurricane Protection Project* (USACE 1974) and the *Reevaluation Study, Lake Pontchartrain, Louisiana and Vicinity, Hurricane Protection Project* (USACE 1984). The Barrier Plan would consist of major structural complexes at The Rigolets, Chef Menteur Pass, and Seabrook (figure 18). The Seabrook complex is being investigated as part of IER #11 and therefore is not being investigated in this IER.

The Rigolets complex would consist of barrier levees, a control structure, a navigation lock with approach channels, and closure dams. The complex would provide a barrier against tidal influx through The Rigolets into Lake Pontchartrain under tropical storm conditions yet provide continuous tidal interchange and navigation movement under nontropical storm conditions.

The Chef Menteur Pass complex would consist of a closure dam astride the existing natural channel, barrier levees, a bypass channel for the Gulf Intracoastal Waterway channel, a control structure astride a new channel cut, and a navigation structure with approach channels. The complex would provide a barrier against tidal influx through Chef Menteur Pass into Lake Pontchartrain under tropical storm conditions and would provide for a continuous tidal interchange and navigation movement during nontropical storm conditions.

Figure 18. Lake Pontchartrain Barrier Plan

Reason for Elimination: The Barrier Plan would provide reduced stages in Lake Pontchartrain; however, the implementation and impacts of such an alternative are extremely complex and far-reaching including possible impacts to Mississippi coastal area. Because of the size of Lake Pontchartrain, a HSDRRS project would still be required along Jefferson and Orleans Parish lakefront due to the effects of wind driven waves that would be expected during a 1% event. A complete investigation of this alternative would require intensive analysis, including storm surges generated by greater than 100 year storm events, that is beyond the scope of this report. Such an analysis is being performed under the Louisiana Coastal Protection and Restoration project (LACPR). Because the scope of this report is limited to the outfall canals, further investigation of the Barrier Plan will not be undertaken but will occur as a part of the LACPR effort.

As part of the post-Katrina investigation, the USACE used the Advanced Circulation model to simulate the effects of the Hurricane Katrina storm surge if the three barrier complexes were in place during the hurricane. If the barrier gates were closed during the storm, the model results show that Gulf of Mexico surge would be blocked from entering the basin. The model shows that there would still be a substantial wind driven surge occurring along the south shore as northerly winds push water in that direction (Team Louisiana 2006). During Hurricane Katrina, the high water marks at the entrances to the 17th Street, Orleans Avenue, and London Avenue Canals were 10.8 ft, 11.8 ft, and 10.6 ft North American Vertical Datum of 1988 (NAVD88), respectively (USACE 2007c). The model predicts that the surge reduction at the entrances of the three outfall canals would have been on the order of 2.2 feet to 2.4 feet, dropping the maximum level experienced by the lakefront levees and floodwalls from 10 feet to 12 feet to between 7 feet and 9 feet. The IPET team theorized that the outfall canals floodwalls breached when the lake level was between 6 feet and 9 feet, so it is possible that the barrier structures at the Rigolets, Seabrook, and Chef Menteur might not have prevented those failures. The barrier structures may have reduced the volume and extent of flooding through the outfall canal breaches because less water would have been in the lake. The model indicates that lake elevation along the south shore of Lake Pontchartrain with the structures in place would have dropped to its normal level within hours, rather than the two days that occurred after Hurricane Katrina.

This alternative could reduce storm surge from the Gulf of Mexico, but it would not eliminate wind-driven lake storm surge, which can enter the outfall canals as shown during Hurricane Katrina. This alternative does not meet the purpose and need of the project because it would not protect the City of New Orleans and Jefferson Parish from hurricane events because it is possible that wind-driven lake storm surge through the 17th Street, Orleans Avenue and London Avenue Canals could still cause extensive damage. Therefore protective structures at the mouths of the outfall canals or modification to the existing floodwalls would still be required to provide protection against the 1% event.

2.5.3 Canal Closure

2.5.3.1 One-Directional Flow Gate

A one-directional flow gate, normally open, could be constructed at the mouths of the outfall canals. The gate would passively close, due to differential head, during hurricane events to prevent storm surge from entering the outfall canals. For example, as the water level in the lake rises with storm surge, the gate would close because of the relative difference in water level height in the lake versus the canal. The existing SWBNO pump stations would remain operational but would cease pumping once the canal's water storage capacity is reached. Canal storage capacity is limited by the safe water elevation along the canal. Once storm surge subsides, the gates would automatically reopen, and the SWBNO pump stations would resume operation.

Reason for Elimination: Engineering analysis indicates that the canals would be filled to the safe water elevation in well under one hour when pumping at full future capacity, and in some cases on the order of only one-half hour (Black & Veatch 2007b). To prevent the exceedance of the safe water elevation in the canals, pumping of storm water into the canal would cease at a specified point, which would limit the ability of the city to evacuate storm water, potentially causing flooding from precipitation.

2.5.3.2 Gates without Pumps (New manual gate)

New gates, normally open, could be constructed at the mouths of the outfall canals. The gate would be manually closed during hurricane events to prevent storm surge from entering the outfall canals. The existing SWBNO pump stations would remain operational but would cease pumping once the canal's water storage capacity is reached. Canal storage capacity is limited by the safe water elevation along the canal. Once storm surge subsides, the gates would be reopened and the SWBNO pump stations would resume operation.

Reason for Elimination: The reason for elimination is similar to the impacts described in section 2.5.3.1.

2.5.4 Pressurizing the System

A pressurized conduit system could be constructed from the existing SWBNO pump stations (#6, #7, and #3) to Lake Pontchartrain. The existing Lake Pontchartrain levee system could be extended across each of the outfall canals, and the new discharge structures would be on the lake side of the levee system. This system would essentially replace the existing canals, forming a closed system, and transport water to the lake. The objective of this alternative would be to improve the existing parallel protection system, which could improve the quantity of water allowed to flow in the outfall canals above the volume restricted due to safe water elevations by converting the canals to a force main system. Conceptual engineering and rough-order-magnitude (ROM) cost information for this alternative are presented in Appendix B of *Final Report of Alternatives Analysis of the Interim Drainage Maintenance Opportunities for Orleans East Bank Project* (DMJM Harris 2006). A summary of this alternative for each canal is presented below.

2.5.4.1 17th Street Canal

At the 17th Street Canal, the existing canal could be replaced with a force main system from SWBNO PS #6 to Lake Pontchartrain (figure 19). The existing canal servitude would become green space. Reconstructing SWBNO PS #6 would be necessary to meet the required total system head to pump to the lake and would need to be performed concurrently with this alternative. The roadway bridges between SWBNO PS #6 and Lake Pontchartrain could be removed once the culverts are installed. The lakefront levee would be extended across the ROW of the canal for closure.

It is estimated that construction would take 60 months.

Figure 19. 17th Street Canal Pressurized System

2.5.4.2 Orleans Avenue Canal

At the Orleans Avenue Canal, the existing canal could be replaced with a force main system from SWBNO PS #7 to Lake Pontchartrain (figure 20). The existing canal servitude would become green space. North of Robert E. Lee Boulevard, the force main alignment would be straightened to the extent possible without impacting Marconi Drive. Reconstruction of SWBNO PS #7 would be necessary to meet the required total system head to pump to the lake and would need to be performed concurrently with this alternative. The roadway bridges between SWBNO PS #7 and Lake Pontchartrain, other than Interstate 610 (I-610), could be removed once the culverts are installed, and the lakefront levee would be extended across the ROW of the canal for closure.

It is estimated that construction would take 44 months.

2.5.4.3 London Avenue Canal

At the London Avenue Canal, the existing canal could be replaced with a force main system from SWBNO PS #3 to Lake Pontchartrain. Because of the large inflow introduced at SWBNO PS #4, the force main system is much larger in that downstream reach below SWBNO PS #4 (figure 21). The existing canal servitude could become green space. With the exception of I-610, the bridge crossings could be replaced with roadways over the top of the culverts. Reconstruction of SWBNO PS #3 would be necessary to meet the required total system head to pump the flow from SWBNO PS #3 to Lake Pontchartrain and would need to be performed concurrently with this alternative. The total capacity of the force main system, from SWBNO PS #3, could be 4,260 cfs. The added capacity of the force main system from SWBNO PS #4 would be 3,720 cfs, for a total discharge downstream at SWBNO PS #4 of 7,980 cfs, which does not include the proposed future 1,000 cfs pump station near SWBNO PS #4.

It is estimated that construction would take 60 months.

Reason for Elimination: The construction time frame to pressurize the system at all three outfall canals has been estimated in excess of five years. While the completed project is possible if project worked concurrently with S&WB improvements to the existing internal drainage system, the costs, time, and impacts required to complete the project would be significant. Therefore, this project has been eliminated for the following reasons:

- Cost of force mains to lake and complete reconstruction of PS #3, #4, #6, and #7 by SWBNO would be excessive.
- Construction of the force mains would interfere with normal drainage for several years.
- The reconstruction of PS #3, #4, #6, and #7 by SWBNO would interfere with normal drainage for several years.

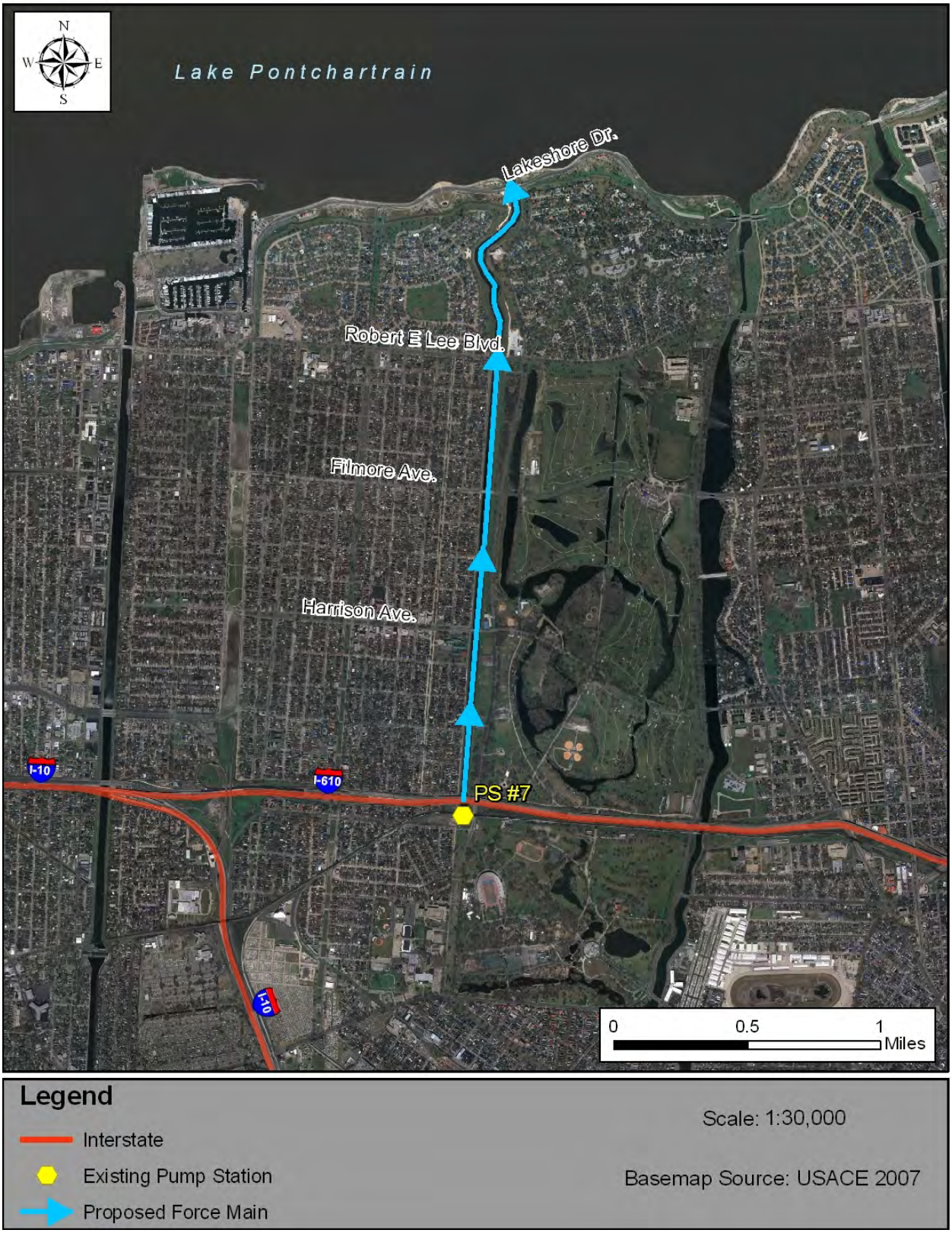


Figure 20. Orleans Avenue Canal Pressurized System

Figure 21. London Avenue Canal Pressurized System

2.5.5 Utilize Grade Variation

At the 17th Street and London Avenue Canals, existing SWBNO PS #6 and PS #3 could be taken out of commission, a new pump station could be constructed at or near the natural low point along the canal grade, and water would be pumped directly from the new pump station to Lake Pontchartrain. Parallel protection would be required between the new pump station and the lake. This concept is intended to take greater advantage of the natural fall of the canal grade to the low point along the canal length, thereby reducing the required canal excavation.

On London Avenue, SWBNO PS #3 would cease operations, and a new pump station would be constructed in its place to handle flows in the existing canal configuration. A T-wall would replace the parallel protection system up to SWBNO PS #4. The canal would require deepening between the new pump station and old SWBNO PS #3 location. Canal deepening in the interior of the canal would increase water storage capacity.

Reason for Elimination: A review of topographic maps and survey data of the canals indicates that the natural low point between the existing pump stations and the lakefront is not low enough to take full advantage of the natural fall of the canal grade. Therefore, this low point would not be an advantage when selecting the location of a new permanent pump station.

2.5.6 One Central Pump Station in Lake Pontchartrain

A ring levee could be constructed in Lake Pontchartrain, generally parallel to the southern shoreline, forming a lagoon to receive flow from the outfall canals and to block storm surge from entering the canals. One new permanent pump station could be on the ring levee to pump water from the lagoon into the lake (figure 22). The pump station could be directly north of the Orleans Marina, west of a primary boat access gate structure.

The cost associated with this alternative would be greater when compared to the proposed action.

Reason for Elimination: Concentrating all storm water from the outfall canals into one location would increase the risk due to a lack of redundancy in the system. If this system were to fail, there is no alternative location to discharge storm water, which could result in overtopping of the levees along the outfall canals and the southern shoreline of Lake Pontchartrain. There would also be issues with aesthetics and recreation, because the location of the pump station in the lake could be perceived as having negative impacts on both resources.

In addition, Lake Pontchartrain has been designated as critical habitat for the Federally listed threatened Gulf sturgeon, particularly those areas east of the Lake Pontchartrain Causeway, which includes those waters on the northern end of the outfall canals. Constructing a new levee and pump station associated with this alternative could adversely impact Gulf sturgeon populations by eliminating an area designated as critical habitat.

2.5.7 Three Pump Stations in Lake Pontchartrain

This alternative is similar to the one pump station in Lake Pontchartrain alternative presented in section 2.5.6, except that three individual new permanent pump stations could be used instead of one central pump station. The three pump stations would operate simultaneously (see figure 22). The pump stations would be north of the mouth of the 17th Street Canal, north of the mouth of the Orleans Avenue Canal, and north between the mouths of Bayou St. John and the London Avenue Canal.

Reason for Elimination: The reasons for elimination are similar to the impacts described in section 2.5.6.

Figure 22. Pump Station(s) in Lake Pontchartrain

2.5.8 Additional Project Features: Internal Drainage Improvements

These alternatives include project features that could provide additional efficiency to those alternatives presented in sections 2.3, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, and 2.4.6. These additional project features would be potential improvements to the interior drainage system, including diverting flow to other systems, storage, subdividing the drainage basins, and adding small pump stations. As stand-alone projects, these alternatives do not meet the purpose and need of the project and are not considered as stand-alone alternatives to the permanent protection system alternatives. Therefore, these alternatives have been eliminated from further consideration and were not carried forward for impacts analysis. Conceptual engineering and estimated cost information for these additional project features are presented in Appendix B of *Final Report of Alternatives Analysis of the Interim Drainage Maintenance Opportunities for Orleans East Bank Project* (DMJM Harris 2006).

2.5.8.1 Divert Water

2.5.8.1.1 London Avenue Canal to IHNC – Alternative 1

The goal of this project feature would be to reduce pumping requirements on the London Avenue Canal by diverting 1,100 cfs that is discharged from SWBNO PS #3 into the Florida Avenue Canal, which flows to SWBNO PS #19 and discharges into the Inner Harbor Navigation Canal (IHNC), also known as the Industrial Canal (figure 23). As the canal gates are closed during a storm event, the IHNC becomes a closed basin with no pumping capacity; therefore, implementation of this alternative would require further analysis, including additional pump stations and gates, to determine the impacts of increased water discharge into the canal on the canal's storage capacity.

Modifications would be necessary to disconnect the Florida Avenue Canal from the suction side of SWBNO PS #3 to prevent the discharge from spilling back into the intake basin and recycling through the pump station. The gate that allows water to be directed to the Florida Avenue Canal could also require modification to allow the full 1,100 cfs to flow through. This project would include these modifications to SWBNO PS #3 and three options (options A, B, and C) for improvements in the capacity of the Florida Avenue Canal.

This alternative assumes that modifications to the interior drainage system could reduce the demand on the London Avenue Canal, thereby reducing costs associated with a new pump station at the mouth of the outfall canal and any required canal modifications.

Option A

Under option A, a box culvert could be placed from Louisa Street to Piety Street adjacent to the existing box culvert. This extra culvert would increase the flow by 1,300 cfs at the major point of constriction from Louisa Street to Piety Street. This option would require removing and relocating a 48-inch steel water line. It would also require removing the north shoulder of Florida Avenue to relocate that steel water line. It is estimated that construction would take 12 months.

Option B

Under option B, pumps could be placed at Louisa Street and pipes would run on a pipe bridge over Louisa Street and Piety Street. The pumps would be west of Louisa Street in a small intake basin to the north of the existing Florida Avenue Canal. Pipes would tie into two larger pipes and carry the water over both Louisa Street and Piety Street and discharge back into the Florida Avenue Canal at the end of the existing box culvert east of Piety Street. It is estimated that construction would take 36 months.

Figure 23. London Avenue Canal to IHNC - Alternative 1

Option C

Option C could include fast-tracking the planned expansion of the Florida Avenue Canal adding a diversion capacity of 1,100 cfs. Currently, under the Southeast Louisiana Project (SELA) program, there are plans to expand the Florida Avenue Canal from Deer Street to SWBNO PS #19. It is estimated that construction would take 18 months.

2.5.8.1.2 London Avenue Canal to IHNC – Alternative 2

Water could be pumped from the London Avenue Canal to the IHNC via PS #3 and from London Avenue Canal to Lake Pontchartrain via PS #4. This alternative would eliminate the need for the canal between PS #3 and PS #4 but would require restoration of parallel protection from Lake Pontchartrain to PS #4. As the canal gates are closed during a storm event, the IHNC becomes a closed basin with no pumping capacity; therefore, implementation of this alternative would require further analysis, including additional pump stations and gates, to determine the impacts of increased water discharge into the canal on the canal's storage capacity.

2.5.8.2 Pump to the Mississippi River

This project feature could redirect storm water flow to the Mississippi River away from the 17th Street Canal, thereby decreasing the overall water volume entering the outfall canal during a rain event.

2.5.8.2.1 Orleans Parish Option

This project could reduce the total volume of water pumped to the 17th Street Canal during a rain event by pumping water from the Monticello Canal to the Mississippi River (figure 24). To reduce the amount of volume to SWBNO PS #6, a pump station would be built across the Monticello Canal from the Pritchard Pump Station. An intake basin would collect water for the pump station consisting of a total capacity of 1,600 cfs. Two pipes, carrying 800 cfs per pipe, would convey water discharged from the proposed pump station to the Mississippi River. This project complements the proposed SELA project work that will be done along Claiborne Avenue.

It is estimated that construction would take 30 months.

2.5.8.2.2 Jefferson Parish Option

This project feature could reduce the total volume of water pumped to the 17th Street Canal during a rain event by redirecting storm water in Hoey's Basin to the Hoey's Canal and pumping to the Mississippi River (figure 25). A proposed technical approach for this alternative was prepared for and presented to Jefferson Parish in 2007 (NY Associates 2007). SELA is currently studying this option.

The project would divert storm water from Hoey's Canal near Jefferson Highway to the Mississippi River via a new pump station to provide flood reduction levels in the east end of the Geisenheimer Culvert where the Hoey's Canal joins with the Geisenheimer Culvert to carry storm water into the 17th Street Canal in Orleans Parish. This project would drain all 2,500 acres of Hoey's Basin, resulting in a decrease in the volume of water entering the 17th Street Canal during a rain event. A1,600 cfs pump station would be constructed on the south bank of Hoey's Canal. A 13-foot diameter pipe carrying 1,600 cfs would convey water discharged from the pump station to the Mississippi River as shown in figure 25. The Jefferson Parish option would allow both Orleans and Jefferson Parish to operate separate drainage systems.

It is estimated that construction would take 30 months.

Figure 24. Pump to the Mississippi River - Orleans Parish Option

Figure 25. Pump to the Mississippi River - Jefferson Parish Option

2.5.8.3 Add Additional Pumping Capacity

This alternative consists of three options that could add drainage pump stations near Lake Pontchartrain and the IHNC. The goal of this alternative would be to reduce the flow into the outfall canals, which have constrained safe water levels, during major storm events. The concept is that flow through the existing drainage system could be reduced, greater redundancy would be provided, and the cost of the primary system would be reduced.

2.5.8.3.1 Orleans Avenue Canal Option

The goal of this option would be to redirect all discharge from SWBNO PS #2 to SWBNO PS #7 and to add pumping capacity to both SWBNO PS #7 and the Orleans Avenue Canal (figure 26). To redirect the water currently flowing from SWBNO PS #2 to SWBNO PS #3 so that it would flow from SWBNO PS #2 to SWBNO PS #7 and the Orleans Avenue Canal, three actions would be necessary: (1) construct an additional U-shaped flume parallel to the Lafitte Street Canal; (2) construct an additional box culvert on Orleans Avenue from Olga Street to SWBNO PS #7 planned under the SELA program; and (3) increase the pumps at SWBNO PS #7 by adding pumps to accommodate the extra flow from SWBNO PS #2.

It is estimated that construction would take 30 months.

2.5.8.3.2 London Avenue Canal – Option 1

The goal of this option would be to divert flow discharged from SWBNO PS #4 from the London Avenue Canal to the IHNC via the Prentiss Avenue, Peoples Avenue, and Dwyer Canals (figure 27). Water from the drainage basin that flows to SWBNO PS #4 would be redirected using the existing drainage system toward a proposed pump station at the eastern terminus of the Dwyer Canal. The pumps would discharge the water into five discharge tubes, which would be routed over the levee and the railroad track into the IHNC. A discharge basin would be constructed on the west bank of the IHNC that would accept the water from the siphon into the canal. As the canal gates are closed during a storm event, the IHNC becomes a closed basin with no pumping capacity; therefore, implementation of this alternative would require further analysis, including additional pump stations and gates, to determine the impacts of increased water discharge into the canal on the canal's storage capacity.

It is estimated that construction would take 30 months.

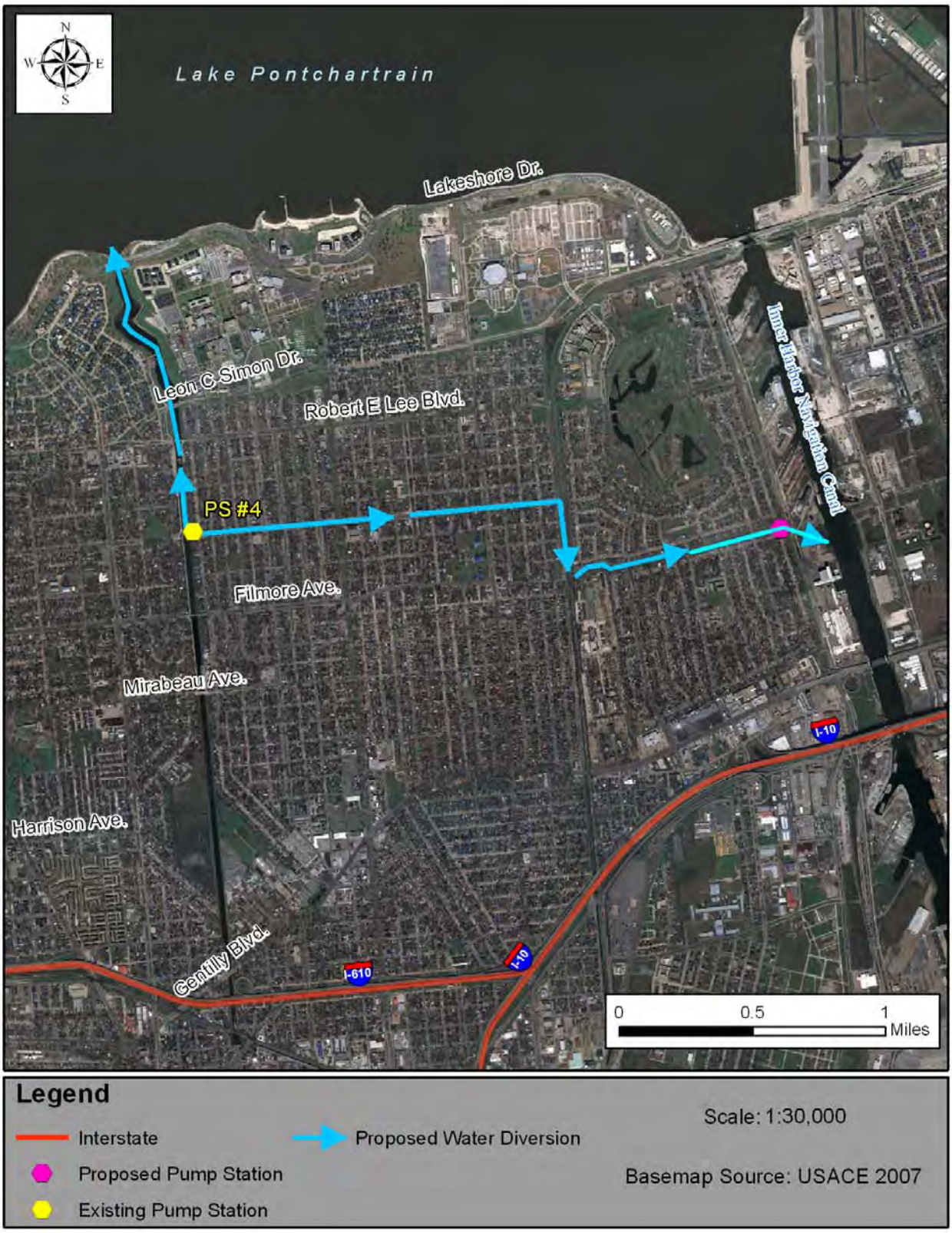
2.5.8.3.3 London Avenue Canal – Option 2

The goal of this option would be to divert a portion of the flow discharged from SWBNO PS #2 into Bayou St. John to reduce pumping requirements at the London Avenue Canal (figure 28). This option would reduce flows at the Orleans Avenue and London Avenue Canals by a total of 1,200 cfs by using Bayou St. John as a temporary conveyance channel to Lake Pontchartrain.

The 1,200 cfs flow from SWBNO PS #2 would be diverted into Bayou St. John via the existing Lafitte Street Canal and a channel that would be added parallel to the existing canal on the north side. Pumps would be placed at the foot of Bayou St. John to pump the 1,200 cfs of water into the bayou with an intake basin in the median of Jefferson Davis Parkway between Lafitte and Conti Streets. A second new pump station, including intake and discharge basins, would be needed just east of the existing gate structure at the outlet of the bayou. The second pump station would have four 300 cfs pumps.

It is estimated that construction would take 30 months.

Figure 26. Add Additional Drainage Pump Stations - Orleans Avenue Canal Option



Legend

Interstate

Proposed Water Diversion

Proposed Pump Station

Existing Pump Station

Scale: 1:30,000

Basemap Source: USACE 2007

Figure 27. Add Additional Drainage Pump Stations - London Avenue Canal Option 1

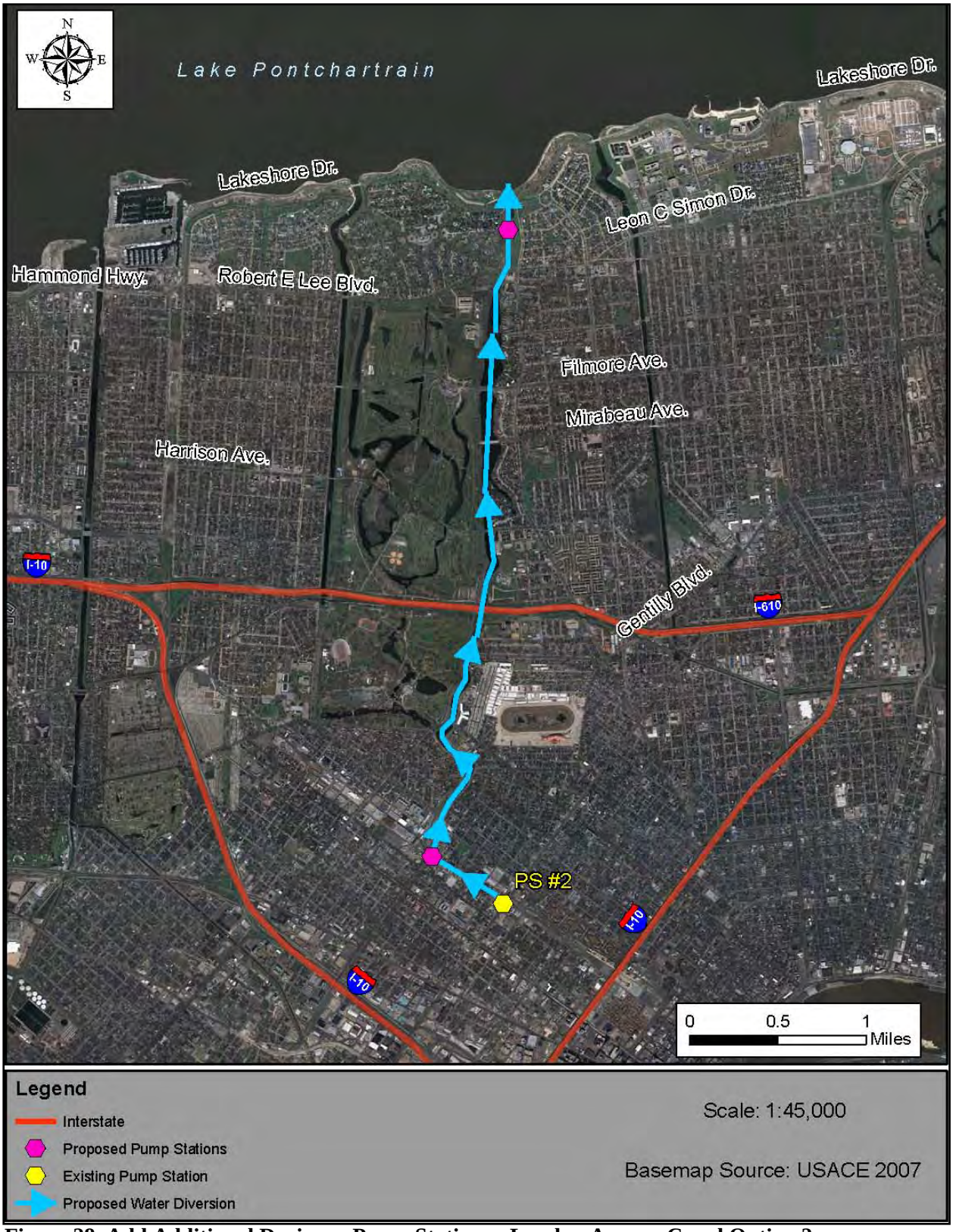


Figure 28. Add Additional Drainage Pump Stations - London Avenue Canal Option 2

2.5.8.4 City Park/Bayou St. John Retention/Detention

This additional project feature could relieve the pumping volume demands on the Orleans Avenue Canal by using a large area of City Park north of I-610 as a storm water detention area to detain water that falls within City Park, until the system is able to accept this storm water without flooding other residences or businesses (figure 29).

To create the detention area, a berm would be constructed around a portion of City Park north of I-610. Because of a gradual slope down to the northern portion of the park, the berm would require a maximum elevation of 5 feet to hold approximately 4 feet of water in the lowest portion, with 1 foot of freeboard. It is estimated that 1,320 acre-feet of storage area would be created in City Park.

The berm would begin at the Orleans Avenue Canal levee on the north side of I-610 near SWBNO PS #7. It would then parallel Zachary Taylor Drive and I-610 to Wisner Boulevard but would exclude Popp's Fountain and Pan American Stadium. Much of Wisner Boulevard could be used as a berm; however, a berm would be required in isolated low areas along that roadway. The berm would turn westward approximately 1,000 feet south of Filmore Avenue and turn north around the clubhouse, the driving range, John F. Kennedy High School, and the U.S. Department of Agriculture research center to Robert E. Lee Boulevard. It again would turn west parallel to Robert E. Lee Boulevard until reaching the Orleans Avenue Canal levee. All buildings and monuments within the detention area, including the stables, would be surrounded with berms to prevent flooding.

To ensure water would not exit City Park while it is being held, all drainage leading to existing alternate outfall structures would be contained with valves or flap gates, or both.

The water would be detained until the storm period has passed. It would then exit through the existing drainage system near Zachary Taylor Drive and Golf Drive, which leads to SWBNO PS #7, the Orleans Avenue Canal, and Lake Pontchartrain. The existing drainage structure would be reconstructed to detain water during the storm event and to release it afterward, as conditions allow, into the municipal drainage system.

It is estimated that construction would take 20 months.

Figure 29. City Park/Bayou St. John Retention/Detention

2.5.8.5 Polders

The polder alternative could divide the Orleans East Bank interior drainage basin into self contained sub-basins (figure 30). This concept would keep any potential flooding localized within individual polders so that flood waters from one polder could not enter another. These inner levees would offer further risk reduction should the perimeter levees fail and confine the flood waters to the immediately impacted area. These polders could be created in part using existing railroads, highways, and other topographical features. The polder alternative would use the natural high ridges of Metairie, Esplanade, Gentilly and Chef Menteur, as well as the man-made high ground including Federal levees, parish levees, levees bordering canals, planters and sound proofing walls on interstate highways and elevated railway road beds to subdivide existing polders, thus creating water containment systems.

To combine linear high ground components into a working system of internal levees, the polder alternative would require incorporating watertight integrity to elevated rail beds, fitting drainage lines with gates or flapper valves that could be closed during a tropical storm, moveable gates across Bayou St. John just north of the railway bridge, retrofitting automobile underpasses to mitigate flood waters, raising railroad and road beds that are not to adequate protection height, and upgrading the floodwalls and bridges from SWBNO PS #6 to Airline Highway (Flood Protection Alliance 2007). Additionally, this alternative would likely require land acquisition to expand the construction imprint of the automobile underpasses with either a U-shaped levee system or converting underpasses to overpasses.

Figure 30. Polders Alternative
Source : (Flood Protection Alliance 2007)

2.5.8.6 Interconnected Laterals

This alternative could provide lateral canals between the three outfall canals that allow drainage from one canal to be diverted to another canal if problems occur at one of the pump stations, creating additional redundancy. Internal drainage would be impacted by allowing water to flow

between canals in emergencies, which could increase the risk to neighboring communities should this system fail.

2.5.8.7 Consolidation of Canals

Under this alternative, the three outfall canals would be consolidated so that flow from each canal would flow into Lake Pontchartrain via one outfall, instead of three individual outfalls.

2.6 SUMMARY TABLE

Table 2 provides a summary of the preliminary alternative screening results and identifies the alternatives selected for detailed impact analysis.

Table 2. Preliminary Alternative Screening Results

Alternative	Detailed Impact Analysis
No Action	☑
Nonstructural	X
Lake Pontchartrain Barrier Plan	X
Concrete-Lined Canals	☑
Improve Parallel Protection	☑
Canal Closure	X
Pressurize the System	X
Convert ICS to Permanent System	☑
Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations	☑
Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations	☑
Permanent Pump Stations at the Mouths of the Outfall Canals	☑
Utilize Grade Variation	X
One Central Pump Station in Lake Pontchartrain	X
Three Pump Stations in Lake Pontchartrain	X
Divert Water	X
Add Additional Drainage Pump Stations	X
City Park/Bayou St. John Retention/Detention	X
Polders	X
Interconnected Laterals	X
Consolidation of Canals	X

☑ - Considered for impact analysis
X – Eliminated from further study

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ENVIRONMENTAL SETTING

The project area includes the area bounded by Lake Pontchartrain to the north, IHNC to the east, the Mississippi River to the south, and the most of Orleans Parish East bank to the west. The project features being investigated are pump stations at or near the mouths of the three outfall

canals (17th Street, Orleans Avenue, and London Avenue Canals), as stipulated in P.L. 109-234. Figure 1 depicts the project area potentially impacted by the proposed actions in this document

3.1.1 Geologic Setting

The project area is on the south shore of Lake Pontchartrain in the northeastern portion of the Mississippi River deltaic plain. Dominant physiographic features in the vicinity include Lake Pontchartrain, the lakefront hurricane protection levee, and the outfall canals. The natural surface environment of marsh and swamp has been altered by filling and drainage for development.

The shallow subsurface in the vicinity of the outfall canals is composed of approximately 15 feet of hydraulic fill from Lake Pontchartrain. Fill deposits contain sand, silt, and clay. Fill deposits overly lacustrine deposits except at the 17th Street Canal where they overly approximately 10 feet of swamp before entering lacustrine deposits. Lacustrine deposits are characterized by soft to medium clays with some silt and sand layers, and shells, and are approximately 20 feet thick. Swamp deposits are mainly very soft to medium organic clays and clays with peat and wood. Beach deposits are beneath lacustrine deposits and are approximately 15 feet thick. Beach deposits are related to the Pine Island Beach Ridge and are generally composed of silty, fine sand and sand with shells. Beach deposits overly 10 feet to 30 feet of bay-sound deposits, which are characterized by soft to medium clays, silts, and some sand containing shell fragments. Pleistocene deposits are beneath bay-sound deposits at approximate elevation -60 NAVD88. These deposits are mainly stiff to very stiff, oxidized clays, silts and sands.

The study site contains Aquents soils which are poorly drained soils that are stratified and clayey to mucky throughout, resulting from hydraulically dredged material (NRCS 1989).

Groundwater is artificially lowered in the project area by forced drainage.

Long-term relative subsidence resulting mainly from compaction of Holocene sediments, and possibly from movement on the downthrown side of growth faults, is estimated at one-half foot per century. Eustatic sea level is predicted to rise an additional 1.3 feet over the next century (IPCC 2001). Therefore, the natural, long-term, relative subsidence rate at the project area is estimated to be 1.8 feet per century. Ground subsidence related to artificial lowering of the water table far exceeds the natural rate of subsidence and is estimated at several feet in areas south of the project area.

3.1.2 17th Street Canal

The 17th Street Canal is an approximately 13,500-foot-long outfall canal in the cities of Metairie and New Orleans in Jefferson and Orleans Parishes and forms the boundary between the parishes and cities (figure 31). The canal is bounded on the north by Lake Pontchartrain, on the south by SWBNO PS #6, on the east and west by the foot of the floodwall and levee complex. The surrounding vicinity of the canal is composed of a mixture of residential homes and commercial businesses and includes West End Park, Municipal Yacht Harbor, Orleans Marina, and a USCG station near the mouth of the canal. An ICS is on the northern end of the canal immediately north of the Hammond Highway Bridge. Bellaire Drive runs parallel to the eastern side of the canal, and Orpheum and Lake Avenues run parallel to the western side of the canal. Three bridges cross the canal, including Hammond Highway at the northern end of the canal, and Veterans Boulevard, and Interstate 10 (I-10)/I-610 near the southern end of the canal.

3.1.3 Orleans Avenue Canal

The Orleans Avenue Canal is an approximately 11,000-foot-long outfall canal in New Orleans in Orleans Parish between the 17th Street Canal and Bayou St. John (figure 32). The canal is bounded on the north by Lake Pontchartrain, on the south by SWBNO PS #7, on the east and

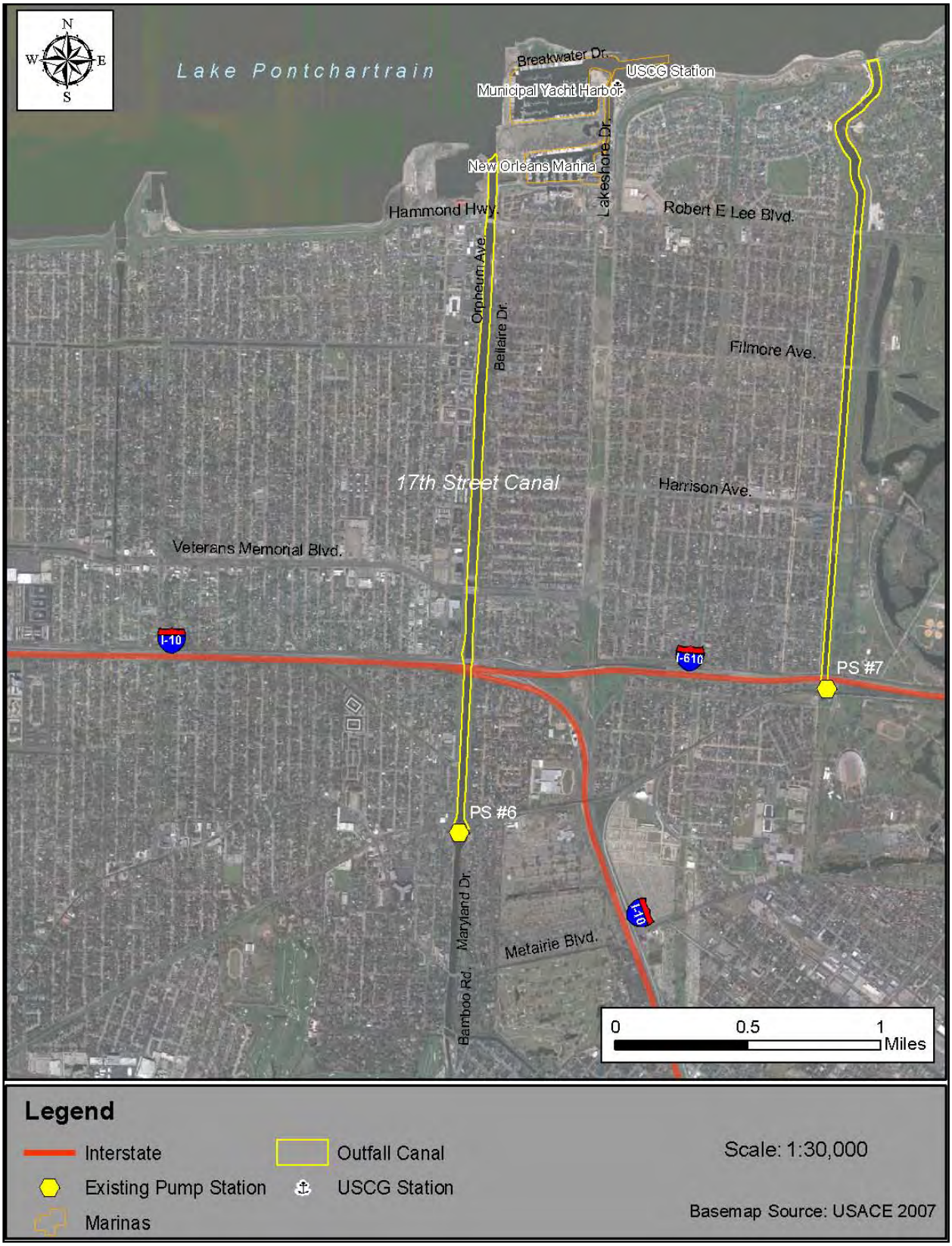


Figure 31. 17th Street Canal and Vicinity

Figure 32. Orleans Avenue Canal and Vicinity

west by the foot of a floodwall and levee complex. The surrounding vicinity of the canal is composed of a mixture of residential homes, commercial businesses, and green space, including City Park, Tourmaline Park, Orleans Park, and Lakeshore Park. The ICS is on the northern end of the canal, south of Lakeshore Drive near the intersection of General Haig Street and Crystal Street. Marconi Drive and City Park run parallel to the eastern side of the canal and Orleans Avenue, and General Haig Street runs parallel to the western side of the canal. Five bridges cross the canal, including Lakeshore Drive, Robert E. Lee Boulevard, Filmore Avenue, Harrison Avenue, and I-610.

3.1.4 London Avenue Canal

The London Avenue Canal is an approximately 15,000-foot-long outfall canal in New Orleans in Orleans Parish, between Bayou St. John and UNO (figure 33). The canal is bounded on the north by Lake Pontchartrain, on the south by SWBNO PS #3, and on the east and west by the foot of a floodwall and levee complex. The surrounding vicinity of the canal is composed of a mixture of residential homes, commercial businesses, green space, UNO, and Dillard University. The ICS is on the northern end of the canal between Lakeshore Drive and Leon C. Simon Drive, adjacent to UNO. Warrington Drive, UNO, and Dillard University run parallel to the eastern side of the canal, and Pratt Drive and Francis W. Gregory Junior High School run parallel to the western side of the canal. Eight bridges cross the canal, including Lakeshore Drive, Leon C. Simon Drive, Robert E. Lee Boulevard, Filmore Avenue, Mirabeau Avenue, Gentilly Boulevard, I-610, and Southern Railroad tracks.

3.1.5 General

The project area is of mostly low relief and characteristic of an alluvial plain. The area is within the Pontchartrain Basin, which is near the center of the Gulf Coastal Plain in the lower reaches of the Mississippi Embayment. The land in Orleans Parish and Jefferson Parish was created relatively recently in geologic history by sedimentary processes of the Mississippi River. Land elevations within the area range from below sea level to a maximum of 7 feet above sea level. The current land use adjacent to the canals is urban, characterized mainly as residential mixed with commercial.

The project area has a subtropical marine climate; warm and humid with mild winters and hot summers. Rainfall averages 60 inches per year, and tropical storms and hurricanes periodically impact the area. The biological community contains populations of resident and transient estuarine fish and shellfish, small mammals, resident and wintering waterfowl, wading birds, and other avian species.

The SWBNO is responsible for operating and maintaining the existing drainage pumping stations at the head of each of the canals. The SWBNO and Orleans Levee District are responsible for maintaining the outfall canals. SWBNO PS #6 is on the 17th Street Canal, PS #7 is on the Orleans Avenue Canal, and PS #3 and PS #4 are on the London Avenue Canal. In 1997 the USACE entered into a Project Cooperation Agreement with the SWBNO to improve drainage. Under the authority of the SELA, drainage improvements consist of channel improvement projects, adding capacity to existing pumping stations, and constructing new pumping stations.

3.2 SIGNIFICANT RESOURCES

This section discusses the significant resources 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 farther removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)).

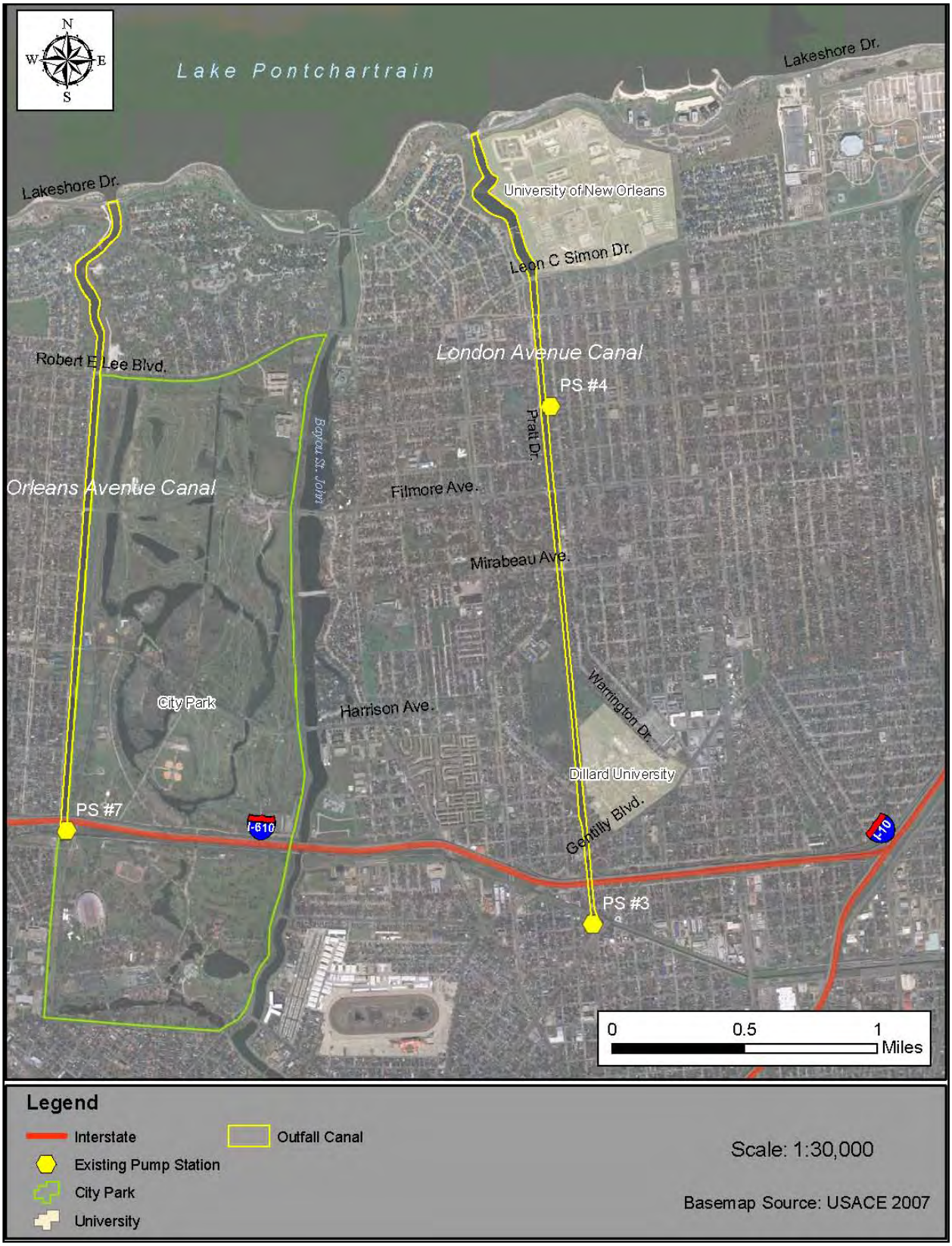


Figure 33. London Avenue Canal and Vicinity

Cumulative impacts considers the effects on the resource that result from the incremental impact of the action being considered 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. Cumulative impacts can result from individually minor, but collectively significant, actions taken place over a period of time (40 CFR §1508.7). A complete description of the known projects considered for the cumulative impacts analysis is provided 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 CEMVN, or on www.nolaenvironmental.gov, which offers information on the ecological and human value of these resources, as well as the laws and regulations governing each resource. Search for "Significant Resources Background Material" in the web site's digital library for additional information. Table 3 presents those significant resources found within the project area, and notes whether they could be impacted by the proposed action.

Table 3. Significant Resources in the Project Area

Significant Resource	Impacted	Not Impacted
Waters of the United States	X	
Wildlife	X	
Threatened and Endangered Species	X	
Essential Fish Habitat	X	
Cultural Resources	X	
Recreational Resources	X	
Noise	X	
Air Quality	X	
Water Quality	X	
Hydrology	X	
Traffic and Transportation	X	
Aesthetics	X	
Land Use	X	
Socioeconomics	X	

3.2.1 Waters of the United States

3.2.1.1 Existing Conditions

Section 404 of the Clean Water Act (CWA) of 1977 (PL 95-217) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States (CWA Section 328.3[2]) are those waters used in interstate or foreign commerce, subject to the ebb and flow of the tide, and all interstate waters including interstate wetlands. Waters of the United States are further defined as all other waters such as intrastate lakes, rivers, streams, mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, or impoundments of waters, tributaries of waters, and territorial seas.

Wetlands are those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). Jurisdictional boundaries for these water resources are defined in the field as the ordinary high water mark, which is that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural lines impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (USACE 1987).

National Wetland Inventory (NWI) maps were consulted for identifying waters of the United States in the vicinity of the project area (NWRC 1988). See figure 34 for a presentation of the mapped potential waters of the United States in the project area.

The 17th Street Canal is shown in the NWI from approximately Veterans Boulevard north to the mouth of the canal as an excavated, lower perennial, riverine system and from Veterans Boulevard south to PS #6 as an excavated, estuarine system. The Orleans and London Avenue Canals are shown as excavated, sub tidal, and estuarine. Lake Pontchartrain, mapped as sub tidal, estuarine, is the northernmost boundary of each of the canals. Other mapped potential waters of the United States include Bayou St. John, areas within City Park and a small area on the west side of the London Avenue Canal adjacent to Dillard University. Because of the lack of wetlands in the project area, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and Louisiana Department of Wildlife and Fisheries (LDWF) have concurred that a habitat evaluation analysis (i.e., wetland value assessment) of the impacts is not necessary for this project.

The waters of the United States within the project area consist of the 17th Street Canal, the Orleans Avenue Canal, the London Avenue Canal, and southern shoreline of Lake Pontchartrain in the vicinity of the three outfall canals. These areas would be regulated by the USACE under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act or both. The proposed action includes construction and filling within these waters of the United States, coordination with the USACE Regulatory Branch and other federal and state agencies would be completed before final approval of the IER.

3.2.1.2 Discussion of Impacts

When possible, approximate lengths of impacts to waters of the United States are given, but the width of the outfall canals varies depending on location. All dimensions were assumed to be the largest possible footprint impacted and the actual impacts could be minimized during the design process. During completion of the applicable coordination, the actual acreage of waters of the United States would be determined on the basis of the chosen site location and the amount of fill to be placed in waters of the United States would be determined. To be in compliance with any agency concurrences, the general conditions and terms of the coordination must be completed during construction/dredging activities.

3.2.1.2.1 No Action Alternative

Direct Impacts to waters of the United States

Under the no action alternative, direct impacts to waters of the United States would not occur. The existing ICS footprint has already impacted waters of the United States and no further directs impacts would be expected under the no action alternative.

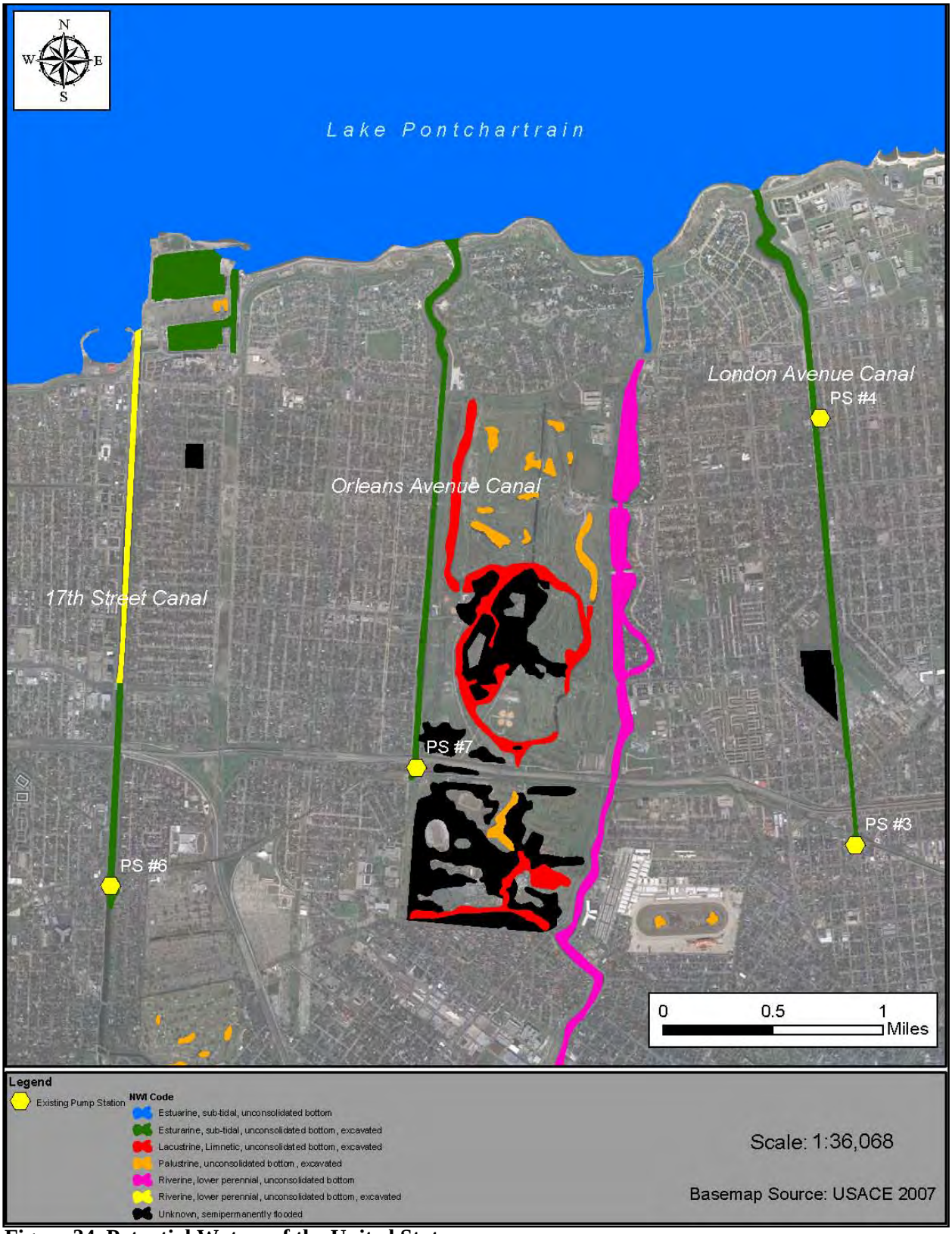


Figure 34. Potential Waters of the United States

Indirect Impacts to waters of the United States
Short-term, indirect impacts could occur from construction-related activities in the project area, including erosion and runoff causing temporary increases in turbidity. Construction best management practices (BMPs) and a storm water pollution prevention plan (SWPPP) would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States.

Cumulative Impacts to waters of the United States
Cumulative impacts would not be expected, since there would be no direct impacts to waters of the United States.

3.2.1.2.2 *Proposed Action*

17th Street Canal

Direct Impacts to waters of the United States
The 17th Street Canal pump station would be approximately 450 feet long by 200 feet wide (1.8 acres), when including floodgates; therefore, approximately 1.8 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States could be directly impacted by placing fill including erosion protection, closure structures, pilings, and other fill associated with construction. A substantial volume of erosion protection armoring could be required; specifically, a strip of riprap protection would be expected in the widened canal floor, located immediately upstream and downstream of the pump station. A breakwater, approximately 104 feet wide by 600 feet long (1.43 acres), in Lake Pontchartrain could be constructed to protect the pump station discharge. Therefore, approximately 1.43 acres of estuarine waters of the United States (Lake Pontchartrain) could be permanently filled from construction of the breakwater.

Indirect Impacts to waters of the United States
Short-term, indirect impacts could occur from construction-related activities including erosion and runoff causing temporary increases in turbidity. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States. Any impacts to waters of the United States from construction activities would be temporary and localized.

Cumulative Impacts to waters of the United States
Approximately 1.8 acres of estuarine/riverine (the 17th Street Canal) and 1.43 acres of estuarine (Lake Pontchartrain) waters of the United States could be directly impacted.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA. Therefore, this potential future project could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) in the waters of the 17th Street Canal.

Orleans Avenue Canal

Direct Impacts to waters of the United States
The Orleans Avenue Canal pump station would be approximately 150 feet long by 150 feet wide (0.51 acres), when including floodgates; therefore, approximately 0.51 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States could be directly impacted by placing fill including erosion protection, closure

structures, pilings, and other fill associated with construction. A substantial volume of erosion protection armoring could be required; specifically, a strip of riprap protection would be expected in the widened canal floor, both located immediately upstream and downstream of the pump station. The breakwater could permanently fill an area approximately 116 feet wide by 700 feet long (1.86 acres). Therefore, approximately 1.86 acres of estuarine waters of the United States (Lake Pontchartrain) could be permanently filled from construction of the breakwater.

Indirect Impacts to waters of the United States
Short-term, indirect impacts could occur from construction-related activities including erosion and runoff causing temporary increases in turbidity. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States. Any impacts to waters of the United States from construction activities would be temporary and localized.

Cumulative Impacts to waters of the United States
Approximately 0.51 acres of estuarine/riverine (the Orleans Avenue Canal) and 1.86 acres of estuarine (Lake Pontchartrain) waters of the United States could be directly impacted. The amount of waters of the United States impacted by the proposed action would be negligible when considered cumulatively with the other HSDRRS projects.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this potential future project could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) in the waters of the Orleans Avenue Canal.

<u>London Avenue Canal</u>

Direct Impacts to waters of the United States
The London Avenue Canal pump station would be approximately 350 feet long by 160 feet wide (1.28 acres), when including floodgates; therefore, approximately 1.28 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States could be directly impacted by placing fill including erosion protection, closure structures, pilings, and other fill associated with construction. A substantial volume of erosion protection armoring could be required; specifically, a strip of riprap protection would be expected in the widened canal floor, both located immediately upstream and downstream of the pump station.

Indirect Impacts to waters of the United States
Short-term, indirect impacts could occur from construction-related activities including erosion and runoff causing temporary increases in turbidity. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States. Any impacts to waters of the United States from construction activities would be temporary and localized.

Cumulative Impacts to waters of the United States
Approximately 1.28 acres of estuarine (the London Avenue Canal) waters of the United States could be impacted. The amount of waters of the United States impacted by the proposed action would be negligible when considered cumulatively with the other HSDRRS projects.

Future inclusion of additional features and other improvements/enhancements could as a result of the actions of the local government or due to future congressional authorizations involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this proposed future project could permanently place fill for approximately 39.16 acres (14, 835 feet by 115 feet) in the waters of the London Avenue Canal.

3.2.1.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to waters of the United States

Direct, indirect, and cumulative impacts would be similar to the impacts discussed for the 17th Street Canal proposed action in section 3.2.1.2.2.

Layout Alternative C

Direct Impacts to waters of the United States

A new 17th Street Canal pump station would be approximately 450 feet long by 200 feet wide (1.8 acres), when including floodgates; therefore, approximately 1.8 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States would be directly impacted by placing fill including erosion protection, closure structures, pilings, and other fill associated with construction.

Indirect Impacts to waters of the United States

The indirect impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States

Approximately 1.8 acres of estuarine/riverine (the 17th Street Canal) waters of the United States could be permanently filled by this alternative; however, this amount could be negligible when considered cumulatively within the project region.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this proposed future project could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) in the waters of the 17th Street Canal.

Orleans Avenue Canal

Layout Alternative A

Direct Impacts to waters of the United States

Under this layout alternative, the new pump station at the Orleans Avenue Canal would have more impacts on waters of the United States when compared to the proposed action (layout alternative B) because more of the pump station, closures, and breakwater are proposed within waters of the United States (Lake Pontchartrain). The breakwater could permanently fill an area approximately 200 feet wide by 1,100 feet long (5.05 acres) of estuarine sub tidal waters of the United States (Lake Pontchartrain). Impacts would also occur within the outfall canal from placing fill material including pilings, riprap, channel armoring, and other associated facilities.

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 5.05 acres of estuarine (Lake Pontchartrain) waters of the United States could be directly impacted by this alternative. The amount of waters of the United States impacted by this alternative would be negligible when considered cumulatively with the other HSDRRS projects.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) in the waters of the Orleans Avenue Canal.

<u>Layout Alternative C</u>
Direct Impacts to waters of the United States
The Orleans Avenue Canal pump station would be approximately 150 feet long by 150 feet wide (0.51 acres), when including floodgates or permanent closures; therefore, approximately 0.51 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States could be directly impacted by placing fill including erosion protection, closure structures, pilings, and other fill associated with construction.

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 0.51 acres of estuarine/riverine waters of the United States (the Orleans Avenue Canal) could be directly impacted by the proposed action. The amount of waters of the United States impacted by the proposed action would be negligible when considered cumulatively with the other HSDRRS projects.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) in the waters of the Orleans Avenue Canal.

<u>Layout Alternative D</u>
Direct Impacts to waters of the United States
The footprint of layout alternative D contains a 3.15 acre area within City Park that exhibits characteristics of a wetland. This area consists of palustrine emergent wetland vegetation with areas of open water and planted cypress trees (*Taxodium distichum*). The Regulatory Branch of the CEMVN has determined that this area is isolated and is not connected to other waters of the United States (Heffner 2008). Therefore, this area is not regulated as waters of the United States. If a new pump station were to be built as part of this layout alternative, impacts would occur within the outfall canal from placing fill material including pilings, riprap, channel armoring, and other associated facilities.

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 3.15 acres of wetlands that were identified during a field survey, but not classified as waters of the United States by the Regulatory Branch of the CEMVN, could be impacted by this layout alternative. Therefore, this alternative would have no additional incremental cumulative impacts to waters of the U.S. above those caused by other projects.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) in the waters of the Orleans Avenue Canal.

<u>London Avenue Canal</u>
<u>Layout Alternative A</u>
Direct Impacts to waters of the United States
Given the in-lake location of this pump station, a substantial volume of erosion protection armoring could be required, primarily around the banks of the pump station facility and the in-lake breakwater structure. The erosion protection could directly impact an area approximately 200 feet wide by 900 feet long (4.13 acres). Therefore, approximately 4.13 acres of estuarine waters of the United States could be permanently filled under this layout alternative. This alternative would have more impacts on waters of the United States when compared to the proposed action because more of the layout alternative is in waters of the United States (Lake Pontchartrain).

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 4.13 acres of estuarine (Lake Pontchartrain) waters of the United States could be directly impacted by this alternative. The amount of waters of the United States impacted by this alternative would be negligible when considered cumulatively with the other HSDRRS projects.

Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14, 835 feet by 115 feet) in the waters of the London Avenue Canal.

<u>Layout Alternative B</u>
Direct Impacts to waters of the United States
Given the lakeshore location of this pump station, erosion protection armoring could be required, primarily as a breakwater, approximately 160 feet wide by 950 feet long (3.49 acres), in Lake Pontchartrain. Therefore, approximately 3.49 acres of estuarine waters of the United States (Lake Pontchartrain) could be permanently filled during construction. Impacts would also occur within the outfall canal from placing fill material including pilings, riprap, channel armoring, and other associated facilities.

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 3.49 acres of estuarine (Lake Pontchartrain) waters of the United States could be directly impacted by this alternative. The amount of waters of the United States impacted by this alternative would be negligible when considered cumulatively with the other HSDRRS projects. Future inclusion of additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could involve concrete-lining the canal, which would involve placing fill below the ordinary high water mark and would be regulated under the CWA Section 404. This would be considered a long-term impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14, 835 feet by 115 feet) in the waters of the London Avenue Canal.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.2 for the London Avenue Canal proposed action.

Layout Alternative E
Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.2 for the London Avenue Canal proposed action.

3.2.1.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.1.2.2 and 3.2.1.2.3.

3.2.1.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal
Layout Alternative A
Direct Impacts to waters of the United States
The 17th Street Canal pump station would be approximately 400 feet long by 200 feet wide (1.8 acres), when including permanent closures; therefore, approximately 1.8 acres of waters of the United States could be impacted during the construction of the new pump station. Waters of the United States could be directly impacted by placing fill including erosion protection, closure structures, pilings, and other fill associated with construction. Concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) at the 17th Street Canal.

A substantial volume of erosion protection armoring could be required; specifically, a strip of riprap protection could be expected in the widened canal floor, both located immediately upstream and downstream of the pump station. A breakwater, approximately 160 feet wide by 700 feet long (2.57 acres), in Lake Pontchartrain could be constructed to protect the pump station discharge. Therefore, approximately 2.57 acres of estuarine waters of the United States (Lake Pontchartrain) could be permanently filled from construction of the breakwater.

Indirect Impacts to waters of the United States
Indirect impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 1.8 acres of estuarine/riverine waters of the United States (the 17th Street Canal) could be impacted by this alternative. The amount of waters of the United States impacted by this alternative would be negligible when considered cumulatively with the other HSDRRS projects.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts to waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the 17th Street Canal layout alternative B, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) at the 17th Street Canal.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts to waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the 17th Street Canal layout alternative C, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) at the 17th Street Canal.

Orleans Avenue Canal
Layout Alternative A
Direct Impacts to waters of the United States
Under this layout alternative, the new pump station would have greater impacts on waters of the United States when compared to the proposed action because more of the pump station, closure structure, and breakwater occur within waters of the United States (Lake Pontchartrain). The breakwater could permanently fill an area approximately 200 feet wide by 900 feet long (4.13 acres) of estuarine sub tidal waters of the United States (Lake Pontchartrain). Impacts could occur within the outfall canal from placing fill material including pilings, riprap, channel armoring, and other associated materials. Concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) at the Orleans Avenue Canal.

Indirect Impacts to waters of the United States
The indirect impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.1.2.2.

Cumulative Impacts to waters of the United States
Approximately 4.13 acres of estuarine waters of the United States (Lake Pontchartrain) could be directly impacted by this alternative. The amount of waters of the United States impacted by this alternative would be negligible when considered cumulatively with the other HSDRRS projects.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.2 for the Orleans Avenue Canal proposed action, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) at the Orleans Avenue Canal.

Layout Alternative C

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the Orleans Avenue Canal layout alternative C, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) at the Orleans Avenue Canal.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the Orleans Avenue Canal layout alternative D, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 36.95 acres (11,100 feet by 145 feet) at the Orleans Avenue Canal.

London Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the London Avenue Canal layout alternative A, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14,835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the London Avenue Canal layout alternative B, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14,835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

Layout Alternative C

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.2 for the London Avenue Canal proposed action, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14,835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the London Avenue Canal layout alternative D, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14,835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

Layout Alternative E

Direct, Indirect, and Cumulative Impacts to waters of the United States

The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.3 for the London Avenue Canal layout alternative E, but would not include future inclusion of additional features and other improvements/enhancements. In addition, concrete-lining the canal would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 39.16 acres (14,835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

3.2.1.2.6 Concrete-Lined Canals

The impacts described below are inclusive for all three outfall canals.

Direct Impacts to waters of the United States

The creation of concrete-lined canals would impact waters of the United States as the canals are drained and concrete linings are put in place. The concrete-lining would involve placing fill below the ordinary high water mark and would be regulated under CWA Section 404. This would be considered a long-term, direct impact. Therefore, this alternative could permanently place fill for approximately 54.24 acres (13,500 feet by 175 feet) at the 17th Street Canal, 36.95 acres (11,100 feet by 145 feet) at the Orleans Avenue Canal, and 39.16 acres (14, 835 feet by 115 feet) of waters of the United States at the London Avenue Canal.

Indirect Impacts to waters of the United States

Short-term, indirect impacts could occur from construction-related activities including erosion and runoff causing temporary increases in turbidity. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States.

Cumulative Impacts to waters of the United States

Approximately 39,435 feet of waters of the United States (130.35 acres) could be permanently filled by lining the three canals with concrete, this alternative resulting in the direct loss of waters of the United States.

3.2.1.2.7 Replace I-walls with T-walls

The impacts described below are inclusive of all three outfall canals.

Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.6.

3.2.1.2.8 ICS Gates with Parallel Protection

The impacts described below are inclusive of all three outfall canals.

Direct, Indirect, and Cumulative Impacts to waters of the United States
The direct, indirect, and cumulative impacts on waters of the United States would be similar to the impacts described in section 3.2.1.2.6.

3.2.1.2.9 Upgrade ICS to Permanent System

The impacts described below are inclusive of all three outfall canals.

Direct Impacts to waters of the United States
This alternative is considered an environmentally preferred alternative because the footprint of the ICS has already been impacted; therefore, there would be minimal additional direct impacts on waters of the United States. Direct impacts from construction activities would be expected from placing fill below the ordinary high water mark of waters of the United States.

Indirect Impacts to waters of the United States
Short-term, indirect impacts could occur from construction-related activities including erosion and runoff causing temporary increases in turbidity. These impacts could include erosion and runoff causing temporary increases in turbidity. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils, temporary increases in turbidity, and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact waters of the United States. Any impacts to waters of the United States from construction activities would be temporary and localized.

Cumulative Impacts to waters of the United States
There would be short-term, indirect cumulative impacts under this alternative when considered with other projects in the area. These indirect impacts to waters of the United States would be negligible when considered cumulatively with the other HSDRRS projects.

3.2.2 Hydrology

3.2.2.1 Existing Conditions

Topographically, much of New Orleans lies below sea level, which leaves the city prone to flooding during storm events. As a result, a complex drainage network is responsible for removing storm water from the city. As part of this drainage network, Orleans Parish has 23 pump stations, operated by the SWBNO, and approximately 90 miles of open canals and 90 miles of subsurface canals. The pumping system has a pumping capacity of greater than 29 billion gallons per day and a flow rate of 45,000 cfs. Twelve of these pumping stations are within the project vicinity in Orleans East Bank in the metropolitan New Orleans area. The SWBNO pump stations received significant damage from Hurricane Katrina but have since undergone repairs and are operational. In addition to the SWBNO pump stations, an ICS is located near the mouth of each of the outfall canals. The ICS operate to pump water from the canals to Lake Pontchartrain and prevent storm surge from entering the canals.

Hydrology in the project area is influenced by the internal drainage features of Orleans and Jefferson Parishes, and includes the pump stations, canals, and Bayou St. John. The pump stations and canals are responsible for evacuating storm water out of the project area into Lake Pontchartrain or the Mississippi River. The major canals and SWBNO pump stations in the project area include the 17th Street, Orleans Avenue, and London Avenue Canals, and SWBNO PS #3, #4, #6, and #7. Each canal flows north toward Lake Pontchartrain, draining the Orleans East Bank sub basin in Orleans Parish, and in the case of the 17th Street Canal, some portion of the East Bank Drainage Basin of Jefferson Parish. With the exception of the Canal Street Pump Station, which the Jefferson Parish Department of Drainage owns, the SWBNO owns and operates all pump stations that discharge into the three canals. An overview of each of these drainage features is presented below.

3.2.2.1.1 17th Street Canal and SWBNO Pump Station #6

The 17th Street Canal conveys drainage water from the western portion of Orleans Parish and the eastern portion of Jefferson Parish north to Lake Pontchartrain. The canal was constructed during the late 1800s and early 1900s—at the same time as SWBNO PS #6—and has undergone canal improvements since its initial construction. Four pump stations discharge directly into the canal, including SWBNO PS #6, the Canal Street Pump Station (160 cfs), the I-10 Pump Station (860 cfs), and the 17th Street Canal ICS. The canal is approximately 13,500 feet long, with an average width of 175 feet, and has earthen banks and bottom. It is lined with a combination of concrete and sheet pile flood walls. It has both railroad (near SWBNO PS #6) and automobile bridges (I-10, Veterans Boulevard, and Hammond Highway) that span its width. The channel geometry has various configurations along its length.

SWBNO PS #6 is on the 17th Street Canal and lifts drainage water to allow gravity flow from the pump station to Lake Pontchartrain. Its 15 pumps are all electric motor driven with some receiving power from the Entergy lines and others from the dedicated 25 Hertz (Hz) SWBNO power system. The station is manned full-time, has smaller pumps sized to operate for dry-weather flows, and has larger pumps dedicated to the higher flows experienced during storm events. The dry-weather flow pumps are piped to discharge to the Mississippi River. The total pump capacity of SWBNO PS #6 is 9,480 cfs. The pumping capacity of the 17th Street Canal ICS is 8,800-9,200 cfs.

3.2.2.1.2 Orleans Avenue Canal and SWBNO Pump Station #7

The Orleans Avenue Canal conveys drainage water from the central area of Orleans Parish to Lake Pontchartrain. It was constructed between 1897 and 1900—at the same time as SWBNO PS #7—and has undergone canal improvements since its initial construction. SWBNO PS #7 and the Orleans Avenue Canal ICS discharge into the Orleans Avenue Canal. The canal is approximately 11,100 feet long, with an average width of 145 feet, and has earthen banks and bottom. It is lined with a combination of concrete and sheet pile flood walls. It has five automobile bridges (I-610, Harrison Avenue, Filmore Avenue, Robert E. Lee Boulevard, and Lakeshore Drive) that span its width. The channel geometry has various configurations along its length.

SWBNO PS #7 is at the head of the Orleans Avenue Canal and lifts drainage water to allow gravity flow from the pump station to Lake Pontchartrain. Its five pumps are all electric motor driven with some receiving power from the Entergy lines and others from the dedicated 25 Hz SWBNO power system. The station is manned full-time, has smaller pumps sized to operate for dry-weather flows, and has larger pumps dedicated to the higher flows experienced during storm events. The total pump capacity of SWBNO PS #7 is 2,690 cfs. The pumping capacity of the Orleans Avenue Canal ICS is 2,200 cfs.

3.2.2.1.3 London Avenue Canal and SWBNO Pump Stations #3 and #4

The London Avenue Canal conveys drainage water from the eastern portion of Orleans Parish to Lake Pontchartrain. It was constructed between 1901 and 1931—at the same time as SWBNO PS #3—and has undergone canal improvements since its initial construction. SWBNO PS #3 and #4 discharge drainage water into the London Avenue Canal. The canal is approximately 14,835 feet long, with an average width of 115 feet, and has earthen banks and bottom. It is lined with a combination of concrete and sheet pile flood walls. It has both railroad (one near SWBNO PS #3) and automobile bridges (I-610, Gentilly Boulevard, Mirabeau Avenue, Filmore Avenue, Robert E. Lee Boulevard, Leon C. Simon Drive, and Lakeshore Drive) that span its width. The channel geometry has various configurations along its length.

SWBNO PS #3 is at the head of the London Avenue Canal and lifts drainage water to allow gravity flow from the pump station to Lake Pontchartrain. Its seven pumps are all electric motor driven with some receiving power from the Entergy lines and others from the dedicated 25 Hz SWBNO power system. The station is manned full-time, has smaller pumps sized to operate for dry-weather flows, and has larger pumps dedicated to the higher flows experienced during storm events. The total pump capacity of SWBNO PS #3 is 4,260 cfs.

SWBNO PS #4 is at the midpoint of the London Avenue Canal, approximately 1.9 miles north of SWBNO PS #3, and lifts drainage water to allow gravity flow from the pump station to Lake Pontchartrain. Its six pumps are all electric motor driven with some receiving power from the Entergy lines and others from the dedicated 25 Hz SWBNO power system. The station is manned full-time, has smaller pumps sized to operate for dry-weather flows, and has larger pumps dedicated to the higher flows experienced during storm events. The total pump capacity of SWBNO PS #4 is 3,720 cfs. The pumping capacity of the London Avenue Canal ICS is 5,000-5,200 cfs.

3.2.2.1.4 Bayou St. John

Bayou St. John traverses the center of New Orleans. The mouth of Bayou St. John enters from Lake Pontchartrain, bound by Lake Vista and Lakeview neighborhoods, travels south past City Park on the western side and residential neighborhoods to the east and ends in Mid-City New Orleans, north of downtown. City Park lagoons depend on bayou water flow by drawing from the bayou in several locations. The bayou is approximately 4 miles long and is as wide as 700 feet and as narrow as 200 feet. The Orleans Levee Board has jurisdiction from the mouth of the bayou, past the new flood control structure near the mouth to the old flood control structure at Robert E. Lee Boulevard. The Orleans Levee Board's interest is to protect the city from flooding by operating and maintaining the 1992-built flood control structure, which has both sector and sluice gates to manage water flow. Water in Bayou St. John is provided by Lake Pontchartrain and precipitation. Water flows naturally from Lake Pontchartrain into Bayou St. John because of wind, currents, tides and storm surges that affect the lake and because of the lake's higher elevation to the bayou. Water movement from the lake is controlled by a flood control structure—built in 1992 and operated by the Orleans Levee Board—by opening and closing sluice gates. The Orleans Levee Board decides to open and close the sluice gates on the basis of water levels and potential storm events. The 1992 flood control structure was constructed to manage water through opening and closing sector gates, which are generally closed.

3.2.2.1.5 Influences on Hydrology

Major water bodies in the project vicinity include Lake Pontchartrain to the north and the Mississippi River to the south. Hydrology in the New Orleans area is influenced by two major forces: tidal flows within Lake Pontchartrain and seasonal fluctuations of the Mississippi River. Tidal exchange with the Gulf of Mexico and Lake Pontchartrain occurs through Lake Borgne

and the Chef Menteur and Rigolets passes. Salinity entering from these tidal movements is partially flushed out by freshwater entering the lake, mainly from the Pearl River system.

3.2.2.2 Discussion of Impacts

3.2.2.2.1 No Action Alternative

Direct and Indirect Impacts to Hydrology
Hydrology would continue to be influenced by the existing internal drainage features, including existing SWBNO pump stations, ICS, and canals described in section 3.2.2.1. The outfall canal floodwalls would be raised along the entire length of the canals as described in section 2.4.1. No changes to the existing drainage network would be made, and storm water would continue to be evacuated from the project area via the SWBNO pump stations and three outfall canals into Lake Pontchartrain.

Cumulative Impacts to Hydrology
Under the no action alternative, the project area would remain at risk to storm surges regardless of the other current or future hurricane protection projects. However, the risk of storm surge-induced flooding through the outfall canals would be reduced as long the ICS remain operable.

One of the HSDRRS projects could have an impact on non-storm hydrologic conditions in the IER #5 study area. The construction of storm surge barriers near Lake Borgne and Lake Pontchartrain to reduce surge entering the IHNC (IER #11) would most likely have an impact on hydrology in the IER #5 project area because a hydrologic connection to Lake Pontchartrain would continue through the proposed gate structures and would provide structural barriers to prevent damaging storm surges from entering the IHNC from Lake Pontchartrain.

The no action alternative in combination with other HSDRRS projects could impact flows and water levels when added to other actions in the study area. The effect on erosion and disturbed sediments during construction would be negligible and would be addressed through BMPs and SWPPPs. The benefits from the no action alternative through reduced risk of flooding would be minor compared to the incremental benefits of the proposed action.

3.2.2.2.2 Proposed Action

17th Street Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the 17th Street Canal. SWBNO PS #6 would be left in place to function in its current mode of operation in coordination with the new permanent pump station. Short-term impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Long-term impacts to hydrology would not be expected as a result of this layout alternative.

Indirect Impacts to Hydrology
During periods when storm surge is anticipated, storm water would continue to be evacuated to Lake Pontchartrain via the new pumps. The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a short-term impact, but the canal would continue to function as a conduit to evacuate storm water.

Cumulative Impacts to Hydrology
The incremental impact of the proposed action would permanently reduce the effect of surges from extreme events up to the 100-year storm, further enhancing the overall benefits of the entire proposed 100-year hurricane protection system throughout the area.

Future additional features and other improvements/enhancements by the local government or due to potential future Congressional authorization could include decommissioning the existing SWBNO pump stations and concrete-lining the canals. These future actions could result in additional impacts, including direct impacts to water circulation in the canal as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases. Concrete-lining the canal would prevent underseepage of water in the canal, which could result in more water detained because that seepage pathway is no longer available. Recharge of groundwater could be impacted because the absence of the seepage pathway would prevent flow into the water table.

Orleans Avenue Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. SWBNO PS #7 would be left in place to function in its current mode of operation in coordination with the new permanent pump station. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the breakwater in the lake. The breakwater could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Indirect Impacts to Hydrology
Indirect impacts would be the same as described for the 17th Street Canal proposed action.

Cumulative Impacts to Hydrology
Cumulative impacts would be the same as described for the 17th Street Canal proposed action.

London Avenue Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. SWBNO PS #3 and PS #4 would be left in place to function in their current mode of operation in coordination with the new permanent pump station. The closure structure would remain open to allow flow-through drainage during ordinary conditions and close only during times of high storm surge. Short-term impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Long-term impacts to hydrology would not be expected as a result of this layout alternative.

Indirect Impacts to Hydrology
Indirect impacts would be the same as described for the 17th Street Canal proposed action.

Cumulative Impacts to Hydrology
Cumulative impacts would be the same as described for the 17th Street Canal proposed action.

3.2.2.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternatives B and C

Direct, Indirect, and Cumulative Impacts to Hydrology

Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Orleans Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Hydrology

Direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2.

Layout Alternative C

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. SWBNO PS #7 would be left in place to function in its current mode of operation in coordination with the new permanent pump station. Short-term impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Long-term impacts on hydrology would not be expected as a result of this layout alternative.

Indirect and Cumulative Impacts to Hydrology

Indirect and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Layout Alternative D

Direct Impacts to Hydrology

Direct impacts would be similar as discussed for Orleans Avenue Canal layout alternative C.

Indirect and Cumulative Impacts to Hydrology

Indirect and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

London Avenue Canal

Layout Alternative A

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. SWBNO PS #3 and #4 would be left in place to function in their current mode of operation in coordination with the new permanent pump station. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the new permanent pump station in the lake. The new pump station could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity or stopping flow altogether. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Indirect and Cumulative Impacts to Hydrology
Indirect and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternative A.

Layout Alternatives D and E
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2.

3.2.2.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

17th Street Canal

Layout Alternative A
Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the 17th Street Canal. The new pump station would not have gates; therefore flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect Impacts to Hydrology
The new pump station would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Layout Alternatives B and C
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Orleans Avenue Canal

Layout Alternative A
Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. The new pump station would not have gates; therefore flow-through conditions in the

canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the new permanent pump station in the lake. The new pump station could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity or stopping flow altogether. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect Impacts to Hydrology
The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion and scour. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2.

<u>Layout Alternative B</u>
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative A.

<u>Layout Alternatives C and D</u>
Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. The new pump station would not have gates; therefore flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect Impacts to Hydrology
The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion and scour. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2.

London Avenue Canal

Layout Alternative A

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. The new pump station would not have gates; therefore flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the new permanent pump station in the lake. The new pump station could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity or stopping flow altogether. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect and Cumulative Impacts to Hydrology

Indirect and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Hydrology

Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternative A.

Layout Alternatives C, D, and E

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. The new pump station would not have gates; therefore flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect Impacts to Hydrology

The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion and scour. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology

Cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2.

3.2.2.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Layout Alternative A

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the 17th Street Canal. SWBNO PS #6 would be taken out of commission, requiring full-time operation of the new permanent pump station. Flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydraulically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. During non-rainfall events, direct impacts to water circulation in the canal could occur as water is impounded and not immediately evacuated into Lake Pontchartrain. This could result in impacts to water quality as water becomes stagnant and DO decreases.

Indirect Impacts to Hydrology

This alternative could require the canals to be concrete-lined. Concrete-lining the canals would prevent underseepage of water in the canal, which could result in more water detained because that seepage pathway is no longer available. Recharge of groundwater could be impacted because the absence of the seepage pathway would prevent flow into the water table. This would be considered a long-term impact but would not significantly affect hydrology because water in the canal would still flow north to Lake Pontchartrain.

The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology

Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Layout Alternatives B and C

Direct, Indirect, and Cumulative Impacts to Hydrology

Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Orleans Avenue Canal

Layout Alternative A

Direct Impacts to Hydrology

Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. SWBNO PS #7 would be taken out of commission, requiring full-time operation of the new permanent pump station. Flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydrologically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the new permanent pump station in the lake. The new pump station could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity or stopping flow altogether.

Indirect Impacts to Hydrology
This alternative could require the canals to be concrete-lined. Concrete-lining the canals would prevent underseepage of water in the canal, which could result in more water detained because that seepage pathway is no longer available. Recharge of groundwater could be impacted because the absence of the seepage pathway would prevent flow into the water table. This would be considered a long-term impact but would not significantly affect hydrology because water in the canal would still flow north to Lake Pontchartrain.

The new pumps and closure structure would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion and scour. Rip rap placed on the floor of the canal would help to decrease erosion impacts. There could also be increased deposition of sediment in the vicinity of the new structure after large storm events. This would result in a temporary impact, but the canal would continue to function as a conduit to evacuate storm water. Any increase in sediment deposition would be monitored and become a part of O&M procedures for the new pump station.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2.

Layout Alternatives B, C, and D
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative A.

London Avenue Canal

Layout Alternative A
Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. SWBNO PS #3 and #4 would be taken out of commission, requiring full-time operation of the new permanent pump station. Flow-through conditions in the canal would no longer exist because the canal and Lake Pontchartrain would be permanently hydrologically disconnected. Temporary impacts during construction would affect water flow within the canal because of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. Longshore currents along the southern shoreline of Lake Pontchartrain could be impacted by placing the new permanent pump station in the lake. The new pump station could obstruct the flow of the longshore current resulting in a decrease in the current's flow velocity or stopping flow altogether.

Indirect and Cumulative Impacts to Hydrology
Indirect and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternative A.

Layout Alternatives C, D, and E
Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal Alternative A, but would not include impacts to longshore currents due to the lack of a breakwater structure.

3.2.2.2.6 Concrete-Lined Canals

17th Street Canal

Direct Impacts to Hydrology
Existing SWBNO PS #6 would continue to lift drainage water to allow gravity flow from the pump station to Lake Pontchartrain via the outfall canal. Concrete-lining the 17th Street Canal would improve the flow characteristics of the canal, but long-term impacts on hydrology would not be expected. Temporary impacts during construction would affect water flow within the canal as a result of the temporary sheet pile box, but the canal would still be able to function as a conduit to evacuate storm water.

Indirect Impacts to Hydrology
Concrete-lining the canals would prevent underseepage of water in the canal, which could result in more water detained because that seepage pathway is no longer available. Recharge of groundwater could be impacted because the absence of the seepage pathway would prevent flow into the water table. This would be considered a long-term impact but would not affect hydrology because water in the canal would still flow north from SWBNO PS #6 to Lake Pontchartrain.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2. This alternative, in combination with completed and on-going SELA projects, would impact how storm water is collected and removed from the project area and vicinity; however, any impacts would be beneficial as storm water would be more efficiently removed from the area to prevent flooding.

Orleans Avenue Canal

Direct Impacts to Hydrology
SWBNO PS #7 would continue to lift drainage water to allow gravity flow from the pump station to Lake Pontchartrain via the outfall canal. Concrete-lining the Orleans Avenue Canal would improve the flow characteristics of the canal, but long-term impacts on hydrology would not be expected. Temporary impacts during construction would affect water flow within the canal as a result of the temporary sheet pile box, but the canal would continue to function as a conduit to evacuate storm water.

Indirect Impacts to Hydrology
Indirect impacts would be similar to the impacts described for the 17th Street Canal, but the flow to Lake Pontchartrain would be from PS #7.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2. This alternative, in combination with completed and on-going SELA projects, would impact how storm water is collected and removed from the project area and vicinity; however, any impacts would be beneficial as storm water would be more efficiently removed from the area to prevent flooding.

London Avenue Canal

Direct Impacts to Hydrology
SWBNO PS #3 and #4 would continue to lift drainage water to allow gravity flow from the pump station to Lake Pontchartrain via the outfall canal. Concrete-lining the London Avenue Canal would improve the flow characteristics of the canal. Temporary impacts during

construction would affect water flow within the canal as a result of the temporary sheet pile box, but the canal would continue to function as a conduit to evacuate storm water.

Indirect Impacts to Hydrology
Indirect impacts would be similar to the impacts described for the 17th Street Canal, but the flow to Lake Pontchartrain would be from PS #3 and #4.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2. This alternative, in combination with completed and on-going SELA projects, would impact how storm water is collected and removed from the project area and vicinity; however, any impacts would be beneficial as storm water would be more efficiently removed from the area to prevent flooding.

3.2.2.2.7 Replace I-walls with T-walls

17th Street Canal

Direct and Cumulative Impacts to Hydrology
Direct and cumulative impacts would be similar to the impacts described for the 17th Street Canal in section 3.2.2.2.6.

Indirect Impacts to Hydrology
Modifications to bridges that cross the canal could affect water flow within the canal by restricting water flow or increasing flow rate. No other indirect impacts would be expected under this alternative.

Orleans Avenue Canal

Direct and Cumulative Impacts to Hydrology
Direct and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal in section 3.2.2.2.6.

Indirect Impacts to Hydrology
Modifications to bridges that cross the canal could affect water flow within the canal by restricting water flow or increasing flow rate. No other indirect impacts would be expected under this alternative.

London Avenue Canal

Direct and Cumulative Impacts to Hydrology
Direct and cumulative impacts on hydrology would be similar to the impacts described for the London Avenue Canal in section 3.2.2.2.6.

Indirect Impacts to Hydrology
Modifications to bridges that cross the canal could affect water flow within the canal by restricting water flow or increasing flow rate. No other indirect impacts would be expected under this alternative.

3.2.2.2.8 ICS Gates with Parallel Protection

17th Street Canal

Direct Impacts to Hydrology
SWBNO PS #6 would continue to lift drainage water to allow gravity flow from the pump station to Lake Pontchartrain via the outfall canal. Improving parallel protection to the 100-year

level would improve the flow characteristics of the canal, but long-term impacts on hydrology would not be expected. Temporary impacts during construction would affect water flow within the canal as a result of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water.

Indirect Impacts to Hydrology
If the canal is concrete-lined to improve the parallel protection to the 100-year level, underseepage of water within the canal would be prevented, which could result in more water detained because that seepage pathway would be no longer available. Recharge of groundwater could be impacted because the absence of the seepage pathway would prevent flow into the water table. This would be considered a long-term impact but would not significantly affect hydrology because water in the canal would still flow north from SWBNO PS #6 to Lake Pontchartrain.

The gates would be closed during high lake events and dissipate the energy of storm surge, which could cause turbulence in the vicinity of the gate increasing the potential for erosion. There could also be increased deposition of sediment in the vicinity of the gate after large storm events.

If I-walls are replaced with T-walls to improve the parallel protection to the 100-year level, it could be necessary to modify the bridges that cross the canal. These modifications could affect water flow within the canal by restricting water flow or increasing flow rate.

Cumulative Impacts to Hydrology
Cumulative impacts are similar to the impacts described for the 17th Street Canal Concrete-Lined Canals alternative in section 3.2.2.2.6.

Orleans Avenue and London Avenue Canals

Direct, Indirect, and Cumulative Impacts to Hydrology
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal.

3.2.2.2.9 Upgrade ICS to Permanent System

17th Street Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the 17th Street Canal. SWBNO PS #6 would continue to pump water north to Lake Pontchartrain in coordination with the upgraded ICS. Temporary impacts during construction would affect water flow within the canal as a result of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. The gates would remain open to allow flow-through drainage during ordinary conditions and close only during times of high storm surge.

Indirect Impacts to Hydrology
During periods when storm surge is anticipated, the gates would be closed and storm water would continue to be evacuated to Lake Pontchartrain via the pumps. The flow-through drainage that exists when the gates are open during ordinary conditions would cease. The pumps and gate would dissipate the energy of the storm surge, which could cause turbulence in the vicinity of the structure increasing the potential for erosion. There could also be increased deposition of sediment in the vicinity of the ICS after large storm events. This would result in a short-term impact, but the canal would continue to function as a conduit to evacuate storm water.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.2.2.2.

Orleans Avenue Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the Orleans Avenue Canal. SWBNO PS #7 would continue to pump water north to Lake Pontchartrain in coordination with the upgraded ICS. Temporary impacts during construction would affect water flow within the canal as a result of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. The gates would remain open to allow flow-through drainage during ordinary conditions and close only during times of high storm surge.

Indirect Impacts to Hydrology
Indirect impacts would be similar to the impacts described for the 17th Street Canal, but the flow to Lake Pontchartrain would be from PS #7.

Cumulative Impacts to Hydrology
Cumulative impacts are similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.2.2.2.

London Avenue Canal

Direct Impacts to Hydrology
Storm water would continue to be evacuated into Lake Pontchartrain via the London Avenue Canal. SWBNO PS #3 and #4 would continue to pump water north to Lake Pontchartrain in coordination with the upgraded ICS. Short-term impacts during construction would affect water flow within the canal as a result of temporary construction features, but the canal would continue to function as a conduit to evacuate storm water. The gates would remain open to allow flow-through drainage during ordinary conditions and close only during times of high storm surge.

Indirect Impacts to Hydrology
Indirect impacts would be similar to the impacts described for the 17th Street Canal, but the flow to Lake Pontchartrain would be from PS #3 and #4.

Cumulative Impacts to Hydrology
Cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.2.2.2.

3.2.3 Water Quality

3.2.3.1 Existing Conditions

3.2.3.1.1 Surface Water

The receiving water body of the 17th Street, Orleans Avenue, and London Avenue Canals is Lake Pontchartrain. The Lake Pontchartrain Basin is a 4,700-square-mile (mi^2) watershed, encompasses 16 parishes in southeast Louisiana, and is one of the largest estuarine ecosystems on the Gulf Coast. Lake Pontchartrain is hydraulically connected to Lake Maurepas to the west, through Pass Manchac and north pass, and with the Gulf of Mexico to the east through Lake Borgne and Mississippi Sound. Lake Pontchartrain is approximately 640 mi^2 in area and averages 12 feet in depth.

3.2.3.1.2 Current Monitoring

Currently, the most severe water quality problems in Lake Pontchartrain are found along the shorelines of Jefferson, Orleans, and St. Tammany Parishes. The conduit that includes the three subject canals for urban storm water runoff is the largest contributor to degraded water quality in the lake. New Orleans often receives a very large volume of rainfall in a short time period, which exceeds the capacity of the sewage collection system. The overflow of sewage spills into city streets and into the canals that drain into Lake Pontchartrain. Sewage overflows are also common in New Orleans when the collection pipes carrying sewage are blocked, when the pipes break, and when equipment designed to pump the sewage to the treatment plant fails.[1] The LDHH advises against swimming within approximately one-quarter mile from the south shore of Jefferson and Orleans parishes and within 600 feet of the mouths of rivers and streams that flow in the lake along the north shore (LDHH 2007).

The Lake Pontchartrain Basin Foundation (LPBF) has implemented an intensive water quality monitoring program and notifies the public when conditions are favorable for primary contact recreation. Sampling stations near the project area are at Old Beach, Pontchartrain Beach, and Bayou St. John. Sampling results at Bayou St. John from 7 August 2007 show fecal coliforms were above the 200 mean probable number (MPN) where swimmers should use caution (LPBF 2007). Fecal coliforms were below 2 MPN at Pontchartrain Beach and Old Beach. Dissolved oxygen (DO) was good at all three sampling stations. Historical data from the LPBF has shown that approximately 72 hours after a rain event, fecal coliform levels are elevated at the mouths of the 17th Street, London Avenue and Orleans Avenue Canals, and a plume often forms during large events. The size and movement of the plumes depend on a variety of factors, including wind direction and speed and duration of pump station activities (Calvin 2008).

LDHH currently posts no fish consumption advisories in Lake Pontchartrain.

There is no ongoing surface water quality monitoring of the 17th Street, Orleans Avenue, and London Avenue Canals.

3.2.3.2 Discussion of Impacts

3.2.3.2.1 No Action Alternative

Direct and Indirect Impacts to Water Quality

There would be no new water quality impacts under the no action alternative. Without the proposed action, the outfall canal floodwalls would be raised to the previously authorized height and the ICS would remain in place for its design life and would not be modified to provide 100-year level of flood protection. Water quality could be negatively impacted from wastewater and storm water runoff during storm events.

Wastewater and storm water runoff enter the 17th Street, Orleans Avenue, and London Avenue Canals from many sources. Fecal coliforms, an indicator of bacterial pollution, have been historically recorded in the three canals during wet-weather flows and attributed to sanitary sewer cross flows with the storm water collection system. High levels of fecal indicator bacteria and microbial pathogens would be expected in future during storm events. Waters contaminated by failing wastewater disposal systems can cause public health problems and degrade aquatic resources.

[1] Following a settlement by the city of New Orleans in a case brought by the EPA and Department of Justice to prevent sewage from flowing into nearby waters (DOJ, 1998), the New Orleans Sewerage and Water Board initiated a capital improvement program "Sewer System Evaluation and Rehabilitation Program." This program was only partially started before Hurricane Katrina, which caused further damage to the system, but has been restarted as a multi-year $640 million program (Fehnel et al, 2005).

Storm water discharges often result in greater magnitudes and frequencies of peak flows on impacted water bodies due to an increase in the coefficient of runoff and a decrease in concentration time. During rain events, storm water can increase the chance of flooding and sediment loading in the 17th Street, Orleans Avenue, and London Avenue Canals. Storm water discharge often contains contaminants, which could further impact water quality. Hurricane and large storm events can increase the number of toxic contaminants present in storm water because of the increased potential for toxic spills and leakage. Parameter categories considered after such events often include dissolved metals and mercury, volatile organics, acid base neutrals, polychlorinated biphenyls (PCBs) and pesticides and cyanide. Under the no action alternative, the future required pumping capacity would not be met, thus increasing the likelihood that storm water discharging into the canals during a storm event could flood into the neighboring areas.

Urban storm water runoff, the conduit that includes the three subject canals, is the largest contributor to degraded water quality in the lake. Primary impacts due to increased pathogen, nutrient, and 5-day biological oxygen demand (BOD_5) were recorded in Lake Pontchartrain immediately following Hurricane Katrina. Other consequences of water quality degradation include beach closures; shellfish harvest restrictions, and loss of biological productivity in coastal habitats. Large storm events in the future could thus indirectly impact the water quality in Lake Pontchartrain.

The LPBF water quality monitoring program would continue under the no action alternative. LPBF activities such as environmental education and public events and outreach could possibly improve water quality conditions by informing the public of storm water BMPs. Existing water quality regulatory programs, such as the National Pollutant Discharge Elimination System (NPDES), LDEQ's Non-point Source Pollution Program, Louisiana Department of Natural Resources' (LDNR's) Coastal Non-point Pollution Program, and Total Maximum Daily Load (TMDL) would continue. Other efforts that could positively affect water quality in the project area would be SWBNO's efforts to improve cross sewer overflows.

Cumulative Impacts to Water Quality

Other past, present, and future projects are not expected to have a significant impact on the large-scale water quality conditions in the study area. However, localized water quality degradation could occur during construction of these projects. Concurrent construction of other HSDRRS projects could cause short-term impacts to water quality that could exceed LDEQ's water quality standards. The cumulative construction impacts of IER #3 (Lakefront Levee, Jefferson Parish, Louisiana), IER #4 (New Orleans Lakefront Levee, West of Inner Harbor Navigational Canal, Orleans Parish, Louisiana), IER #6 (Citrus Lakefront Levee, Orleans Parish, Louisiana), and IER #7 (New Orleans East Levee, Maxent Canal to Michoud Slip, Orleans Parish, Louisiana), namely a temporary increase in concentration of fine sediments within the water column due to upland erosion or sediment disturbance in waterways, would be additive to similar impacts caused by other levee improvement projects. This could lead to increased turbidity and possible reductions in DO levels in the vicinity and downstream of construction activities. These sediments could also act as a source of nutrients within the water column. These impacts would generally be localized to areas where construction would occur and would be expected to be temporary. Implementing BMPs and SWPPPs would further mitigate cumulative impacts from construction.

Continued industrial activities, urban wastewater discharges, and construction activities would lead to a continued decline in water quality. However, state and Federal programs are in place to regulate and improve water quality, which could improve the cumulative impact over time.

3.2.3.2.2 <u>Proposed Action</u>

The impacts on water quality discussed below are equally applicable to the proposed action at the 17th Street, Orleans Avenue, and London Avenue Canals.

Direct Impacts to Water Quality
Short-term direct impacts from construction activities include increased turbidity, decreased DO, increased suspended sediments, slightly increased temperature, and increased BOD_5. These impacts would be associated with demolition and earthwork, as well as constructing channel transitions, the generator building and tank farm complex, and the pump station. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities. Any impacts to water quality from construction activities would be temporary and localized in the canals and at the mouths of the canals. A possible breakwater in Lake Pontchartrain could be necessary to protect the pump station at the 17th Street and Orleans Avenue Canals. In high-energy environments, breakwaters reduce the longshore transport of sand and could cause or significantly increase erosion in nearby unprotected beaches. Because of the relatively low energy of Lake Pontchartrain, this breakwater is not expected to pose a threat of erosion; however erosion impacts could occur during large storm events. Any increase in erosion would be monitored and become a part of O&M procedures for the new pump station.

Indirect Impacts to Water Quality
Water quality in the canals could continue to be negatively impacted from wastewater and storm water runoff during storm events, however, the proposed action would provide a 100-year level of flood protection and significantly reduce the risk that large amounts of rainwater from a storm event could cause water within the canals to flood the neighboring areas and pose a health hazard.

Indirect impacts to the water quality of Lake Pontchartrain could occur at the mouths of the canals following a storm event, similar to those described in the no action alternative.

Cumulative Impacts to Water Quality
In addition to the cumulative impacts discussed under the no action alternative, the potential temporary water quality impacts during construction, including increases of turbidity, decreases in DO, and influx of nutrients could be greater than under the no action alternative because of the construction measures of the proposed action.

Future inclusion of additional features and other improvements/enhancements by the local government or due to potential future Congressional authorization could include canal deepening, which would have short-term impacts to turbidity, DO, and suspended sediments during canal excavation activities. Full-time operation of the new pump stations could increase the turbidity at the mouths of the canal and could lead to an increase in suspended organic sediments in the water column.

3.2.3.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar as discussed for the proposed action in section 3.2.3.2.2.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the proposed action in section 3.2.3.2.2, with the following exception, a breakwater would not be constructed under this layout alternative.

Orleans Avenue Canal

Layout Alternative A

Direct Impacts to Water Quality

In addition to the direct impacts discussed for the proposed action in section 3.2.3.2.2, the location of the pump station requires placing of the pump station at the mouth of the Orleans Avenue Canal, in Lake Pontchartrain. Given the near-shore proximity of the new pump station to Lake Pontchartrain, a spill at this location could be more likely to directly impact the water quality of Lake Pontchartrain. Although a Spill Prevention Plan would be followed, a large spill at this location could include consequences of water quality degradation.

Indirect Impacts to Water Quality

In addition to the indirect impacts discussed for the proposed action in section 3.2.3.2.2, the breakwater structure necessary in this layout alternative could increase erosion impacts during large storm events due to the disruption of the longshore transport process.

Cumulative impacts to Water Quality

Cumulative impacts would be similar to the impacts described for the proposed action in section 3.2.3.2.2.

Layout Alternative C

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts would be similar as discussed for the proposed action in section 3.2.3.2.2 except that there would be no increased erosion impacts because a breakwater is not required at this site location.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts would be similar as discussed for the proposed action in section 3.2.3.2.2 except that there would be no increased erosion impacts because a breakwater is not required at this site location.

London Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts of this alternative would be similar to the impacts described for Orleans Avenue Canal layout alternative A.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts of this alternative would be similar as discussed for the proposed action in section 3.2.3.2.2.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts of this alternative would be similar to those discussed for the proposed action in section 3.2.3.2.2 except that there would be no increased erosion impacts because a breakwater would not be required at this site location.

Layout Alternative E

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts of this alternative would be similar to those discussed for the proposed action in section 3.2.3.2.2 except that there would be no increased erosion impacts because a breakwater would not be required at this site location.

3.2.3.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.3.2.2 and 3.2.3.2.3.

3.2.3.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Layout Alternative A

Direct Impacts to Water Quality

Short-term, direct impacts from construction and construction-related activities would be similar, but greater than, the impacts described for the proposed action in section 3.2.3.2.2. Because of the significant canal excavation required under this alternative (approximately 13,500 feet), short-term, direct impacts to water quality would be expected. The features proposed by this layout alternative could increase turbidity, decrease DO, increase suspended sediments, slightly increase temperature, and increase BOD_5 as a direct result of construction activities. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities. Any impacts to water quality from construction activities would be temporary and localized. Long-term, direct impacts could occur from spills or leakages related to the generators and equipment necessary for operating the new pump stations, particularly during storm events.

Indirect Impacts to Water Quality

Long-term, indirect impacts under this alternative could occur from the permanent closures of the outfall canals. Full-time operation of the pump stations could increase the turbidity at the mouths of the canal and could lead to an increase in suspended organic sediments in the water column. Impacts from full-time operation of the pump stations would be localized at the mouth of the outfall canal.

Cumulative impacts to Water Quality

Cumulative impacts would be similar, but greater than, the impacts discussed for the proposed action in section 3.2.3.2.2. Due to the deeper canal and lack of continual flow to Lake Pontchartrain, water within the canal could become stagnant. This could result in a decrease in DO and contribute to poor water quality.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Layout Alternative C

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

Orleans Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Water Quality

Direct, indirect, and cumulative impacts would be similar to the impacts described for the Street Canal layout alternative A.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

London Avenue Canal

Layout Alternative A
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

Layout Alternative E
Direct, Indirect, and Cumulative Impacts to Water Quality
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative A with the following exception, a breakwater would not be constructed under this layout alternative.

3.2.3.2.6 Concrete-Lined Canals

The impacts on water quality discussed below are equally applicable to the 17th Street, Orleans Avenue, and London Avenue Canals, with the exception that the 17th Street Canal could experience slightly more impact from recreational activities, such as boating given the location of Orleans Marina at the mouth of 17th Street Canal. The use of motorized watercraft near the mouth of the canal could lead to oil and gas spills, and release of greywater or wastewater in the vicinity of the canal.

Direct Impacts to Water Quality
Short-term, direct impacts would be expected under this alternative. The features proposed by this alternative could temporarily increase turbidity, decrease DO, increase suspended sediments, slightly increase temperature, and increase BOD_5 as a direct result of construction activities. These would be short-term impacts associated with construction of the canal liner box. Additionally, once the canals are successfully concrete-lined, short-term impacts on water quality could be expected from removing the ICS. Impacts to water quality from construction activities would be temporary and localized. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities.

Indirect Impacts to Water Quality
Long-term, indirect impacts would be similar to those discussed for the proposed action in section 3.2.3.2.2.

Cumulative Impacts to Water Quality
In addition to the cumulative impacts discussed for the proposed action, the potential water quality impacts during construction including increases of turbidity, decreases in DO, and influx of nutrients could be greater from the construction measures of this alternative compared to the proposed action. Impacts to water quality under this alternative would affect the length of the canals, whereas under the proposed action, impacts would be limited to the construction areas localized at the mouths of the canals. Because these impacts are temporary and minimized, they are not likely to detract benefits from the existing water quality regulatory programs.

3.2.3.2.7 Replace I-walls with T-walls

The impacts on water quality discussed below are equally applicable to the 17th Street, Orleans Avenue and London Avenue Canals, with the exception that the 17th Street Canal could experience slightly more impact from recreational activities, such as boating given the location of Orleans Marina at the mouth of 17th Street Canal. The use of motorized watercraft in the canals could lead to oil and gas spills, and release of greywater or wastewater into the canals.

Direct, Indirect, and Cumulative Impacts to Water Quality
The direct, indirect, and cumulative impacts on water quality under this alternative would be similar to the impacts described for the Concrete-Lined Canals Alternative in section 3.2.3.2.6, as well as applicable for each of the outfall canals, with one exception. Short-term, indirect impacts from construction could occur if modifying the bridges that cross the outfall canals is required, which could result in a temporary disturbance of the slope environment and drainage alterations. These impacts would be temporary and localized.

3.2.3.2.8 ICS Gates with Parallel Protection

The impacts on water quality discussed below are equally applicable to the 17th Street, Orleans Avenue, and London Avenue Canals, with the exception that the 17th Street Canal could experience slightly more impact from recreational activities, such as boating, given the location of Orleans Marina at the mouth of 17th Street Canal.

Direct, Indirect, and Cumulative Impacts to Water Quality
The direct, indirect, and cumulative impacts on water quality under this alternative would be similar to the impacts described in section 3.2.3.2.6, as well as applicable for each of the outfall canals, with two exceptions. Long-term, direct impacts could occur from spills or leakages related to the generators and equipment necessary for operating the ICS gates; however, spill prevention plans significantly reduce that risk.

Long-term, indirect impacts to the water quality of Lake Pontchartrain could occur at the mouths of the 17th Street, Orleans Avenue, and London Avenue Canals following a storm event, particularly if the event requires closure of the respective canal gates. Water quality in the canals could be impacted during storm events because of storm water runoff and sanitary sewer overflows. During a severe storm that carries the threat of a surge, the existing SWBNO pump stations would pump storm water from the canals and the ICS gates would be closed. Following such an event, when the canal gates open, the 17th Street, Orleans Avenue, and London Avenue canals could be considered a point source of pollution for Lake Pontchartrain. Primary impacts of increased pathogen, nutrient, and BOD_5 could affect Lake Pontchartrain. From data collected post-Katrina, these impacts would most likely be temporary and localized.

3.2.3.2.9 Upgrade ICS to Permanent System

The impacts on water quality discussed below are equally applicable to the 17th Street, Orleans Avenue and London Avenue Canals, with the exception that the 17th Street Canal could experience slightly more impact from recreational activities, such as boating given the location of Orleans Marina at the mouth of 17th Street Canal.

Direct and Indirect Impacts to Water Quality

This alternative is considered an environmentally preferred alternative because the footprint of the structures has already been impacted; therefore, there would be minimal additional impacts on the environment. Short-term direct impacts from construction activities could be expected; however, these would be temporary and localized. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities. Any impacts to water quality from construction activities would be temporary and localized.

Cumulative impacts to Water Quality

Potential cumulative impacts from construction activities including increases of turbidity, decreases in DO, and influx of nutrients could be less than those discussed under the proposed action in section 3.2.3.2.2, because the footprint of the structures has already been impacted.

3.2.4 Wildlife

3.2.4.1 Existing Conditions

The Lake Pontchartrain Basin's marsh and open waters provide varied and highly productive habitat for game and fur-bearing animals, as well as important habitat for migratory waterfowl, shorebirds, and wading birds.

The open-water habitats, particularly Lake Pontchartrain, of the project area support a large number of waterfowl of the Central Flyway. Although some species such as mottled duck (*Anas fulvigula*) are year-round residents, most use the project area as wintering grounds. Dabbling ducks such as mallard (*Anas platyrhynchos*), green-winged teal (*Anas crecca*), blue-winged teal (*Anas discors*), northern pintail (*Anas acuta*), gadwall (*Anas strepera*), widgeon (*Anas americana*), and northern shoveler (*Anas clypeata)* use freshwater and intermediate marshes in fall and early winter, later moving on to saline marshes as food supplies dwindle. Mottled duck, wood duck (*Aix sponsa*), and hooded merganser (*Lophodytes cucullatus*) utilize the marshes, swamps, and bottomland forests of the project area as nesting habitat. Within the vicinity of the Orleans Avenue Canal, the Oak Tree Bird Sanctuary is well known as a viewing area for migratory birds and is often visited by birding enthusiasts.

Diving ducks use the open-water areas of the project area primarily as wintering grounds. More than 90 percent of the lesser scaup (*Aythya affinis*) that inhabit the Mississippi Flyway during the winter in Louisiana concentrate in the open waters of Lake Pontchartrain and Lake

Borgne. Other common species include greater scaup (*Aythya marila*), canvasback (*Aythya valisineria*), and redhead (*Aythya americana*). Game birds such as king rail (*Rallus elegans*), clapper rail (*Rallus longirostris*), common snipe (*Gallinago gallinago*), coot (*Fulica americana*), purple gallinule (*Porphyrula martinica*), and common moorhen (*Gallinula chloropus*) all reside in the study area and nest in the marshes. Other species present in the study area include Louisiana heron (*Egretta tricolor*), great egret (*Casmerodius albus*), roseate spoonbill (*Ajaia ajaja*), and killdeer plover (*Charadrius vociferous*).

Fish species within the project area include finfish, shrimp, crabs, and benthic fauna. Movement between fresh and more saline waters is essential to the life history of many of these species. Major fish species of fresh to slightly brackish, along with the waters of Lake Pontchartrain include black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), largemouth bass (*Micropterus salmoides*), spotted sunfish (*Lepomis punctatus*), yellow bass (*Morone mississippiensis*), catfish (*Ictalurus punctatus*), red drum (*Sciaenops ocellatus*), black drum (*Pogonias romis*), speckled trout (*Cynoscion nebulosus*), menhaden (*Brevoortia tyrannus*), southern flounder (*Paralichthys thostigma*), sheepshead (*Archosargus robatocephalus*), sea catfish (*Arius felis*), sand seatrout (*Cynoscion arenarius*), and Atlantic croaker (*Micropogonias undulatus*). These waters also include white and brown shrimp along with blue crab (*Callinectes sapidus*). Benthic species are organisms that live at the bottom of the body of water in which they are found, including the Rangia clam (*Rangia cuneata*) and the American oyster (*Crassostrea virginica*).

The bald eagle (*Haliaeetus leucocephalus)* was removed from the Federal list of threatened and endangered species effective on 8 August 2007, because of recovery of the species [72 *Federal Register* (FR) 37345-37372 (9 July 2007)]. However, it continues to be protected and managed under the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et. seq.) and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (USFWS 2007a). No documented bald eagle nests are within the project area.

Urban wildlife, such as squirrels, nutria, and other small rodents, can be found in the vicinity of the project area. Nutria are often found foraging in the outfall canals and are considered a nuisance species in the area. An abundance of these urban species can be found in City Park and other parks in the vicinity of the outfall canals.

3.2.4.2 Discussion of Impacts

3.2.4.2.1 No Action Alternative

Direct and Indirect Impacts to Wildlife

Construction activities in the project area could temporarily impact nesting, fishing and flyways; however, these impacts would be temporary and localized and would not be anticipated to impact the habitat or activities of the area wildlife. Species located within the project footprint may have temporary and localized dispersal during construction, but should return after completion of the project. Fisheries resources would have short-term localized and temporary impacts during construction due to water quality impacts, such as increased turbidity and low DO. Once construction has ceased, water quality would be expected to return to pre-construction conditions and fish species would return to the area.

The proposed project area does not contain any documented bald eagle nests. Impacts to the bald eagle are not anticipated with implementation of the proposed project features. In a letter dated 6 December 2007, the USFWS (USFWS 2007b) found that the proposed project features would not likely adversely affect the bald eagle.

Cumulative Impacts to Wildlife
Cumulative impacts would occur along the southern shoreline of Lake Pontchartrain, particularly those areas encompassed by IERs #3, #4, #6, and #7. Temporary impacts to fisheries and some avian species, in the form of displacement, could occur as a result of construction activities during other IER projects. Fish species would be expected to return to these areas upon completion of these projects.

3.2.4.2.2 *Proposed Action*

17th Street Canal

Direct and Indirect Impacts to Wildlife
Direct and indirect impacts to wildlife species could include temporary impacts to nesting, fishing, and flyways during construction activities. It is anticipated that these impacts would be temporary and localized during the duration of construction activities for the new pump station.

Species located within the project footprint may have temporary and localized dispersal during construction, but would be expected to return upon completion of the project. The proposed action does not impact the open water habitat of Lake Pontchartrain or the marshlands in the project vicinity; however there would be a loss of lakebottom habitat due to the breakwater structure that would be offset by the increased hard substrate created by the breakwater. Fisheries resources would have short-term localized impacts during construction due to water quality impacts, such as increased turbidity and low DO. Once construction has ceased, water quality would be expected to return to normal and fish species would return to the area. It is not anticipated that the O&M of the new pump station, once construction has ceased, would impact the habitat or activities of wildlife.

The proposed project area does not contain any documented bald eagle nests. Impacts to the bald eagle are not anticipated with implementation of the proposed project features. In a letter dated 6 December 2007 the USFWS (USFWS 2007b) found that the proposed project features would not likely adversely affect the bald eagle.

Cumulative Impacts to Wildlife
The cumulative impacts of this project when considered with other projects within the study area could increase with the addition of the proposed project features. However, it is anticipated that temporary displacement of species during the construction activities of IER's #3, #4, #6, and #7 may have short-term impacts, however they would be temporary and localized during the duration of construction activities and cease following construction. Fish species and avian species would be expected to return to these areas upon completion of these projects.

Orleans and London Avenue Canals

Direct and Indirect Impacts to Wildlife
Direct and indirect impacts to wildlife species could include temporary impacts to nesting, fishing and flyways during construction activities, since the proposed action encompasses land designated as green space. It is not anticipated that the O&M of the proposed action would impact habitat or activities of wildlife in the vicinity of the project areas. Avian species could be temporarily dispersed from localized areas during construction activities, but would be expected to return after construction ceases. Because of the mobility of these species, mortality due to construction activities would not be anticipated. Other species located within the project footprint may have temporary and localized dispersal during construction, but these would be expected to return to the area once construction is complete. The proposed action does not impact the open water habitat of Lake Pontchartrain or the marshlands in the project vicinity; however there would be a loss of lake bottom habitat due to the breakwater structure at the Orleans Avenue Canal. Fisheries resources would have short-term localized and temporary

impacts during construction due to water quality impacts, such as increased turbidity and low DO. Once construction has ceased, water quality would be expected to return to normal and fish species would return to the area.

The proposed project area does not contain any documented bald eagle nests. Impacts to the bald eagle are not anticipated with implementation of the proposed project features. In a letter dated 6 December 2007 the USFWS (USFWS 2007b) found that the proposed project features would not likely adversely affect the bald eagle.

Cumulative Impacts to Wildlife
The cumulative impacts of this project when considered with other projects within the study area are not expected to increase with the addition of the proposed project features. However, it is anticipated that temporary displacement of species during the construction activities of IER's #3, #4, #6, and #7 may have short-term impacts, however they would be temporary and localized during the duration of construction activities and cease following construction. Fish species and avian species would be expected to return to these areas upon completion of these projects.

3.2.4.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternatives B and C
Direct, Indirect, and Cumulative Impacts to Wildlife
Direct, indirect, and cumulative impacts for layout alternatives B and C would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.4.2.2, except layout alternative C would not require a breakwater to be constructed in Lake Pontchartrain.

Orleans Avenue Canal

Layout Alternatives A, C, and D
Direct, Indirect, and Cumulative Impacts to Wildlife
Direct, indirect, and cumulative impacts for layout alternatives A, C, and D would be similar as discussed for the Orleans Avenue Canal proposed action in section 3.2.4.2.2, except that layout alternatives C and D would not require a breakwater to be constructed in Lake Pontchartrain. In addition, layout alternative D could have direct impacts to avian and small mammal species due to the loss of approximately 16 acres of habitat, of which approximately 6 acres have been identified as a cypress stand, located in City Park.

London Avenue Canal

Layout Alternatives A, B, D, and E
Direct, Indirect, and Cumulative Impacts to Wildlife
Direct, indirect, and cumulative impacts for layout alternatives A, B, D, and E would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.4.2.2, except that layout alternatives A and B could require a breakwater to be constructed in Lake Pontchartrain which would have additional lake impacts associated with a habitat shift from open water and lake bottom to the rock breakwater.

3.2.4.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.4.2.2 and 3.2.4.2.3.

3.2.4.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Layout Alternatives A, B, and C

Direct, Indirect, and Cumulative Impacts to Wildlife

Direct, indirect, and cumulative impacts for layout alternatives A, B, and C would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.4.2.2, except that layout alternative C would not require a breakwater.

Orleans Avenue Canal

Layout Alternatives A, B, C, and D

Direct, Indirect, and Cumulative Impacts to Wildlife

Direct, indirect, and cumulative impacts for layout alternatives A, B, C, and D would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.4.2.2, except that layout alternatives C and D would not require a breakwater to be constructed in Lake Pontchartrain.

London Avenue Canal

Layout Alternatives A, B, C, D, and E

Direct, Indirect, and Cumulative Impacts to Wildlife

Direct, indirect, and cumulative impacts for layout alternatives A, B, C, D, and E would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.4.2.2, except that layout alternatives A and B could require a breakwater to be constructed in Lake Pontchartrain which would have additional lake impacts associated with a habitat shift from open water and lake bottom to the rock breakwater.

3.2.4.2.6 Parallel Protection Alternatives

Direct, indirect, and cumulative impacts would be similar for all of the parallel protection alternatives including Concrete-Lined Canals, Replace I-Walls with T-Walls, and ICS Gates with Parallel Protection.

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal

Direct and Indirect Impacts to Wildlife

Direct and indirect impacts to wildlife species would be similar to the impacts described for the proposed action in section 3.2.4.2.2, except that a breakwater would not be required for this alternative.

Cumulative Impacts to Wildlife

The cumulative impacts of this project when considered with other projects within the study area are not expected to increase with the addition of the proposed project features.

3.2.4.2.7 Upgrade ICS to Permanent System

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Wildlife

Direct, indirect, and cumulative impacts would be similar to the impacts described in section 3.2.4.2.5.

3.2.5 Threatened and Endangered Species

The threatened and endangered species that could be present in the vicinity of the 17th Street, Orleans Avenue, and London Avenue Canals are the West Indian manatee (*Trichechus manatus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), brown pelican (*Pelecanus occidentalis*), Kemp's Ridley sea turtle (*Lepidochelys kempii*), green sea turtle (*Chelonia mydas*), and loggerhead sea turtle (*Caretta caretta*).

3.2.5.1 Brown Pelican

3.2.5.1.1 Existing Conditions

Brown pelican nests are usually constructed on the ground or in small shrubs and trees on coastal islands (Palmer 1962). Endangered brown pelicans are known to nest on several islands and on mud lumps at the mouth of South Pass on the Mississippi River Delta (USFWS 1995a). Southern populations of the brown pelican nest irregularly, usually beginning in late fall and extending through June.

Populations in Louisiana were decimated by pesticides in the 1950s and 1960s (NatureServe Explorer 2001). Other factors affecting the brown pelican throughout the United States include disturbance of nesting birds by humans, declining fish populations, increased turbidity, oil and other chemical spills, entanglement in fishing gear, shooting, extreme weather conditions, disease, parasitism, and fish die-offs in connection with chemical runoff (USFWS 1995a; NatureServe Explorer 2001).

The brown pelican is listed as an endangered species in Orleans and Jefferson Parishes because it could use Lake Pontchartrain for foraging. There are no suitable roosting or nesting sites in the project area.

3.2.5.1.2 Discussion of Impacts

The direct, indirect, and cumulative impacts would be similar for the No Action Alternative, proposed action, and all other alternatives.

Direct Impacts to the brown pelican
There are no suitable roosting or nesting sites for brown pelicans in the project area; therefore, implementing the proposed action or other alternatives would have no direct impacts to the brown pelican. In a letter dated 2 February 2009, the USFWS found that the proposed actions would not likely impact the brown pelican (USFWS 2009). Transient brown pelicans passing through the area could find additional roosting or resting locations in the vicinity of the proposed facilities, structures, or breakwaters. Additional feeding habitats could be created from breakwaters, riprap, and other structures that create shallow water habitats; however, the effects would be minimal and localized.

Indirect Impacts to the brown pelican
Short-term impacts from construction activities could impact water quality, which could indirectly impact the brown pelican. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and also to prevent leakages and spills from construction-related equipment and activities. Increases in turbidity during construction would be temporary and localized by the use of BMPs.

Cumulative Impacts to the brown pelican
There would be no cumulative impacts under this alternative when considered with other projects in the area (IERs #3, #4, #6, and #7).

3.2.5.2 Gulf sturgeon

3.2.5.2.1 Existing Conditions

The Gulf sturgeon is listed as a threatened species [56 FR 49653-49658 (30 September 1991)] with designated critical habitat [67 FR 39105-39199 (6 June 2002)]. Historically, Gulf sturgeon occurred in most major river systems from the Mississippi River east to the Suwannee River, Florida, and in marine waters of the Central and Eastern Gulf of Mexico south to Florida Bay (Wooley and Crateau 1985). In Louisiana, specimens have been identified offshore and along the Mermentau River Basin, Mississippi River Basin, Lake Pontchartrain Basin, Pearl River Basin, and Mississippi Sound. According to the USFWS (1995b), Gulf sturgeon have been collected in Lake Pontchartrain and incidentally caught by shrimp trawlers, netters, and recreational anglers.

The Gulf sturgeon bottom feeds in areas that have predominantly hard, sandy bottoms (USFWS 1991). The current population levels of the Gulf sturgeon are unknown throughout most of its range but are thought to be reduced from historic levels (USFWS 1995b). The USFWS (1991) has identified factors that could have caused a decline in Gulf sturgeon populations. Historical overfishing of the species exacerbated by destruction, modification, or curtailment of its habitat and range has greatly affected Gulf sturgeon reproduction. In addition, dredging, de-snagging, and spoil deposition carried out in connection with channel improvement and maintenance represent threats to the Gulf sturgeon and their critical habitat. Incidental taking by commercial fisherman, and the sturgeon's slow growth rate and late maturation are other threats identified to the species (USFWS 1991). Other natural or man-made factors that affect the Gulf sturgeon's continued existence include poor water quality from heavy pesticide use and heavy metal and industrial contaminants (USFWS 1991).

Critical habitat within Lake Pontchartrain for the Gulf sturgeon is listed as those areas east of the Lake Pontchartrain Causeway, which includes the lake waters on the northern end of the project area. The Gulf sturgeon could enter the mouths of the canals up to the existing ICS; however, no confirmed sightings or documentation have established their presence in the canals nor is the habitat in these canals high quality foraging habitat. As such, their presence in these canals would be highly unlikely and incidental.

3.2.5.2.2 Discussion of Impacts

No Action Alternative

Direct Impacts to the Gulf sturgeon

The Gulf sturgeon is not likely to occur within the outfall canals; therefore, direct impacts would not be expected.

Indirect Impacts to the Gulf sturgeon

Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact the Gulf sturgeon and their critical habitat.

Cumulative Impacts to the Gulf sturgeon

Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Gulf sturgeon and their critical habitat. The increased turbidity could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. All water quality impacts would be

temporary, short-term. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the Gulf sturgeon.

Proposed Action

An informal Endangered Species Act Section 7 consultation for IER #5 was submitted to NMFS on 23 September 2008. The NMFS initiated formal consultation on November 14, 2008. They issued a response in the form of a biological opinion dated 17 April 2009. NMFS has analyzed the potential effects from the proposed action and concluded that Gulf sturgeon are not likely to be adversely affected (NMFS 2009). The likelihood of Gulf sturgeon being struck during construction of breakwaters is discountable due to the species' mobility. Further, in-water activities will be minimized by construction the breakwaters using land-based equipment.

IER #5 is located within designated Gulf sturgeon critical habitat Unit 8. The amount of area impacted by the action is approximately 3.3 acres, which constitutes less than 0.00037 percent of the total area within Unit 8. IER #5 will directly impact the benthos by the placement of rock and concrete rubble which will permanently remove (cover) 3.3 acres of designated Gulf sturgeon critical habitat consisting of 50 percent or less sandy substrate. Substrate modification can impact prey availability and abundance. NMFS analyzed the project's effects on Gulf sturgeon critical habitat and determined that prey abundance will be adversely affected by the project but not to the extent that would reduce the critical habitat's ability to support Gulf sturgeon conservation. NMFS considers the permanent loss of 3.3 acres of habitat as having insignificant effects on Gulf sturgeon.

17th Street Canal

Direct Impacts to the Gulf sturgeon

Project features that occur within Lake Pontchartrain, such as breakwater structures, could impact Gulf sturgeon critical habitat. Given the lakeshore location of this pump station, erosion protection armoring could be required, primarily in a breakwater, approximately 104 feet wide by 600 feet long. This breakwater would be placed in Lake Pontchartrain and would directly impact approximately 1.43 acres of Gulf sturgeon critical habitat by permanently covering the lake bottom with the breakwater. BMPs would be implemented during construction activities to minimize impacts to Gulf sturgeon critical habitat.

Indirect Impacts to the Gulf sturgeon

Indirect impacts would be similar to the impacts described for the no action alternative.

Cumulative Impacts to the Gulf sturgeon

Approximately 2.57 acres of Gulf sturgeon critical habitat could be permanently impacted by the proposed action. Considered cumulatively with IERs #3, #4 #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact the Gulf sturgeon and their critical habitat. The increased turbidity and siltation barriers could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the Gulf sturgeon.

Orleans Avenue Canal

Direct Impacts to the Gulf sturgeon

Project features that occur within Lake Pontchartrain, such as breakwater structures, would impact Gulf sturgeon and their critical habitat. Given the lakeshore location of this pump station, erosion protection armoring could be required, primarily in a major breakwater, approximately 116 feet wide by 700 feet long. This breakwater would be placed in Lake Pontchartrain and

would directly impact approximately 1.86 acres of Gulf sturgeon critical habitat by permanently covering the lake bottom with the breakwater. BMPs would be implemented during construction activities to minimize impacts to Gulf Sturgeon critical habitat.

Indirect Impacts to the Gulf sturgeon
Indirect impacts would be similar to the impacts described for the no action alternative.

Cumulative Impacts to the Gulf sturgeon
Approximately 3.49 acres of Gulf sturgeon critical habitat could be directly impacted by this alternative. Considered cumulatively with IERs #3, #4, #6, #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Gulf sturgeon and their critical habitat. The increased turbidity could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. All water quality impacts would be temporary, short-term and lessened by the movement of the tides. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the Gulf sturgeon.

London Avenue Canal

Direct Impacts to the Gulf sturgeon
The Gulf sturgeon is not likely to occur within the immediate project area. Direct impacts would not be expected from proposed project features.

Indirect Impacts to the Gulf sturgeon
Indirect impacts would be similar to the impacts described for the no action alternative.

Cumulative Impacts to the Gulf sturgeon
Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Gulf sturgeon and their critical habitat. The increased turbidity could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. All water quality impacts would be temporary, short-term and lessened by the movement of the tides. Implementing BMPs and SWPPPs would further mitigate cumulative impacts from construction affecting the Gulf sturgeon.

Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action, except that a breakwater would not be required for this alternative.

Orleans Avenue Canal

Layout Alternative A

Direct Impacts to the Gulf sturgeon

Project features that occur within Lake Pontchartrain, such as breakwater structures, would impact Gulf sturgeon and their critical habitat. Given the lakeshore location of this pump station, erosion protection armoring could be required, primarily in a breakwater, approximately 200 feet wide by 1,100 feet long. This breakwater would be placed in Lake Pontchartrain and would directly impact approximately 5.05 acres of Gulf sturgeon critical habitat by permanently covering the lake bottom with the breakwater. BMPs would be implemented during construction activities to minimize impacts to Gulf Sturgeon critical habitat.

Indirect Impacts to the Gulf sturgeon

Indirect impacts would be similar to the impacts described for the no action alternative.

Cumulative Impacts to the Gulf sturgeon

Approximately 5.05 acres of Gulf sturgeon critical habitat could be directly impacted by this alternative. Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Gulf sturgeon and their critical habitat. The increased turbidity could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. All water quality impacts would be temporary, short-term and lessened by the movement of the tides. Implementing BMPs and SWPPPs would further mitigate cumulative impacts from construction affecting the Gulf sturgeon.

Layout Alternatives C and D

Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon

The direct, indirect, and cumulative impacts on the Gulf sturgeon under these layout alternatives would be similar to the impacts described for the no action alternative.

London Avenue Canal

Layout Alternative A

Direct Impacts to the Gulf sturgeon

Project features that occur within Lake Pontchartrain, such as breakwater structures, would impact Gulf sturgeon and their critical habitat. Given the lakeshore location of this pump station, erosion protection armoring could be required, primarily in a breakwater, approximately 200 feet wide by 900 feet long. This breakwater would be placed in Lake Pontchartrain and would directly impact approximately 4.13 acres of Gulf sturgeon critical habitat by permanently covering the lake bottom with the breakwater. BMPs would be implemented during construction activities to minimize impacts to Gulf Sturgeon critical habitat.

Indirect Impacts to the Gulf sturgeon

Indirect impacts would be similar to the impacts described in for the no action alternative.

Cumulative Impacts to the Gulf sturgeon

Approximately 4.13 acres of Gulf sturgeon critical habitat could be directly impacted by this alternative. Considered cumulatively with IERs #3, #4, #6, #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Gulf sturgeon and their critical habitat. The increased turbidity could temporarily displace Gulf sturgeon during construction activities, but the species would be expected to return when construction ceases. All water quality impacts would be temporary, short-term and lessened by the movement of the tides. Implementing BMPs and

SWPPPs would further mitigate cumulative impacts from construction affecting the Gulf sturgeon.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action.

Layout Alternative E
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action.

Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described for the Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations alternative.

Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal
Layout Alternative A
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative B, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal layout alternative C, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Orleans Avenue Canal
Layout Alternative A
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative A, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative C, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative D, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

London Avenue Canal
Layout Alternative A
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternative A, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternative B, Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal Layout proposed action.

Layout Alternative D
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action.

Layout Alternative E
Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action.

Concrete-Lined Canals
The impacts described below are inclusive for all three outfall canals.

Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the no action alternative.

Replace I-walls with T-walls

The impacts described below are inclusive for all three outfall canals.

Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the no action alternative.

ICS Gates with Parallel Protection

The impacts described below are inclusive for all three outfall canals.

Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the no action alternative.

Upgrade ICS to Permanent System

The impacts described below are inclusive for all three outfall canals.

Direct, Indirect, and Cumulative Impacts to the Gulf sturgeon
The direct, indirect, and cumulative impacts would be similar to the impacts described for the proposed actions at each outfall canal.

3.2.5.3 West Indian Manatee

3.2.5.3.1 Existing Conditions

Federally listed as an endangered species, West Indian manatees occasionally enter Lakes Pontchartrain and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been reported in the Amite, Blind, Tchefuncte, and Tickfaw rivers and in canals within the adjacent coastal marshes of Louisiana (USFWS 2007b). They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee could enter the mouths of the canals up to the existing ICS; however, no confirmed sightings or documentation have confirmed their presence in the canals. Substantial food sources (submerged or floating aquatic vegetation) have not been observed in the vicinity of the project area in the open waters of Lake Pontchartrain, and occurrence of the manatee has not been recorded in project area. The manatee has declined in population because of cold weather, red tides, collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution (USFWS 2007b).

3.2.5.3.2 Discussion of Impacts

The direct, indirect, and cumulative impacts would be similar for the no action alternative, proposed action, and all other alternatives.

Direct and Indirect Impacts to the West Indian Manatee
In a letter dated 2 February 2009 the USFWS (2009) stated that constructing the proposed project features is not likely to impact the manatee. USACE would incorporate the following protective measures into its construction contracts:

> All contract personnel associated with the project should be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all

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

Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities which could directly impact water quality that could impact the West Indian Manatee.

Cumulative Impacts to the West Indian Manatee
When considered with other HSDRRS projects in the area, the presence of construction-related activity, machinery, and noise would be expected to cause manatees to avoid the shoreline habitats in the project area during the construction period. Given the lack of food sources in the project area, it is unlikely that the manatee would occur in the inshore waters along the project area other than sporadically while transiting the lake.

3.2.5.4 Kemp's Ridley Sea Turtle

3.2.5.4.1 Existing Conditions

The Kemp's Ridley sea turtle is federally listed as endangered. Although the turtle does not nest in Louisiana, deepwater channels, estuarine, and offshore areas may provide this species with important feeding, developmental, and hibernation sites. Development or alteration of these areas may be a threat to the availability of such habitats.

3.2.5.4.2 Discussion of Impacts

IER #5 includes the installation of a breakwater in front of the 17th Street Canal Pump Station and a breakwater at the Orleans Avenue Canal Pump Station. Construction of these breakwaters would result in the permanent loss of 3.3 acres of potential sea turtle habitat.

The NMFS initiated formal consultation on 14 November 2008, in accordance with section 7 of the Endangered Species Act of 1973 as amended. They issued a response in the form of a biological opinion dated 17 April 2009.

Direct and Indirect Impacts to the Kemp's Ridley Sea Turtle
The NMFS has analyzed potential effects from the proposed projects in IER #5 and concluded that listed sea turtles are not likely to be adversely affected. The likelihood of sea turtles being struck during the construction of breakwaters currently proposed is discountable due to these species' mobility. Further, in-water activities would be minimized by construction the breakwaters using land-based equipment.

NMFS considers the permanent loss of 3.3 acres of habitat due to construction of the breakwaters on the submerged substrate as having insignificant effects on sea turtles. The project area

encompasses only a small portion of the lake and there is similar habitat in the vicinity such that impacts to foraging success, reproduction, resting, or other activities that might occur in the area are expected to be minor and insignificant. Further, the bottom substrate does not support submerged aquatic vegetation and is likely a poor source of other forage resources for sea turtle species. The NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions dated 23 March 2006, would be implemented during construction to minimize potential impacts to sea turtles.

Cumulative Impacts to the Kemp's Ridley Sea Turtle
Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact Kemp's Ridley sea turtles and their habitat. The increased turbidity could temporarily displace Kemp's Ridley sea turtles during construction activities, but the species could return when construction ceases. All water quality impacts would be temporary, short-term. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the Kemp's Ridley sea turtle.

3.2.5.5 Green Sea Turtle

3.2.5.5.1 Existing Conditions

The green sea turtle is federally listed as threatened. The turtle occurs in inshore and near-shore waters of the Gulf of Mexico. Green sea turtles primarily use three types of habitat: oceanic beaches (nesting), convergence zones in the open ocean, and benthic feeding grounds in coastal areas. Adult green sea turtles feed primarily on sea grasses and algae, which are limited within the study area. Therefore, green sea turtles are a rare visitor to the area.

3.2.5.5.2 Discussion of Impacts

IER #5 includes the installation of a breakwater in front of the 17th Street Canal Pump Station and a breakwater at the Orleans Avenue Canal Pump Station. Construction of these breakwaters would result in the permanent loss of 3.3 acres of potential sea turtle habitat.

Direct and Indirect Impacts to the Green Sea Turtle
NMFS has analyzed potential effects from the proposed projects in IER #5 and concluded that listed sea turtles are not likely to be adversely affected. NMFS considers the permanent loss of 3.3 acres of habitat due to construction of the breakwaters on the submerged substrate as having insignificant effects on sea turtles. The NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions date 23 March 2006, would be implemented during construction to minimize potential impacts to sea turtles.

Cumulative Impacts to the Green Sea Turtle
Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact green sea turtles and their habitat. The increased turbidity could temporarily displace green sea turtles during construction activities, but the species could return when construction ceases. All water quality impacts would be temporary, short-term. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the green sea turtle.

3.2.5.6 Loggerhead Sea Turtle

3.2.5.6.1 Existing Conditions

The loggerhead sea turtle is listed as threatened. Similar to the Kemp's Ridley seas turtle, the loggerhead sea turtle is not a full-time resident of the study area, but uses the estuaries as feeding and developmental habitat.

3.2.5.6.2 Discussion of Impacts

IER #5 includes the installation of a breakwater in front of the 17th Street Canal Pump Station and a breakwater at the Orleans Avenue Canal Pump Station. Construction of these breakwaters would result in the permanent loss of 3.3 acres of potential sea turtle habitat.

Direct and Indirect Impacts to the Loggerhead Sea Turtle

NMFS has analyzed potential effects from the proposed projects in IER #5 and concluded that listed sea turtles are not likely to be adversely affected. NMFS considers the permanent loss of 3.3 acres of habitat due to construction of the breakwaters on the submerged substrate as having insignificant effects on sea turtles. The NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions date 23 March 2006, would be implemented during construction to minimize potential impacts to sea turtles.

Cumulative Impacts to the Loggerhead Sea Turtle

Considered cumulatively with IERs #3, #4, #6, and #7, short-term increased runoff and turbidity from disturbed soils due to construction activities and dredging access channels in Lake Pontchartrain could temporarily impact loggerhead sea turtles and their habitat. The increased turbidity could temporarily displace loggerhead sea turtles during construction activities, but the species could return when construction ceases. All water quality impacts would be temporary, short-term. Implementing BMPs and SWPPPs would further minimize cumulative impacts from construction affecting the loggerhead sea turtle.

3.2.6 Essential Fish Habitat

3.2.6.1 Existing Conditions

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established a new requirement to describe and identify essential fish habitat (EFH) in each fishery management plan. This act sets forth a new mandate for the NMFS, regional fishery management councils (FMCs), and other Federal agencies to identify and protect important marine and anadromous fish habitat. The EFH provisions of the act support maintenance of sustainable fisheries, which is one of the overall management goals for the nation's marine resources.

As defined in the interim final rule (62 FR 66551), "Essential fish habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: 'Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and could include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle." Under this definition, Lake Pontchartrain would be classified as EFH, but the 17th Street, Orleans Avenue, and London Avenue Canals would not be classified as EFH. The three outfall canals flow into and are hydraulically connected to Lake Pontchartrain;

therefore, activities that take place within the outfall canals could impact EFH in Lake Pontchartrain.

Seven fish and invertebrates species that could be impacted by changes in EFH have been identified by the Gulf of Mexico Fishery Management Council (GMFMC) as managed species and have been found in Lake Pontchartrain. However, with regard to the proposed action, NMFS has narrowed this concern to three of those species: brown shrimp, white shrimp, and red drum (NMFS 2006 and NMFS 2007).

Brown shrimp, white shrimp, and red drum are listed as abundant, highly abundant, and common in Lake Pontchartrain (USGS 2008). EFH mapping in Lake Pontchartrain as a whole, and in the project area specifically, indicates the relative abundance of juveniles and adults for each these species during the various seasonal salinity regimes (table 4). While juveniles of the white and brown shrimp and both juveniles and adults of red drum can be found in some abundance, adults of the shrimp species are listed as rare. This rarity of adult shrimp could be due to their tendency to move offshore with maturation.

Table 4. EFH Mapping, Lake Pontchartrain

		Relative Abundance			
Species	**Life Stage**	**Low Salinity Season (Feb – April)**	**Increasing Salinity Season (May – July)**	**High Salinity Season (Aug – Oct)**	**Decreasing Salinity Season (Nov – Jan)**
White Shrimp (*Penaeus setiferus*)	juvenile	common	abundant	abundant	abundant
	adult	rare	rare	common (London Avenue Canal); rare (17th Street and Orleans Avenue Canals)	rare
Brown Shrimp (*Penaeus aztecus*)	juveniles	abundant	highly abundant	abundant	common
	adult	rare	rare	rare	rare
Red Drum (*Sciaenops ocellatus*)	juvenile	common	common	common	common
	adult	common	common	common	common

Source: NMFS 2006

3.2.6.2 Discussion of Impacts

3.2.6.2.1 No Action Alternative

Direct and Indirect Impacts to EFH

Impacts to EFH would occur primarily in Lake Pontchartrain because the outfall canals are not classified as EFH. Direct impacts would include temporary impacts to water turbidity, DO, and BOD_5. The increased turbidity could temporarily displace fish species, but they would be expected to return after construction has ceased or the storm event passes. Construction BMPs and a SWPPP would be employed to decrease erosion and runoff from disturbed soils and to prevent leakages and spills from construction-related equipment and activities from impacting water quality that could indirectly impact the EFH. No permanent or indirect EFH impacts would be expected from the no action alternative.

Cumulative Impacts to EFH
Direct impacts would include temporary impacts to water turbidity, DO, and BOD_5. These impacts could occur during construction associated with Lake Pontchartrain levee improvement projects (IERs #3, #4, #6, and #7). The increased turbidity could temporarily displace fish species, but they would be expected to return after construction has ceased or the storm event passes.

3.2.6.2.2 *Proposed Action*

17th Street Canal

Direct and Indirect Impacts to EFH
Direct impacts to EFH would result from construction activities and storm events but would be expected to be temporary in both instances. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction activities and during storm events when the pump station is pumping water from the outfall canal into the lake. The increased turbidity could temporarily displace fish species, but they would be expected to return after the storm event passes.

There could be direct impacts to EFH as a result of the breakwater structure that could be constructed as part of erosion protection of the new pump station. The breakwater could permanently result in a loss of approximately 1.43 acres of open water/mud bottom habitat in the lake. The breakwater could result in a beneficial indirect impact by providing substrate for sessile organisms that provide food for other aquatic species.

Cumulative Impacts to EFH
The cumulative impacts would be similar to the impacts described in section 3.2.6.2.1.

Orleans Avenue Canal

Direct and Indirect Impacts to EFH
Direct impacts to EFH would result from construction activities and storm events but would be expected to be temporary in both instances. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction activities and during storm events when the pump station is pumping water from the outfall canal into the lake. The increased turbidity could temporarily displace fish species, but they would be expected to return after the storm event passes.

There could be direct impacts to EFH as a result of the breakwater structure that would be constructed as part of erosion protection of the new pump station. The breakwater could permanently result in a loss of approximately 1.8 acres of open water/mud bottom habitat in the lake. The breakwater could result in a beneficial indirect impact by providing substrate for sessile organisms that provide food for other aquatic species.

Cumulative Impacts to EFH
The cumulative impacts would be similar to the impacts described in section 3.2.6.2.1.

London Avenue Canal

Direct and Indirect Impacts to EFH
Direct impacts to EFH would result from construction activities and storm events but would be expected to be temporary in both instances. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction activities and during storm events when the pump station is pumping water from the outfall canal into the lake. The increased turbidity could temporarily displace fish species, but they would be expected to return after the storm event passes.

Cumulative Impacts to EFH
The cumulative impacts would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.3 *Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts*

17th Street Canal

Layout Alternative B
Direct, Indirect, and Cumulative Impacts to EFH
The direct, indirect, and cumulative impacts for this layout alternative would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.6.2.2.

Layout Alternative C
Direct Impacts to EFH
Direct impacts to EFH would result from construction activities and storm events but would be expected to be temporary in both instances. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction activities and during storm events when the pump station is pumping water from the outfall canal into the lake. The increased turbidity could temporarily displace fish species, but they would be expected to return after the storm event passes.

Indirect Impacts to EFH
No indirect impacts would be expected for this layout alternative.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1.

Orleans Avenue Canal

Layout Alternative A
Direct and Indirect Impacts to EFH
The direct and indirect impacts for this alternative would be similar to the impacts described for Orleans Avenue Canal proposed action, except depending on its exact placement on the water bottom, the breakwater and pump station could permanently result in a loss of approximately 4.5 acres of open water/mud bottom habitat in the lake.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative C
Direct Impacts to EFH
Direct impacts to EFH would result from construction activities and storm events but would be expected to be temporary in both instances. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction activities and during storm events when the pump station is pumping water from the outfall canal into the lake. The increased turbidity could temporarily displace fish species, but they would be expected to return after the storm event passes.

Indirect Impacts to EFH
No indirect impacts would be expected for this layout alternative.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1

Layout Alternative D
Direct and Indirect Impacts to EFH
Direct and indirect impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative C.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1.

London Avenue Canal
Layout Alternative A
Direct and Indirect Impacts to EFH
Direct and indirect impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternative A.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative B
Direct and Indirect Impacts to EFH
The direct and indirect impacts for this alternative would be similar to the impacts described for Orleans Avenue Canal proposed action, except depending on its exact placement on the water bottom, the breakwater could permanently result in a loss of approximately 3 acres of open water/mud bottom habitat in the lake.

Cumulative Impacts to EFH
The cumulative impacts for this layout alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative D
Direct and Indirect Impacts to EFH
Direct and indirect impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.6.2.2.

Cumulative Impacts to EFH
The cumulative impacts for these layout alternatives would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative E
Direct and Indirect Impacts to EFH
Direct and indirect impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.6.2.2.

Cumulative Impacts to EFH
The cumulative impacts for these layout alternatives would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.6.2.2 and 3.2.6.2.3.

3.2.6.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Layout Alternatives A and B

Direct and Indirect Impacts to EFH

The direct and indirect impacts for these layout alternatives would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.6.2.2.

Cumulative Impacts to EFH

The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative C

Direct and Indirect Impacts to EFH

The direct and indirect impacts for this layout alternative would be similar to the impacts described for the 17th Street Canal layout alternative C in section 3.2.6.2.3.

Cumulative Impacts to EFH

The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

Orleans Avenue Canal

Layout Alternatives A, C, and D

Direct and Indirect Impacts to EFH

The direct and indirect impacts for these layout alternatives would be similar to the impacts described for the Orleans Avenue Canal layout alternatives A, C, and D in section 3.2.6.2.3.

Cumulative Impacts to EFH

The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative B

Direct and Indirect Impacts to EFH

The direct and indirect impacts for this layout alternative would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.6.2.2.

Cumulative Impacts to EFH

The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

London Avenue Canal

Layout Alternatives A, B, D, and E

Direct and Indirect Impacts to EFH

The direct and indirect impacts for these layout alternatives would be similar to the impacts described for the London Avenue Canal layout alternatives A, B, D, and E in section 3.2.6.2.3.

Cumulative Impacts to EFH
The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

Layout Alternative C
Direct and Indirect Impacts
The direct and indirect impacts for this layout alternative would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.6.2.2.

Cumulative Impacts to EFH
The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.6 Concrete-Lined Canals

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal
Direct Impacts to EFH
Direct impacts to EFH could result from concrete-lining construction activities but would be expected to be temporary. Direct temporary impacts to water turbidity, DO, and BOD_5 could occur during construction. The increased turbidity could temporarily displace fish species, but they would be expected to return after construction has ceased. Direct impacts to EFH after construction has ceased would not be expected.

Indirect Impacts to EFH
Indirect impacts to EFH would not be expected under this alternative.

Cumulative Impacts to EFH
The cumulative impacts for the proposed action would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.7 Replace I-walls with T-walls

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal
Direct and Indirect Impacts to EFH
The direct and indirect impacts to EFH for this alternative would be similar to the impacts described in section 3.2.6.2.6.

Cumulative Impacts to EFH
The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.8 ICS Gates with Parallel Protection

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal
Direct and Indirect Impacts to EFH
The direct and indirect impacts to EFH for this alternative would be similar to the impacts described in section 3.2.6.2.6.

Cumulative Impacts to EFH
The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

3.2.6.2.9 Upgrade ICS to Permanent System

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal

Direct and Indirect Impacts to EFH
Direct and indirect impacts would be similar as discussed for the 17th Street Canal proposed action and layout alternative C on Orleans and London Avenue Canal.

Cumulative Impacts to EFH
The cumulative impacts for this alternative would be similar to the impacts described in section 3.2.6.2.1.

3.2.7 Cultural Resources

3.2.7.1 Existing Conditions

Records for the greater metropolitan New Orleans area on file at the Louisiana Division of Archaeology and the CEMVN indicate there are numerous previously recorded archaeological sites and historic properties located within the IER #5 study area. Known prehistoric shell midden sites are primarily located on the relatively high natural levee areas adjacent to the Mississippi River, the Lake Pontchartrain shoreline, and along smaller waterways such as Bayou St. John and the higher ground along Metairie Ridge. Similarly, historic period archaeological sites and structures in the city including forts, plantations, farmsteads, and cemeteries; residential, commercial, and industrial districts; and river and lake port facilities were initially developed in these same areas. Later development expanded into drained back swamp and land-filled locations and along canal waterways and railroad terminals in the city. Historic period watercraft are recorded in Lake Pontchartrain as well as bayou and river channels in the region.

Due to the high potential for cultural resources, the CEMVN contracted R. Christopher Goodwin and Associates, Inc. to conduct a reconnaissance level cultural resources investigation of the entire IER #5 study area (Heller et al. 2008). The study covered the entire length of all proposed project alternatives within a 1,000 foot wide area measuring 500 feet on both sides of the alignment center line. Researchers evaluated results of previous cultural resources investigations along with soil data and field reconnaissance information in order to identify high potential areas for cultural resources and to make recommendations for Phase I field investigations. Limited Phase I field investigations were conducted in one area with negative results. A general assessment of historic structures in the study area was also conducted to identify individual structures and historic districts that may be eligible for, or that are listed on, the National Register of Historic Places (NRHP). In addition, a remote sensing survey was conducted at the mouths of the 17th Street, Orleans Avenue, and London Avenue Canals for a distance of 1,250 feet north into Lake Pontchartrain to identify targets exhibiting submerged cultural resources characteristics. Information regarding specific cultural resources identified in each alternative alignment is provided in the impacts discussion below.

The CEMVN held meetings with the State Historic Preservation Office (SHPO) staff and Tribal governments to discuss the emergency alternative arrangements approved for NEPA project review and the development of a Programmatic Agreement (PA) to tailor the Section 106 consultation process under the alternative arrangements. The CEMVN formally initiated Section 106 consultation for the LPV Hurricane Protection Project (100-year), which includes IER #5, in a letter dated 9 April 2007 and emphasized that standard Section 106 consultation procedures would be followed during PA development. A public meeting was held on 18 July 2007 to discuss the working draft PA.

In letters to the SHPO and Indian Tribes dated 22 February 2008, the CEMVN provided project documentation, an evaluation of cultural resources potential in the project area, and the results of

Phase 1 investigations, and found that the proposed actions would have no impact on cultural resources. The SHPO concurred with our "no historic properties affected" finding in a letter dated 17 March 2008. Indian Tribes did not respond to our requests for comment. Section 106 consultation for the proposed project actions has been concluded. However, if any unrecorded cultural resources are determined to exist within the proposed project action boundaries, then no work will proceed in the area containing these cultural resources until a CEMVN archaeologist has been notified and final coordination with the SHPO and Indian Tribes has been completed. The following discussion of impacts is based on the information provided in the cultural resources investigation management summary prepared by R. Christopher Goodwin and Associates, Inc. (Heller et al. 2008).

3.2.7.2 Discussion of Impacts

3.2.7.2.1 No Action Alternative

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Under the no action alternative, direct, indirect, or cumulative impacts to cultural resources would not be expected. Activities performed under the no action alternative would impact previously impacted areas; therefore, impacts to known cultural resources would not be expected.

3.2.7.2.2 Proposed Action

17th Street Canal

Direct Impacts to Cultural Resources
The proposed action for the 17th Street Canal would have no direct impact on cultural resources. Research indicates that the project area is built land associated with the construction of the USCG Station and the Southern Yacht Club. Prior to land-filling during the construction of these facilities, the Lake Pontchartrain shoreline once extended east-west across the very southern end of the project area possibly north of the Hammond Highway. One previously recorded archaeological site (Site 16JE40) is reportedly located on this buried shoreline in or near the USCG Station facility. Limited Phase 1 field investigations in this area did not identify any intact shoreline deposits or remnants of Site 16JE40 (Heller et al. 2008). The entire 17th Street Canal project area has been subjected to severe ground disturbing activities associated with major land-filling episodes, harbor and levee construction and canal excavation. The likelihood for the presence of intact and undisturbed terrestrial archaeological deposits is considered extremely minimal.

Three previously reported shipwrecks have been recorded within 1,000 feet of the 17th Street Canal project area. None of these shipwrecks would be impacted by proposed construction. A submerged remote sensing survey was recently conducted at the mouth of the 17th Street Canal and ten magnetic anomalies were identified (Heller et al. 2008). These anomalies appear to represent debris associated with nearby piers and platforms destroyed by Hurricane Katrina and do not exhibit cultural resources characteristics. Analysis of sub-bottom profile data showed no clearly defined shell middens, geomorphic features with potential to contain significant submerged prehistoric cultural resources, or objects indicative of submerged cultural resources in the 17th Street Canal project area.

Relatively modern residential condominiums and commercial structures are located in the 17th Street Canal project area and are not considered eligible for listing on the NRHP. One NRHP listed property - the Metairie Cemetery, and one eligible NRHP property – SWBNO PS #6, are located well outside of the project area and will not be impacted by proposed construction.

Indirect Impacts to Cultural Resources
Implementation of the proposed action for the 17th Street Canal would provide an added level of flood protection to known and unknown cultural resources located outside of the project area by reducing the damage caused by flood events.

Cumulative Impacts to Cultural Resources
Implementation of the proposed action for the 17th Street Canal would have beneficial cumulative impacts on cultural resources in the greater New Orleans metropolitan area. The combined effects from construction of the multiple projects underway and planned for the Lake Pontchartrain Hurricane Protection System would reduce flood risk and storm damage to archaeological sites, individual historic properties, engineering structures and historic districts.

Orleans Avenue Canal

Direct Impacts to Cultural Resources
Implementation of the proposed action for the Orleans Avenue Canal would have no direct impact on cultural resources. The entire project area contains built land that was constructed in the late 1920s. The likelihood for the presence of archaeological sites is very minimal. Researchers determined that no existing or potential NRHP historic districts lie within the immediate area and no historic structures or features are present in the project area (Heller et al. 2008). SWBNO PS #7, which is eligible for listing on the NRHP, is located south of the project area at Taylor Avenue and will not be impacted by proposed construction. City Park, also located south of the project area, contains many Works Progress Administration components and one property already listed on the NRHP: New Orleans City Park Carousel and Pavilion. City Park would not be impacted by proposed construction. No previously recorded archaeological sites or shipwrecks are located within 1000 feet of the project area. However, one potential submerged cultural resource was identified approximately 800 feet east of the project area during recent remote sensing survey for IER #4. The proposed action does not extend into Lake Pontchartrain and this potential cultural resource will not be impacted by proposed construction.

Indirect and Cumulative Impacts to Cultural Resources
Indirect and cumulative impacts for the proposed action at the Orleans Avenue Canal would be similar to the impacts described for the 17th Street Canal proposed action.

London Avenue Canal

Direct Impacts to Cultural Resources
The proposed action for the London Avenue Canal would have no direct impact on cultural resources. The project area is located entirely on built land constructed in the 1920s. The potential for intact and undisturbed archaeological sites is considered extremely minimal. There are no historic structures or features identified in the project area. Dillard University, nominated to the NRHP in 2003, and several individual historic properties that may be eligible for listing on the NRHP, including SWBNO PS #3 and the Mount Olive Cemetery, are located south of the project area and will not be impacted by the proposed action. The London Avenue Canal proposed action does not extend into Lake Pontchartrain and submerged cultural resources will not be impacted.

Indirect and Cumulative Impacts to Cultural Resources
Indirect and cumulative impacts for the proposed action at the London Avenue Canal would be similar to the impacts described for the 17th Street Canal proposed action.

3.2.7.2.3 *Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts*

17th Street Canal

Direct Impacts to Cultural Resources

Direct impacts to cultural resources for layout alternatives B and C would be similar as those described for the 17th Street Canal proposed action. The project area located north of Hammond Highway for both alternatives is built land associated with the construction of the USCG Station and the Southern Yacht Club where the likelihood for intact and undisturbed cultural resources is considered extremely minimal. Prior to urban development, most of the project area south of Hammond Highway for both alternatives consisted of cypress swamp. Because cypress swampland is frequently inundated, the potential for identifying archaeological sites or historic structures that predate modern drainage of the region is also very low. No submerged cultural resources were identified in the USCG Basin or Lake Pontchartrain portions of the project area for these two alternatives. The relatively modern residential and commercial structures located in the layout alternative areas are not considered eligible for listing on the NRHP.

Indirect and Cumulative Impacts to Cultural Resources

Indirect and cumulative impacts for the 17th Street Canal layout alternatives B and C would be similar to the impacts described for the 17th Street Canal proposed action.

Orleans Avenue Canal

Direct Impacts to Cultural Resources

Direct impacts to cultural resources for layout alternatives A, C, and D would be similar to those discussed for the Orleans Avenue Canal proposed action. The entire project areas for layout alternatives A and C, and the majority of layout alternative D are located on built land that was constructed in the late 1920s. The likelihood for archaeological sites in these locations is considered extremely minimal. No potential NRHP historic districts, historic structures, or features were identified in any of the layout alternatives (Heller et al. 2008). Researchers conducted a remote sensing survey in the portions of layout alternatives A and B that extend into Lake Pontchartrain and found no anomalies that exhibited shipwreck characteristics. One potential submerged cultural resource was identified approximately 800 feet east of the project area during recent remote sensing survey for IER #4 and would not be impacted.

Indirect and Cumulative Impacts to Cultural Resources

Indirect and cumulative impacts for the Orleans Avenue Canal layout alternatives A, C, and D would be similar to the impacts described above for the Orleans Avenue Canal proposed action.

London Avenue Canal

Direct Impacts to Cultural Resources

Direct impacts for layout alternatives A, B, D, and E would be similar as those discussed for the London Avenue Canal proposed action. The alternative layout areas are located entirely on built land constructed in the 1920s. The potential for intact and undisturbed archaeological sites in these locations is considered extremely minimal and no historic structures or features were identified. NRHP listed or eligible properties in the project vicinity, including Dillard University, SWBNO PS #3 and the Mount Olive Cemetery, would not be impacted by alternative layouts. Researchers conducted remote sensing survey in the portions of layout alternatives A and B that extend into Lake Pontchartrain and found no anomalies that exhibited shipwreck characteristics.

Indirect and Cumulative Impacts to Cultural Resources

Indirect and cumulative impacts for the London Avenue Canal layout alternatives A, B, D, and E would be similar to the impacts described above for the London Avenue Canal proposed action.

3.2.7.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.7.2.2 and 3.2.7.2.3.

3.2.7.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts for layout alternatives A, B, and C would be similar to the impacts described for the 17th Street Canal proposed action in sections 3.2.7.2.2 and 3.2.7.2.3.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts for layout alternatives A, B, C, and D would be similar to the impacts described for the Orleans Avenue Canal proposed action in sections 3.2.7.2.2 and 3.2.7.2.3.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts for layout alternatives A, B, C, D, and E would be similar to the impacts described for the London Avenue Canal proposed action in sections 3.2.7.2.2 and 3.2.7.2.3.

3.2.7.2.6 Parallel Protection Alternatives

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts would be similar for the parallel protection alternatives including, Concrete-Lined Canals, Replace I-Walls with T-Walls, and ICS Gates with Parallel Protection.

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal

Direct, Indirect and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts to cultural resources would be similar to those discussed for the proposed action at each outfall canal in sections 3.2.7.2.2 and 3.2.7.2.3.

3.2.7.2.7 Upgrade ICS to Permanent System

17th Street Canal, Orleans Avenue Canal, and London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Cultural Resources
Direct, indirect, and cumulative impacts to cultural resources would be similar to those discussed for the proposed action at each outfall canal in sections 3.2.7.2.2 and 3.2.7.2.3.

3.2.8 Recreational Resources

3.2.8.1 Existing Conditions

3.2.8.1.1 17th Street Canal

Recreational opportunities within the vicinity of the 17th Street Canal include boating, fishing, picnicking, walking/running, bicycling, birdwatching, and open green space used for playfields.

Figure 35. Recreational Resources

Designated parks and recreational areas are shown in figure 35. Green space along the canal is used for recreation such as jogging and walking. Orleans Marina and Municipal Yacht Harbor are directly east of the mouth of the canal and provide a sheltered harbor for resident and transient vessels. Amenities at the marina include security, a pump-out facility, and laundry facilities.

West End Park and the Coconut Beach Volleyball Complex (CBVC) are on the east side of the canal mouth in Orleans Parish. The volleyball complex offers a unique recreational opportunity not otherwise available in the region, and recently hosted a regional qualifying event in July 2007 for the U.S. Open of Beach Volleyball. The CBVC leases its land from the City of New Orleans and pays taxes and revenue to the city, which is then used to maintain West End Park. A representative of CBVC stated that 316 teams play per week, attracting around 2,600 people to its 13 outdoor-lighted courts. Construction is underway to increase the total number of courts to 22 and management is discussing plans to add an indoor facility in the area.

The Regional Planning Commission (RPC) has prepared a master plan of the West End area adjacent to and surrounding the marina and harbor facilities (RPC 2006). This plan includes mix use of the area for recreation, education, retail, residence and commercial.

Jefferson Parish has two playgrounds west of the 17th Street Canal—Lakeshore Playground and Wally Pontiff Jr. Park. Bucktown Recreation Area and Harbor, along with a USCG patrol station, are directly west of the mouth of the canal. The Bucktown area of the lakefront was heavily damaged from Hurricane Katrina. In late 2007, the remainder of a commercial fishing fleet returned to the Bucktown Harbor. In March of 2008, the Louisiana Recovery Authority (LRA) announced that $2.1 million in grants would be available to rebuild the historic marina. In addition, Jefferson Parish contracted with Burk-Kleinpeter, Inc. to prepare a master plan for the Bucktown Harbor Marina Complex, which includes a calm-water harbor for a small-craft marina.

3.2.8.1.2 Orleans Avenue Canal

Recreational opportunities in the vicinity of the Orleans Avenue Canal consist mainly of parks and green space (figure 35). Lakeshore Park runs parallel to the shoreline of Lake Pontchartrain, directly east and west of the mouth of the canal and Tourmaline Park is on the west side of the canal between Lakeshore Park and Robert E. Lee Boulevard. Parks on the east side of the canal between Lakeshore Park and Robert E. Lee Boulevard include Foliage Park, Breeze Park, Ozone Park, Zephyr Park, and Floral Park. Most of the parks near the canal are in residential sections of the Lakeview neighborhood. The green space along the canal is used for recreational opportunities such as jogging and walking.

A major landmark between the Orleans Avenue Canal and Bayou St. John is City Park. The 1,500-acre park was founded in 1854 and is one of the largest and oldest urban parks in the nation. It contains a golf course, the New Orleans Museum of Art, Besthoff Sculpture Garden, New Orleans Botanical Garden, Tad Gormley Stadium, Storyland, Equest Farms horse stables, an amusement park, tennis courts, and a historic carousel and pavilion. The park stretches from City Park Avenue on the south, Wisner Boulevard on the east, Robert E. Lee Boulevard on the north, and Orleans Avenue and the Orleans Avenue Canal on the west.

3.2.8.1.3 London Avenue Canal

Recreational opportunities in the vicinity of the London Avenue Canal consist mainly of parks and green space (figure 35). Lakeshore Park runs parallel to the shoreline of Lake Pontchartrain, directly east and west of the mouth of the canal. Other parks adjacent to the canal include Carlson Park and Pratt Park on the west side. Numerous other playgrounds and parks are in the

residential sections of the neighborhoods in the vicinity of the canal. The green space along the canal is also used for recreational opportunities such as jogging and walking.

3.2.8.1.4 Lake Pontchartrain

Several recreational opportunities exist near or around Lake Pontchartrain, including boating, fishing, picnicking, walking/running, bicycling, bird-watching, and open green space used for playfields. Beaches near Lake Pontchartrain include Old Beach, Lincoln Beach, and Pontchartrain Beach, all which are located east of the outfall canals.

3.2.8.2 Discussion of Impacts

3.2.8.2.1 No Action Alternative

Direct Impacts to Recreation Resources

Short-term impacts during construction could affect recreational resources in the vicinity of the canals and could cause the closure of some facilities from use during construction activities. Any disruptions of recreation resources would be temporary and affected only during construction activities.

Indirect Impacts to Recreation Resources

Indirect impacts to the recreational facilities would consist of transportation to and from the facilities, in the form of temporary road closures during construction. There could be temporary, indirect impacts to fishing opportunities, mainly at the mouths of the canals, as local fishing areas could become inaccessible during construction. Long-term, indirect impacts to recreational resources would not be expected.

Cumulative Impacts to Recreation Resources

Under the no action alternative, authorized levee raises are expected to have minimal impacts on recreation resources. Impacts to fishing would be expected to be short-term and would occur during construction of the project. Projects under CIAP and CWPPRA that stabilize erosion, build wetlands, and improving water quality by diverting freshwater could improve recreation fishing in the project area. The no action alternative would not impede these benefits because fishery resource impacts would be temporary and cease after construction completion. Raising existing levees to authorized heights would have beneficial impacts to recreation facilities. Some recreational facilities could remain vulnerable to the effects of 100-year storms.

3.2.8.2.2 Proposed Action

17th Street Canal

Direct Impacts to Recreation Resources

There is a potential for long-term impacts on the recreational facilities within the footprint of the proposed action, but optimization of plans could avoid and minimize impacts where possible. The proposed footprint would require ROW acquisitions of approximately 32 acres. West End Park and the CBVC could be directly impacted because they are adjacent to or within the footprint of the proposed action. CBVC could lose some or all of their existing sand-volleyball courts. If the CBVC is permanently acquired during the proposed action, the revenue generated by leasing the land could be lost, and the city would have to find alternative funding sources to maintain West End Park.

Permanent ROW could also impact Bucktown Harbor and future expansion plans. The temporary construction easement could impact portions of West End Park and the Bucktown Harbor.

Indirect Impacts to Recreation Resources
Indirect impacts for the recreational facilities would mainly be effects to transportation to and from the facilities in the form of temporary road closures during construction. Short-term impacts during construction would affect the Orleans Marina, Municipal Yacht Harbor and other recreational resources in the vicinity of the canal and could restrict some of the facilities from use during construction activities. Some recreational resources could be required for construction easements if directly adjacent to the construction site and would not be available for recreational use.

Cumulative Impacts to Recreation Resources
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 (depending on actual design) 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 temporarily, which would impact recreational fishing opportunities.

<u>Orleans Avenue Canal</u>

Direct Impacts to Recreation Resources
Under this layout alternative, recreational resources would be directly impacted. The footprint would require ROW acquisition of 21 acres of green space along the canal levee and portions of Lakeshore Park. This layout alternative includes picnic facilities, pathways, green space and shoreline access and fishing. An additional 5 acres of Lakeshore Park on both sides of the canal would be impacted temporarily by construction easements; impacted features include picnic facilities, pathways, green space and shoreline access and fishing.

Short-term impacts during construction could affect active and passive use of open space in the vicinity of the canal and could cause the closure of this area during construction activities. Some recreational resources could be required for construction easements if directly adjacent to the site.

Indirect Impacts to Recreation Resources
Indirect, short-term impacts for the recreational facilities would primarily include transportation to and from the facilities in the form of temporary road closures during construction. Long-term, indirect impacts would not be expected.

Cumulative Impacts to Recreation Resources
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

<u>London Avenue Canal</u>

Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of 21 acres of green space on both sides of the canal, which includes green space and pathways. Temporary easements would impact an additional 6 acres, including use of green space on the west side and portions of UNO on the east side. Short-term impacts during construction could affect recreational resources in the vicinity of the canal and could cause the closure of these areas during construction activities.

Indirect Impacts to Recreation Resources
Indirect, short-term impacts for the recreational facilities would mainly affect transportation to and from the facilities in the form of temporary road closures during construction. Long-term impacts would not be expected.

Cumulative Impacts to Recreation Resources
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

3.2.8.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Layout Alternative B
Direct Impacts to Recreation Resources
Direct impacts for this layout alternative would primarily be on the west side of the canal. Permanent ROW acquisition, of approximately 34 acres, includes portions of the Bucktown Harbor and recreation area in Jefferson Parish. This area is used by fishing fleets and also includes a USCG patrol station. Future development of this site has been proposed by the parish. Other direct impacts to recreation within the footprint include the pathway along the west side floodwall to the south of Hammond Highway and could include a portion of the CBVC. Short-term impacts during construction could affect recreational resources in the vicinity of the west and east side canal and could cause the temporary closure of the Orleans Marina, Municipal Yacht Harbor or West End Park during construction activities.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.8.2.2.

Layout Alternative C
Direct Impacts to Recreation Resources
Direct impacts for this layout alternative would require ROW acquisitions of approximately 17 acres, primarily on the west side of the canal and includes walking/jogging activities on a pathway that runs along the floodwall. Short-term impacts during construction could affect recreational resources in the vicinity of the east and west side canal and could cause the closure of some facilities from use during construction activities. Facilities near the project area that could be impacted include the Orleans Marina, Municipal Yacht Harbor, West End Park, or the Coconut Beach Volleyball Complex.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.8.2.2.

Orleans Avenue Canal

Layout Alternative A
Direct Impacts to Recreation Resources
Under this layout alternative, recreational resources would be directly impacted. The footprint would require ROW acquisition of 28 acres of green space along the canal levee and portions of the Lakeshore Park, which could impact picnic facilities, pathways, green space, shoreline access and fishing. An additional 5 acres of Lakeshore Park on both sides of the canal would be temporarily impacted by construction easements. Impacted features could include picnic facilities, pathways, green space and shoreline access and fishing.

Short-term impacts during construction could affect active and passive use of open space in the vicinity of the canal and could cause the closure of this area during construction activities. Some recreational resources could be required for construction easements if directly adjacent to the site.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.8.2.2.

Layout Alternative C
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of approximately 19 acres along Lakeshore Park and the east and west sides of the canal. There is a potential for long-term impacts to the recreational resources within the footprint of the proposed action, resulting mostly in the loss of green space for walking, running, picnicking, and playfields. Short-term impacts, which would be similar in nature to long-term impacts, during construction, could affect use of green space in the vicinity of the canal.

Indirect Impacts to Recreation Resources
Indirect impacts for the recreational facilities would primarily include disruption of transportation to and from recreational facilities in the form of temporary road closures during construction. Parks near or adjacent to the project area that could be indirectly impacted include, Lakeshore Park, Carlson Park, and Pratt Park.

Cumulative Impacts to Recreation Resources
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.8.2.2.

Layout Alternative D
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of 35 acres of green space along the canal levee, including portions of City Park. This area primarily consists of pathways, green space and shoreline access, including a courtesy dock in the canal. Short-term impacts during construction could affect active and passive use of open-space in the vicinity of the canal and could cause the closure of this area during construction activities. Some recreational resources could be required for construction easements if directly adjacent to the site.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.8.2.2.

London Avenue Canal

Layout Alternative A
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of 28 acres of green space along the canal levee and portions of the Lakefront Park. This includes picnic facilities, pathways, green space and shoreline access and fishing. An additional 5 acres of Lakeshore Park on both sides of the canal would be impacted temporarily by construction easements; impacted features include picnic facilities, pathways, green space and shoreline access and fishing. Some recreational resources could be required for construction easements if directly adjacent to the site.

Indirect Impacts to Recreation Resources
Indirect impacts for the recreational facilities would mainly affect transportation to and from the facilities in the form of temporary road closures during construction. Long-term, indirect impacts would not be expected.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.8.2.2.

Layout Alternative B
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of 25 acres of green space along the canal levee and portions of Lakeshore Park. This includes picnic facilities, pathways, green space and shoreline access and fishing. An additional 6 acres of Lakeshore Park on the east and west side of the canal, and on the west side to the south of Lakeshore Drive would be temporarily impacted by construction easements; impacted features include picnic facilities, pathways, green space and shoreline access.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.8.2.2.

Layout Alternative D
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of 31 acres on both sides of the canal, including green space and pathways on the east and west side of the canal. Temporary easements of 3 acres would impact use of green space on the west side of the canal. Short-term impacts during construction could affect use of green space in the vicinity of the canal and could cause the closure of these areas during construction activities.

Indirect and Cumulative Impacts to Recreation Resources
Indirect and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.8.2.2.

Layout Alternative E
Direct Impacts to Recreation Resources
This layout alternative would require ROW acquisition of approximately 26 acres along Lakeshore Park and the east and west sides of the canal. There is a potential for long-term impacts to the recreational resources within the footprint of the proposed action, consisting mostly in the loss of green space for walking, running, picnicking, and playfields. Short-term impacts during construction could affect use of green space in the vicinity of the canal.

Indirect Impacts to Recreation Resources
Indirect impacts for the recreational facilities would primarily include disruption of transportation to and from recreational facilities in the form of temporary road closures during construction. Parks near or adjacent to the project area that could be indirectly impacted include, Lakeshore Park, Carlson Park, and Pratt Park.

Cumulative Impacts to Recreation Resources
Cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.8.2.2.

3.2.8.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.8.2.2 and 3.2.8.2.3.

3.2.8.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts for layout alternative A would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.8.2.2, with one exception. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

Layout Alternatives B and C

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts for layout alternatives B and C would be similar to those discussed for the 17th Street Canal in section 3.2.8.2.3, with the exception that an increase in acquisition of ROW could impact a larger area. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

Orleans Avenue Canal

Layout Alternatives A, C, and D

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal layout alternatives A, C, and D in section 3.2.8.2.3, with the exception that an increase in acquisition of ROW could impact a larger area. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts for layout alternative B would be similar as discussed for the Orleans Avenue Canal proposed action in section 3.2.8.2.2, with the exception that an increase in acquisition of ROW could impact a larger area. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

London Avenue Canal

Layout Alternatives A, B, D, and E

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal layout alternatives A, B, D, and E in section 3.2.8.2.3, with the exception that an increase in acquisition of ROW could impact a larger area. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

Layout Alternative C

Direct, Indirect, and Cumulative Impacts to Recreation Resources

The direct, indirect, and cumulative impacts for layout alternative C would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.8.2.2, with the

exception that an increase in acquisition of ROW could impact a larger area. Under this alternative, the green space along the entire length of the canal would be temporarily impacted as the canal is deepened.

3.2.8.2.6 Concrete-Lined Canals

17th Street Canal

Direct Impacts to Recreation Resources
Short-term impacts during construction could affect recreational resources in the vicinity of the canal and could cause the closure of some facilities during construction activities. Any disruptions of recreation resources would be temporary and affected only during construction activities. Facilities near or adjacent to the project area that could be impacted during construction include the Orleans Marina and Municipal Yacht Club, West End Park, and the CBVC, which are all on the east side of 17th Street Canal, and Bucktown Harbor on the west side of the canal.

Indirect Impacts to Recreation Resources
Indirect impacts to the recreational facilities would consist of transportation to and from the facilities, in the form of temporary road closures during construction. Long-term, indirect impacts to recreational resources would not be expected.

Cumulative Impacts to Recreation Resources
The cumulative impacts of concrete-lining the canals would be similar to the impacts described for 17th Street Canal proposed action in section 3.2.8.2.2.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Recreation Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal Concrete-Lined Canals alternative; however, facilities near or adjacent to the project area that could be impacted include Lakeshore Park, Tourmaline Park, Foliage Park, Breeze Park, Ozone Park, Zephyr Park, Floral Park, and City Park.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Recreation Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal Concrete-Lined Canals alternative; however, facilities near or adjacent to the project area that could be temporarily impacted include Lakeshore Park, Carlson Park, and Pratt Park.

3.2.8.2.7 Replace I-walls with T-walls

Direct, Indirect, and Cumulative Impacts to Recreation Resources
The direct, indirect, and cumulative impacts for this alternative would be similar for each canal to the impacts described in section 3.2.8.2.1 because the footprint for this alternative would remain within the confines of the existing canals' ROW.

3.2.8.2.8 ICS Gates with Parallel Protection

Direct, Indirect, and Cumulative Impacts to Recreation Resources
The direct, indirect, and cumulative impacts for this alternative would be similar for each canal to the impacts described in section 3.2.8.2.6 because the footprint for this alternative would remain within the confines of the existing canals' ROW.

3.2.8.2.9 Upgrade ICS to Permanent System

17th Street Canal

Direct Impacts to Recreation Resources
Recreational resources would not be directly impacted above what was previously impacted by the construction of the ICS under this alternative because the footprint would remain within the confines of the existing ROW and ICS. Construction of the ICS temporarily impacted the green space along the canal in the ROW, which would become permanent under this alternative.

Short-term direct impacts during construction could affect recreational resources in the vicinity of the canal and could cause the closure of some facilities during construction activities. Some recreational resources could be required for construction easements if directly adjacent to the site. Facilities that could be impacted during construction include the Orleans Marina and Municipal Yacht Club, West End Park, and the CBVC, which are on the east side of 17th Street Canal, and Bucktown Harbor on the west side of the canal.

Indirect Impacts to Recreation Resources
Indirect impacts to the recreational facilities would consist of transportation to and from the facilities in the form of temporary road closures during construction. The air and noise quality of recreational resources adjacent to or in the vicinity of the construction site could also be impacted by temporary construction activities. Long-term impacts would not be expected.

Cumulative Impacts to Recreation Resources
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.8.2.2.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Recreation Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal above; however, the facilities near or adjacent to the project area that could be impacted during construction include Lakeshore Park, Tourmaline Park, Foliage Park, Breeze Park, Ozone Park, Zephyr Park, Floral Park, and City Park.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Recreation Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal above; however, the facilities near or adjacent to the project area that could be impacted include Lakeshore Park, Carlson Park, and Pratt Park.

3.2.9 Noise

3.2.9.1 Overview and Regulatory Requirements

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities part of everyday life, such as construction or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency.

The human ear responds differently to different frequencies. *A-weighing*, described in a-weighted decibels (dBA), approximates this frequency response to express accurately the perception of sound by humans. Sounds encountered in daily life and their approximate levels in dBA are provided in table 5.

The dBA noise metric describes steady noise levels. Very few noises are, in fact, constant; therefore, a noise metric, A-weighted Day-night Sound Level (ADNL) has been developed. Day-night Sound Level (DNL) is defined as the average sound energy in a 24-hour period with a 10-dB penalty added to the nighttime levels (10 P.M. to 7 A.M.). DNL is a useful descriptor for noise because (1) it averages ongoing yet intermittent noise, and (2) it measures total sound energy over a 24-hour period. In addition, Equivalent Sound Level (Leq) is often used to describe the overall noise environment. Leq is the average sound level in dB.

Table 5. Common Sounds and Levels

Outdoor	Sound level (dBA)	Indoor
Snowmobile	100	Subway train
Tractor	90	Garbage disposal
Noisy restaurant	85	Blender
Downtown (large city)	80	Ringing telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

Source: Harris 1998

The Noise Control Act of 1972 (P.L. 92-574) directs Federal agencies to comply with applicable Federal, state, interstate, and local noise control regulations. In 1974 the EPA provided information suggesting that continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals.

Neither Louisiana, nor the LDEQ, has implemented noise regulations at the state level. However, both Orleans and Jefferson Parishes have local noise regulations. The maximum permissible sound levels by land use category are outlined in table 6. Sounds generated from construction and demolition activities are exempt from the New Orleans ordinance between 7:00 A.M. and 6:00 P.M. (11:00 P.M. for areas other than residential) (Chap 66 Article IV New Orleans Municipal Code). In Jefferson Parish, industrial sound level limits apply to construction activity for all land use categories. In addition, the Jefferson Parish ordinance specifically prohibits the operating of any construction equipment within 300 feet of any residential or noise-sensitive area between 9:00 P.M. and 7:00 A.M. Monday through Saturday, and 9:00 P.M. and 8:00 A.M. on Sundays and holidays, except for emergency work (Sec. 20-102 Jefferson Parish Municipal Code).

Table 6. Maximum Permissible Sound Levels by Receiving Land Use Category in Orleans and Jefferson Parishes

Receiving Land Use Category	Time	Sound Level Limit (dBA)		
		New Orleans		Jefferson Parish
		L101	Lmax	Lmax
Resident	7:00 A.M. - 10:00 P.M.	60	70	60
	10:00 P.M. - 7:00 A.M.	55	60	55
Commercial	7:00 A.M. - 10:00 P.M.	65	75	65
	10:00 P.M. - 7:00 A.M.	60	65	60
Industrial	At all times	75	85	75

Sources: Chap 66 Article IV New Orleans Municipal Code (City of New Orleans 2008)
Section 20-102 Jefferson Parish Municipal Code (Jefferson Parish 2008)
1 L_{10} = sound pressure level that is exceeded ten percent of the time

3.2.9.2 Existing Conditions

Existing sources of noise near the 17th Street Canal include shipping and boating activity, local road traffic, high-altitude aircraft over flights, and natural noises such as water, leaves rustling, and bird vocalizations. The noise environment is a mixture of quiet residential and light commercial. Boating activity at two large marinas and a USCG station is the main source of commercial noise near the site. There are several individual residences and multifamily dwellings within 1,000 feet of the 17th Street Canal. There are several schools within one-half mile of the 17th Street Canal including Marie B. Riviere Elementary School, Mt. Carmel Academy, and St. Louis King of France School. The nearest hospital (Ochsner Clinic) is more than a mile away.

Existing sources of noise near the Orleans and London Avenue Canals are local road traffic, local commercial operations, boat repair shops, construction activities, high-altitude aircraft over flights, and natural noises such as water, leaves rustling, and bird vocalizations. Operation of the ICS at all three canals also contribute to the noise environment. The areas near the mouths of all three canals are primarily residential. There are several individual residences and multifamily dwellings within 1,000 feet of the Orleans and London Avenue Canal. The St. Pius X Church and school, and the Lakeview Church and school are within one-half mile of the Orleans Avenue Canal. The Benjamin Franklin High School and Jean Gordon School are less than one-half mile from the London Avenue Canal. The nearest church (Chapel of Holy Comforter) and the nearest hospital (Ochsner Clinic) are farther away.

Fence-line noise monitoring was performed at London Avenue Canal ICS in March and July of 2007. The testing and the baselines established did not show levels dangerous to the workers on the site or to residents in the vicinity of the ICS.

Existing noise levels (Leq and ADNL) were estimated for the proposed sites, outfall canals, and surrounding areas using the techniques specified in the *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with an observer present*, and are provided in table 7 (ANSI 2003).

Table 7. Estimated Existing Noise Levels at Proposed Sites Outfall Canals, and Surrounding Areas

Location	Leq (daytime)	Leq (nighttime)	ADNL
17th Avenue Canal	58	52	58
Orleans Avenue Canal	53	47	55
London Avenue Canal	53	47	55

Source: ANSI 2003

3.2.9.3 Discussion of Impacts

The potential direct and indirect noise impacts associated with the following activities were assessed for all alternatives:

- Construction of pump station including uses of heavy construction equipment, pile-driving and dredging activities, and construction of parallel protection upgrades
- Operation of pump stations including existing stations, upgraded ICS, and proposed new pump stations

This noise impact evaluation considered significant sound sources that could affect nearby sensitive receptors including residents, schools, churches, and hospitals. All significant sources of noise, their contribution to the overall noise environment, and maximum sound level were estimated for comparison to local noise control standards.

3.2.9.3.1 Construction Noise Overview

The most likely sources of noise generation during construction would be from heavy construction equipment, trenching, dredging, and pile-driving activities. The specific impact of construction activities on the nearby receptors would vary depending on the type, number, and loudness of equipment in use.

Individual pieces of construction equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet. With multiple items of equipment operating concurrently, noise levels can be relatively high during daytime periods at locations within several hundred feet of active construction sites. The zone of relatively high construction noise levels typically extends to distances of 400 feet to 800 feet from the site of major equipment operations. Locations more than 1,000 feet from construction sites seldom experience substantial levels (greater than 62 dBA) of construction noise. Table 8 presents typical noise levels (dBA at 50 feet) that EPA has estimated for the main phases of outdoor construction. Figure 36 presents maximum noise levels vs. distance for construction-related activities.

Table 8. Noise Levels Associated with Outdoor Construction

Construction Phase	Leq (dBA) at 50 feet from Source
Ground Clearing	84
Excavation, Grading	89
Foundations	78
Structural	85
Finishing	89

Source: USEPA 1971

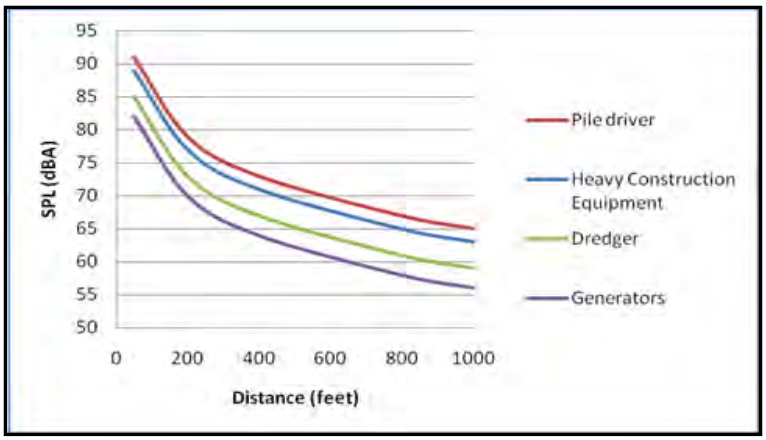


Figure 36. Maximum Noise Levels vs. Distance for Construction Related Activities
Source: FHWA 2006

The widening and deepening of the existing canals to accommodate the larger flows and provide parallel protection would involve dredging activities. The dredging would likely be performed primarily with a mechanical clamshell dredge. Dredging would be completed during normal periods of construction, up and down the canals. As with the pipe laying activities, equipment would not be fixed in one location for long durations but would progress along the canals. Dredging noise would be temporary and would subside at any particular location as it progresses to subsequent segments of the canal.

Pile driving for the storage tank foundations and upgrading the canal walls would generate the most intense noise associated with construction of the proposed facilities. Noise associated with pile-driving activities is an impact type noise. Impact type noises are those of high intensity and a very short duration and can be particularly intrusive.

When considered with other noise sources in the area, such as construction of HSDRRS projects and homes and businesses, noise levels would be expected to temporarily increase as the region continues to rebuild and recover from Hurricane Katrina. As construction activities are completed, it would be expected that noise levels in the area would return to normal.

3.2.9.3.2 Operational Noise Overview

Noise levels that would be generated by operation of the proposed pump stations were estimated for non-storm operations, 50 percent capacity, and 100 percent capacity (table 9). Sound level data for the proposed equipment were obtained from vendors, calculated using empirical formulas on the basis of process and mechanical equipment data, or from similar projects. It was assumed that under non-storm conditions the stations would operate using power supplied 100 percent by the power grid in the area; under 50 percent operating conditions 50 percent of the power would be supplied by the grid and 50 percent would be from direct motor drives; and that under 100 percent capacity, 100 percent of the power would be supplied by direct drive motors and diesel generators.

Table 9. Predicted Noise Levels at Nearest Noise Sensitive Areas for All Alternatives

17th Street Canal	Alternative	Distance to Nearby Residence (feet)	Capacity (cfs)	Pump (hp)	Power Requirements (hp)	Number of Motors	Leq (dBA)		
							Non-storm	50% Capacity	100% Capacity
Existing DPS6	PP	100	12,500	15,234	22,050	16	58	86	87
ICS	CICS	870	2,000	2,487	3,600	2	58	62	64
Proposed Pump Station	PPSC-I –A*	200	2,000	2,487	3,600	2	58	73	76
	PPSC-I –B	150	2,000	2,487	3,600	2	58	76	79
	PPSC-I –C	100	2,000	2,487	3,600	2	58	79	82
	PPSC-II -A	200	12,500	31,091	45000	16	58	85	87
	PPSC-II -B	150	12,500	31,091	45000	16	58	83	87
	PPSC-II -C	100	12,500	31,091	45000	16	58	91	93
Orleans Avenue Canal									
Existing DPS 7	PP	500	3,390	4,353	6,300	4	53	64	65
ICS	CICS	310	700	1243.62	1800	1	53	63	63
Proposed Pump Station	PPSC-I –A	350	700	1243.62	1800	1	53	62	63
	PPSC-I –B*	300	700	1243.62	1800	1	53	63	64
	PPSC-I –C	200	700	1243.62	1800	1	53	66	67
	PPSC-I -D	380	700	1243.62	1800	1	53	61	62
	PPSC-II -A	350	3390	5,804	8400	4	55	74	75
	PPSC-II -B	300	3390	5,804	8400	4	55	75	76
	PPSC-II -C	200	3390	5,804	8400	4	55	79	80
	PPSC-II -D	380	3390	5,804	8400	4	55	73	74
London Avenue Canal									
Existing DPS 3 capacity	PP	140	4,260	4,974	7,200	7	53	76	78
Existing DPS 4 capacity	PP	115	3,720	4,974	7,200	5	53	77	79
ICS	CICS	380	1000	1243.62	1800	2	53	77	79
Proposed Pump Station	PPSC-I –A	390	1000	1243.62	1800	2	53	61	63
	PPSC-I –B	150	1000	1243.62	1800	2	53	69	71
	PPSC-I –C*	300	1000	1243.62	1800	2	53	64	65
	PPSC-I -D	450	1000	1243.62	1800	2	53	60	62
	PPSC-I -E	450	1000	1243.62	1800	2	53	60	62
	PPSC-II -A	390	4260	1243.62	14350	7	55	55	75
	PPSC-II -B	150	4260	1243.62	14350	7	55	55	84
	PPSC-II -C	300	4260	1243.62	14350	7	55	55	77
	PPSC-II -D	450	4260	1243.62	14350	7	55	55	74

Note: Shaded areas indicate levels loud enough to temporarily impact quality of life at the nearest receptor.
PPSC-I = Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations (*Proposed Action)
PPSC-II= Permanent Pump Stations and Closures at the Mouths of the Outfall Canals
PP = Parallel Protection
CICS = Convert ICS to Permanent System
cfs = cubic feet per second
hp = horsepower

Due to the design-build nature of this project, a complete equipment list and associated manufacturers specifications is not finalized. However, it is assumed that the major noise-producing equipment associated with the pump stations would include pumps, electric motors, direct drive motors, and emergency generators. Much of the noise-producing equipment would be contained inside pump superstructures that would be fabricated with noise reducing material. However, the diesel motors' and emergency generators' intakes and exhausts would be open to the exterior of the stations.

3.2.9.3.3 No Action Alternative

Under the no action alternative, construction activities to raise the height of the outfall canal floodwalls to a height of 15 feet to 18 feet as originally authorized in the 1984 EIS plus new standards and structural superiority would take place. Because of the close proximity of residences, sounds generated from heavy construction would exceed the levels in the New Orleans noise ordinances for construction activities after-hours (70 dBA). Noise levels would be expected to exceed the levels in the Jefferson Parish noise ordinance (75 dBA daytime and 55 dBA at night). Special variances to the local noise ordinance or mitigation measure could be required. These activities are exempt from the New Orleans ordinance between 7:00 A.M. and 6:00 P.M. (11:00 P.M. for areas other than residential). Trucking or boating of dredged material and the delivery of concrete to the site would be additional sources of construction noise when compared to other alternatives. The following BMPs could be used to reduce the noise:

- Construction could predominately occur during normal weekday business hours in areas adjacent to noise-sensitive land uses such as residential areas.
- Construction equipment mufflers would be properly maintained and in good working order.

To comply with local noise ordinances, sound generating equipment would likely need to be partially enclosed with noise barriers at some construction locations. The following mitigation measures could be used to address noise impacts identified at the construction sites, as necessary:

- Enclose construction power units
- Enclose pumps and engines where applicable
- Enclose generator sets
- Restrict the use of mobile equipment and trucks to daytime hours
- Use of noise barriers
- Place silencers on equipment
- Addressing individual landowner's impacts on a case-by-case basis with measures up to or including provisions for temporary lodging

Construction noise would be expected to dominate the soundscape for all on-site personnel. Construction personnel, and particularly equipment operators, would don adequate personal hearing protection to limit exposure and ensure compliance with Federal health and safety regulations.

The ICS would not be upgraded. Motors and generators would not be enclosed in permanent structures. During storm events, when the ICS were required for flood control, sounds generated from ICS stations would be expected to exceed the levels in the New Orleans noise ordinances activities (70 dBA daytime and 60 dBA at night) and the Jefferson Parish noise ordinance (60 dBA daytime and 55 dBA at night) at the 17th Street Canal station. No special variances to the local noise ordinance would be sought, and no mitigation measures would be implemented to control operational noise.

3.2.9.3.4 Proposed Action

For all canals, construction activities would have temporary effects. Effects due to construction noise, BMPs, and potential mitigation would be similar to those outlined under the No Action Alternative (section 3.2.9.3.3). However, effects would be confined to those areas around the new permanent pump stations and along the walls near the mouth of the canals.

Operation of the new pump stations would have long-term effects when compared to the no action alternative. These benefits would be mainly due to enclosing the generators and direct drive motors. Sound levels from operation of the pump station under this alternative are outlined in table 9. Under normal non-storm conditions, the pump stations at all canals would be virtually inaudible to nearby residences. Because of the close proximity of residences, sounds generated from pump stations at both 50 percent and 100 percent capacity would be expected to exceed the levels in the New Orleans noise ordinances (70 dBA daytime and 60 dBA at night). Noise levels at the 17th Street Canal pump station at both 50 percent and 100 percent capacity would be expected to exceed those outlined in the Jefferson Parish noise ordinance (60 dBA daytime and 55 dBA at night). Mitigation measures could be required to reduce these impacts to acceptable levels and comply with the local noise ordinance if necessary.

Future additional features and other improvements/enhancements as a result of the actions of the local government or due to future congressional authorizations could include modifications to the new pump stations, including increasing size of the direct motor drives and generators. The noise levels from the modified pump stations would be somewhat higher. Although operational noise levels would increase, under normal non-storm conditions, the pump stations at all canals would be virtually inaudible to nearby residences.

3.2.9.3.5 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

For all canals and layout alternatives, construction activities would have temporary effects. Effects due to construction noise, BMPs, and potential mitigation would be similar to those outlined under the no action alternative (section 3.2.9.3.3). However, effects would be confined to those areas around the new permanent pump stations and along the walls near the mouth of the canals.

Operation of the new pump stations would have long-term effects when compared to the no action alternative (section 3.2.9.3.3). Effects would be similar to those of the proposed action (section 3.2.9.3.4). Overall noise levels for each layout vary slightly depending on the distance to the nearest receptor (table 9).

3.2.9.3.6 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all canals and layout alternatives, construction activities would have temporary effects. Effects due to construction noise, BMPs, and potential mitigation would be similar to those outlined under the no action alternative (section 3.2.9.3.3). However, effects would be confined to those areas around the new permanent pump stations and along the walls near the mouth of the canals.

Operation of the new pump stations would have long-term effects when compared to the no action alternative. Sound levels from operating the pump station under this alternative are outlined in table 9. Minor differences in the overall sound level for each station at the nearby residences have been identified. However, for all pump station locations and layouts effects of operating the upgraded pump stations would be similar to those outlined under section 3.2.9.3.4. Although operational noise levels would increase when compared to the no action alternative, under normal non-storm conditions, the pump stations at all canals would be virtually inaudible

to nearby residences. Sound generated from the new pump stations, at both 50 percent and 100 percent capacity would be expected to exceed the levels of the Orleans and Jefferson Parish noise ordinances. Special variances, mitigation measures, or both could be required to reduce these effects to acceptable levels.

3.2.9.3.7 Permanent Pump Stations at the Mouths of the Outfall Canals

For all canals and layout alternatives, construction activities would have temporary effects. Effects due to construction noise, BMPs, and potential mitigation would be similar to those outlined under the no action alternative (section 3.2.9.3.3). However, effects would be confined to those areas around the new permanent pump stations and along the walls near the mouth of the canals.

Operation of the new pump stations would have long-term effects when compared to the no action alternative. Sound levels from operating the pump station under this alternative are outlined in table 9. These noise levels would be somewhat higher than other alternatives because of the increased size of the direct motor drives and generators. Minor differences in the overall sound level for each station at the nearby residences have been identified. However, for all pump station locations and layouts effects of operating the upgraded pump stations would be similar to those outlined under section 3.2.9.3.4. Although operational noise levels would increase when compared to the no action alternative, under normal non-storm conditions, the pump stations at all canals would be virtually inaudible to nearby residences. Sound generated from the new pump stations, at both 50 percent and 100 percent capacity would be expected to exceed the levels of the Orleans and Jefferson Parish noise ordinances. Special variances, mitigation measures, or both could be required to reduce these effects to acceptable levels.

3.2.9.3.8 Concrete-Lined Canals

Construction activities would have temporary effects. Effects of construction noise, BMPs, and potential mitigation would be similar to those outlined under section 3.2.9.3.3. However, the duration of construction would be somewhat longer.

3.2.9.3.9 Replace I-walls with T-walls

Construction activities would have short-term effects. Effects of construction and operation noise, BMPs, and potential mitigation would be similar to those outlined under section 3.2.9.3.3, with two exceptions. The duration of construction would be somewhat longer, and pile driving for the replacement sidewalls would provide an additional source of construction noise when compared to the no action alternative.

3.2.9.3.10 ICS Gates with Parallel Protection

Construction activities would have temporary effects. Effects of construction noise, BMPs, and potential mitigation would be similar to those outlined under the Concrete-Lined Canals and Replace I-walls with T-walls Alternatives. Noise from existing pump stations would be similar as outlined under the no action alternative (section 3.2.9.3.3).

3.2.9.3.11 Upgrade ICS to Permanent System

Construction activities would have short-term effects. Effects of construction noise, BMPs, and potential mitigation would be similar to those outlined under section 3.2.9.3.3. However, using material transports and concrete trucks would be limited, and effects would be confined to those areas around the upgraded ICS and along the walls near the mouth of the canals.

Operating the upgraded pump stations would have long-term effects when compared to the no action alternative. These benefits would be mainly due to enclosing the generators and direct drive motors. Sound levels from operating the pump station under this alternative are outlined in

table 9. Effects of operating the upgraded pump stations would be similar to those outlined under section 3.2.9.3.4. However, the ICS would not be removed, and generators and driver motors would be enclosed in a permanent structure. Under normal non-storm conditions, the pump stations at all canals would be virtually inaudible to nearby residences. Sound generated from the ICS at 50 percent and 100 percent capacity would be expected to exceed the levels in the Orleans Parish and Jefferson Parish noise ordinances. Special variances, mitigation measures, or both could be required to reduce these effects to acceptable levels.

3.2.10 Air Quality

3.2.10.1 National Ambient Air Quality Standards and Local Ambient Air Quality

The EPA Region 3 and LDEQ regulate air quality in Louisiana. The Clean Air Act (CAA) (42 U.S.C. 7401-7671q), as amended, gives the EPA the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR §50) that set acceptable concentration levels for six criteria pollutants: particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrous oxides (NOx), ozone (O_3), and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health impacts, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health impacts. Each state has the authority to adopt standards stricter than those established under the Federal program; however, Louisiana accepts the Federal standards.

Existing ambient air quality conditions for the project area can be estimated from measurements conducted at a nearby air quality monitoring station (table 10). Recent air quality measurements are below the NAAQS for all criteria pollutants and are a conservative representation of the air quality conditions near the sites (USEPA 2007). At any given time, concentrations of criteria pollutants would be expected to be below those outlined in table 10.

3.2.10.2 Attainment Status

Federal regulations designate Air-Quality Control Regions (AQCRs) in violation of the NAAQS as *nonattainment* areas. Federal regulations designate AQCRs with levels below the NAAQS as *attainment* areas. *Maintenance* AQCRs are areas that have previously been designated nonattainment and have been redesignated to attainment for a probationary period through implementation of maintenance plans. According to the severity of the pollution problem, nonattainment areas can be categorized as marginal, moderate, serious, severe, or extreme.

Orleans and Jefferson Parishes (and therefore, the 17th Street, Orleans Avenue, and London Avenue Canals) are within the Southern Louisiana-Southeast Texas Interstate Air Quality Control Region (AQCR 106) (40 CFR §81.53). The EPA has designated Orleans and Jefferson Parishes as in attainment for all criteria pollutants. These areas are not subject to any conformity requirements of the CAA.

As of 15 June 2005, the 1-hour ozone NAAQS was revoked and replaced by an 8-hour NAAQS. As stated above, the EPA has designated Orleans and Jefferson Parishes as attainment areas for ozone. On 20 June 2007, the EPA proposed to strengthen the 8-hour ozone NAAQS. The most recent data (2003–2005) indicate that Jefferson Parish would be a nonattainment area under the newly proposed 8-hour NAAQS. By 2010 the EPA expects to make final designations of attainment and nonattainment areas based on 2006–2008 data. Because ozone can be transported regionally and the strengthening of the 8-hour NAAQS threatens the attainment status of the Jefferson Parish, its precursors NO_x and volatile organic compounds (VOCs) were carried forward for more detailed analysis to determine the level of impact under NEPA.

Table 10. 2006 Local Ambient Air Quality Monitoring

Pollutant and averaging time	Primary NAAQS[a]	Secondary NAAQS[a]	Monitored data[b]	Location where maximum was recorded
CO				
8-hour maximum[c] (ppm)	9	(None)	3.4	Baton Rouge
1-hour maximum[c] (ppm)	35	(None)	4.8	Baton Rouge
NO_2				
Annual arithmetic mean (ppm)	0.053	0.053	0.010	Kenner
O_3				
8-hour maximum[d] (ppm)	0.08	0.12	0.095	Kenner
$PM_{2.5}$				
Annual arithmetic mean[e] (µg/m3)	15	15	16.1	New Orleans
24-hour maximum[f] (µg/m3)	65	65	44	Marrero
PM_{10}				
Annual arithmetic mean[g] (µg/m3)	50	50	45	Chalmette
24-hour maximum[c] (µg/m3)	150	150	94	Chalmette
SO_2				
Annual arithmetic mean (ppm)	0.03	(None)	0.004	Baton Rouge
24-hour maximum[c] (ppm)	0.14	(None)	0.015	Baton Rouge
3-hour maximum[c] (ppm)		0.5	0.042	Baton Rouge

Notes:
[a] - Source: 40 CFR 50.1-50.12.
[b] - Source: USEPA 2007
[c] - Not to be exceeded more than once per year.
[d] - The 3-year average of the fourth highest daily maximum 8-hour average ozone concentrations over each year must not exceed 0.08 ppm.
[e] - The 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from must not exceed 15.0 µg/m^3.
[f] - The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor must not exceed 65 µg/m^3.
[g] - The 3-year average of the weighted annual mean PM_{10} concentration at each monitor within an area must not exceed 50 µg/m^3.
ppm = parts per million
µg/m^3 = micrograms per cubic meter
NO_2 = Nitrogen dioxide

In March 2007, dust monitoring based on a 12-hour Time Weighted Average (TWA) was conducted during activities of highest dust production at the London Avenue Canal ICS. No significant migration of dust off-site was measured or observed. The USACE performed air quality monitoring in this area the week of 6 August 2007, and concluded that air quality was within acceptable limits for human health.

3.2.10.3 Discussion of Impacts

For the purpose of this analysis, air pollution impacts would be considered significant if project emissions would be expected to exceed 100 tons per year (tpy) of any criteria pollutant, would be regionally significant, or would contribute to a violation of air regulations.

When considered with other air pollution sources in the area, such as construction of HSDRRS projects and homes and businesses, air quality would be expected to be temporarily impacted as the region continues to rebuild and recover from Hurricane Katrina. As construction activities are completed, it would be expected that air quality in the area would return to normal.

3.2.10.3.1 Emissions Overview

The total direct and indirect emissions associated with implementing the proposed action and alternatives were estimated in tables 11, 12, and 13. Emissions from heavy construction

activities, the transportation of materials, and fugitive dust were assessed. Slight variations in the construction emissions would be expected with the different alternatives. Therefore, conservative assumptions were used to evaluate a worst-case scenario to capture the impacts of all the alternatives. The operational emissions would primarily be from backup generators at the pump stations, boilers used for heating, and emissions from fuel storage tanks. Because combustion emissions from the generators would be the primary source, they were carried forward to gauge the level of impact under NEPA and facilitate a discussion of potential permitting requirements (tables 11 and 12).

The exact size and type of new stationary sources are unknown. For the purposes of this IER, it was assumed that pump stations under all alternatives would have 100 percent on-site emergency backup power or would run on direct drive motors. Actual diesel generator and direct drive motor emission estimates were based on 1 percent operations (88 hours per year) (GEC 2006a), and the potential to emit (PTE) was based on 500 hours per year for all alternatives. During the final design stages, care would be taken to select equipment and perform detailed emission calculations to ensure compliance with all applicable permitting requirements.

3.2.10.3.2 Regulatory Review

The general conformity rules require Federal agencies to determine whether their action(s) would increase emissions of criteria pollutants above preset threshold levels [40 CFR 93.153(b)]. These *de minimis* (of minimal importance) rates vary depending on the severity of the nonattainment and geographic location. Because the proposed action and alternatives would be within areas designated by the EPA as attainment for all criteria pollutants, the air conformity regulations do not apply.

LDEQ oversees programs for permitting the construction and operation of new or modified stationary source air emissions in Louisiana. Louisiana air permitting is required for many industries and facilities that emit regulated pollutants. From the size of the emission units and type of pollutants emitted, LDEQ sets permit rules and standards for emission sources.

Construction Permits

The air quality permitting process begins with the application for a construction permit. There are three types of construction permits available through the LDEQ for the construction and temporary operation of new emission sources: Major New or Modified Source Construction Permits in Nonattainment Areas (Nonattainment New Source Review (NNSR)); Prevention of Significant Deterioration (PSD) permits; and Minor New, Modified, and Certain Major Source Construction Permits (Minor New Source Review (NSR)). NNSR and PSD permits are both part of the LDEQ Major NSR program. For sources whose emissions are less than these threshold values, a Minor NSR permit would be required.

Table 11. Estimated Construction Emissions

	Actual Emissions (tpy)				
Activity/Source	**NO_x**	**CO**	**VOC**	**PM_{10}**	**SO_x**
Construction Equipment	30.60	12.58	3.98	1.61	0.03
Painting	0.00	0.00	0.55	0.00	0.00
Transportation of Concrete / Materials	17.52	5.35	1.38	0.85	0.02
Delivery of Equipment and Supplies	0.98	0.91	0.12	0.04	0.00
Worker Commutes	1.52	14.56	1.49	0.12	0.01
Total Construction Emissions	**50.62**	**33.40**	**7.52**	**2.61**	**0.06**

Sources: CARB 2007a; CARB 2007b; and SCAQMD 1993

Table 12. Estimated Actual Operational Emissions

17th Street	Alternative	Power Requirements (Horsepower)	Actual Emissions (tpy)				
			NO_x	CO	VOC	PM_{10}	SO_x
Existing DPS6	PP	22,050	23.18	5.31	0.62	0.68	0.39
ICS	CICS	3,600	3.78	0.87	0.10	0.11	0.06
Proposed Pump Station	PPSC-I (A-C)	3,600	3.78	0.87	0.10	0.11	0.06
	PPSC-II (A-C)	45000	47.30	10.84	1.26	1.38	0.80
Orleans Avenue							
Existing DPS 7	PP	6,300	6.62	1.52	0.18	0.19	0.11
ICS	CICS	1800	1.89	0.43	0.05	0.06	0.03
Proposed Pump Station	PPSC-I (A-D)	1800	1.89	0.43	0.05	0.06	0.03
	PPSC-II (A-D)	8400	8.83	2.02	0.24	0.26	0.15
London Avenue							
Existing DPS 3 capacity	PP	7,200	7.57	1.73	0.20	0.22	0.13
Existing DPS 4 capacity	PP	7,200	7.57	1.73	0.20	0.22	0.13
ICS	CICS	1800	1.89	0.43	0.05	0.06	0.03
Proposed Pump Station	PPSC-I (A-D)	1800	1.89	0.43	0.05	0.06	0.03
	PPSC-II (A-D)	14350	15.08	3.46	0.40	0.44	0.25

PPSC-I = Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations
PPSC-II= Permanent Pump Stations and Closures at the Mouths of the Outfall Canals
PP = Parallel Protection
CICS = Convert ICS to Permanent System
Notes: Assumed 1 percent operation (88 hours/year) for each generator
Source: USEPA, 1995

- **Nonattainment New Source Review.** Major New or Modified Source Construction Permits in Nonattainment Areas (or NNSR permit) are required for any major new sources or major modifications to existing sources intended to be constructed in an area designated as nonattainment. NNSR permits are legal documents that specify what construction is allowed; what emission limits must not be exceeded; reporting, record-keeping, and monitoring requirements; and often how the source may be operated.

- **Prevention of Significant Deterioration.** The PSD program protects the air quality in attainment areas. PSD regulations impose limits on the amount of pollutants that major sources may emit. The PSD process would apply to all pollutants for which the region is in attainment. The PSD permitting process typically takes 18–24 months to complete.

- **Minor New Source Review.** A Minor NSR permit would be required to construct minor new sources, minor modifications of existing sources, and major sources not subject to NNSR or PSD permit requirements. The Minor NSR permitting process typically takes 4–5 months to complete.

Table 13. Estimated Operational Potential to Emit

17th Street	Alternative	Power Requirements (Horsepower)	Potential to Emit (tpy)				
			NO_x	CO	VOC	PM_{10}	SO_x
Existing DPS6	PP	22,050	132.30	30.32	3.54	3.86	2.23
ICS	CICS	3,600	21.60	4.95	0.58	0.63	0.36
Proposed Pump Station	PPSC-I (A-C)	3,600	21.60	4.95	0.58	0.63	0.36
	PPSC-II (A-C)	45000	270.00	61.88	7.22	7.88	4.55
Orleans Avenue							
Existing DPS 7	PP	6,300	37.80	8.66	1.01	1.10	0.64
ICS	CICS	1800	10.80	2.48	0.29	0.32	0.18
Proposed Pump Station	PPSC-I (A-D)	1800	10.80	2.48	0.29	0.32	0.18
	PPSC-II (A-D)	8400	50.40	11.55	1.35	1.47	0.85
London Avenue							
Existing DPS 3 capacity	PP	7,200	43.20	9.90	1.15	1.26	0.73
Existing DPS 4 capacity	PP	7,200	43.20	9.90	1.15	1.26	0.73
ICS	CICS	1800	10.80	2.48	0.29	0.32	0.18
Proposed Pump Station	PPSC-I (A-D)	1800	10.80	2.48	0.29	0.32	0.18
	PPSC-II (A-D)	14350	86.10	19.73	2.30	2.51	1.45

PPSC-I = Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations
PPSC-II= Permanent Pump Stations and Closures at the Mouths of the Outfall Canals
PP = Parallel Protection
CICS = Convert ICS to Permanent System
Note: Shaded areas indicate an excedance of the major source threshold.
Assumed maximum potential operation of 500 hours/year for each generator.
Source: USEPA, 1995

Operation Permits

Operating Permit applications are typically required within one year of operation of the sources. State Operating Permits are available through LDEQ. A Federal Operating Permit (Title V) could be required if a source is determined to be a major source. This determination is part of the final design stage and is required within one year of the first operation of the new source.

- **State Operating Permits.** State Operating Permits are elective and could be used to obtain Federally enforceable limits on criteria pollutants and Hazardous Air Pollutants (HAPs) below applicable major source thresholds. These synthetic minor sources would designate a stationary source or emission unit as a synthetic minor or area stationary source and thus be exempt from major source permitting requirements. State Operating Permits are also used to combine stationary source or emissions unit requirements under multiple permits into one permit.

- **Federal Operating Permit (Title V).** A Title V permit would be required for major sources of criteria pollutants as defined at 40 CFR §70. Title V permits would be required if the annual PTE exceeds thresholds for criteria pollutants and HAPs. Orleans and Jefferson Parish are attainment areas. The Title V major source thresholds for pollutant emissions in these parishes are 100 tpy for all criteria pollutants. If, with the additional sources the PTE exceeds major source thresholds, Federally enforceable limits on the operation of the facility could be established so the source does not trigger Title V applicability.

In addition, boilers rated greater than 10 million British Terminal Unit (BTU)/hrs heat input and all generators would have to comply with New Source Performance Standards (NSPS). Moreover, under the National Emission Standards for Hazardous Air Pollutants (NESHAP), new and modified stationary sources of air emissions may be subject to Maximum Achievable Control Technology (MACT) requirements if their potential to emit HAPs exceeds either 10 tpy of a single HAP, or 25 tpy of all regulated HAPs (table 14).

Table 14. Air Quality Regulatory Review for Proposed Stationary Sources

Regulation	Project Status
Title V Permitting	For the Parallel Protection and Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Alternatives the potential to emit may exceed major new source thresholds (table 13). Federally enforceable limits on the operation of the facility may be established so the source does not trigger Title V applicability.
State Operating Permits – Minor and Synthetic Minor	All alternatives other than the Parallel Protection and Permanent Pump Stations and Closures at the Mouths of the Outfall Canals Alternatives may require new or modified state operating permits. Pump stations that have the potential to emit less than 5 tpy may meet special LDEQ permitting exemptions.
Nonattainment New Source Review	The Proposed action and alternatives are within an attainment region. Therefore, NNSR would not apply.
Prevention of Significant Deterioration	For the Proposed action and alternatives, potential emissions would not exceed the 250-tpy PSD threshold. Therefore, would not be subject to PSD review.
National Emission Standards for Hazardous Air Pollutants	Potential HAP emissions are not expected to exceed NESHAP thresholds. Therefore, the use of MACT would not be required.
New Source Performance Standards	Boilers rated greater than 10 million BTU/hrs heat input and all generators would have to comply with NSPS.

3.2.10.3.3 <u>No Action Alternative</u>

Short-term increases in emissions due to construction activities would be expected. Primary emission sources would be from heavy construction equipment, delivering concrete to the site, and removing dredged material. All construction would be accomplished in full compliance with the Louisiana Regulations for the Control and Abatement of Air Pollution, particularly Title 33 Part III. Chapters of relevance are as follows:

- Chapter 11, Control of Emissions of Smoke
- Chapter 13, Emission Standards for Particulate Matter
- Chapter 21, Control of Emissions of Organic Compounds

BMPs/mitigation could be required for both construction and stationary source emissions associated with the proposed action. The construction of the new facilities would be accomplished in full compliance with current and pending Louisiana regulatory requirements, with compliant practices, products, or both. These requirements could include the following:

- Reducing visible emissions and fugitive dust and emissions through watering
- Using BMPs during asphalt paving operations
- Limiting or restricting open burning activities
- Appropriate use of portable fuel containers
- Meeting new engine standards for nonroad vehicles
- Using low VOC architectural, industrial, and maintenance coatings

This listing is not all inclusive; contractors would be required to comply with all applicable air pollution control regulations.

The diesel equipment at the ICS would not exceed major source thresholds, and only minor construction and operating permits would likely be required. This determination is required within one year of the first operation of the new source. The permitting process has inherent checks that could require the following:

- Installing emission control devices on new stationary sources
- Best Available Control Technology review for each criteria pollutant
- MACT review for regulated HAPs and designated categories
- Air quality analysis (predictive air dispersion modeling)
- Establishing procedures for measuring and recording emissions or process rates, or both
- Meeting the NSPS and NESHAP requirements

In the final design stages, extra care would be taken to ensure full compliance with all air permitting regulations for stationary sources.

3.2.10.3.4 Proposed Action

The impacts analysis presented below applies to the proposed action at all three outfall canals.

Construction activities and operation of the pump stations would have both short-term and long-term effects. Emissions would not exceed 100 tpy of any criteria pollutant, would not be regionally significant, and would not contribute to a violation of air regulations (tables 11, 12 and 13). Effects of construction, operational emissions, and regulatory requirements would be similar to those outlined under section 3.2.10.3.3. Each layout would require slightly different construction schedule, fabrication requirements, and use of heavy equipment. Therefore, there would be slight variations in the type and total amount of construction emissions for each layout.

Future additional features and other improvements/enhancements by the local government or due to potential future Congressional authorization could include modifications to the new pump stations, including increasing size of the direct motor drives and generators. Emissions from the modified pump stations would exceed 100 tpy for NO_x at the 17th Street Canal and could require an operating permit. Emissions would be unlikely to exceed major source thresholds at the Orleans Avenue and London Avenue Canals and minor operation permits could be required.

3.2.10.3.5 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in section 3.2.10.3.4.

3.2.10.3.6 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in section 3.2.10.3.4.

3.2.10.3.7 Permanent Pump Stations at the Mouths of the Outfall Canals

The impacts analysis presented below applies to all layout alternatives at all three outfall canals.

Construction activities and operation of the pump stations would have both short-term and long-term effects. Emissions would exceed 100 tpy for NO_x (table 13) and could require an operating permit. Effects of construction, operational emissions, and regulatory requirements would be

similar to those outlined under section 3.2.10.3.3. Each layout would require slightly different construction schedule, fabrication requirements, and use of heavy equipment. Therefore, there would be slight variations in the type and total amount of construction emissions for each layout.

Regulatory requirements and BMPs would be similar to those outlined under section 3.2.10.3.3. The permanent diesel equipment that would be required at the new 17th Street Canal pump station could require a Title V operating permit. Emissions would be unlikely to exceed major source thresholds at the Orleans Avenue and London Avenue Canals pump stations and minor construction and operation permits would likely be required. Emissions from the new stations would be somewhat offset by decommissioning sources at the existing SWBNO stations.

3.2.10.3.8 Concrete-Lined Canals

Construction activities combined with operation of the expanded existing SWBNO pump stations would have both short-term and long-term effects. Construction and operational emissions, regulatory requirements, and BMPs would be similar to those outlined under section 3.2.10.3.3.

The permanent diesel equipment that would be required at the expanded 17th Street Canal pump station could require a Title V operating permit. Emissions would be unlikely to exceed major source thresholds at the Orleans Avenue and London Avenue canals pump stations and minor construction and operation permits would likely be required.

3.2.10.3.9 Replace I-walls with T-walls

Construction activities combined with operation of the existing SWBNO pump stations would have both short-term and long-term effects. Construction and operational emissions, regulatory requirements, and BMPs would be similar to those outlined under section 3.2.10.3.3.

The permanent diesel equipment that would be required at the expanded 17th Street Canal pump station could require a Title V operating permit. Emissions would be unlikely to exceed major source thresholds at the Orleans Avenue and London Avenue canals pump stations and minor construction and operation permits would likely be required.

3.2.10.3.10 ICS Gates with Parallel Protection

Construction activities combined with operation of the expanded existing SWBNO pump stations would have both short-term and long-term effects. Construction and operational emissions, regulatory requirements, and BMPs would be similar to those outlined under section 3.2.10.3.3.

The permanent diesel equipment that would be required at the expanded 17th Street Canal pump station could require a Title V operating permit. Emissions would be unlikely to exceed major source thresholds at the Orleans Avenue and London Avenue canals pump stations and minor construction and operation permits would likely be required.

3.2.10.3.11 Upgrade ICS to Permanent System

Construction activities and operating the pump stations would have both short-term and long-term effects. However, emissions would not exceed 100 tpy of any criteria pollutant, would not be regionally significant, and would not contribute to a violation of air regulations (tables 11, 12 and 13).

Construction emissions, regulatory requirements, and BMPs would be similar to those outlined under section 3.2.10.3. During operation, the existing SWBNO pump stations could continue to operate under their existing permitting structure. Minor construction operation permits would

likely be required with upgrading the ICS. However, because the facilities would be discontinuous from the existing SWBNO pump stations, emissions would not likely exceed major source thresholds.

3.2.11 Traffic and Transportation

3.2.11.1 Existing Conditions

Transportation in and around the project area is achieved mainly via air systems, rail routes, public transits, navigation channels, and road networks. The following section describes these transportation resources and their importance to the surrounding communities.

3.2.11.1.1 Road Networks

Roads and bridges compose the majority of the transportation network serving the project area. Included with this network are several roadway classifications including interstates, principal roads, and local roads (figure 37).

3.2.11.1.2 Interstates

Interstate 10

The I-10 corridor serves as an express way for commuter traffic as well as regional interstate serving east-west traffic from Florida to California. The greatest commuting demand is into New Orleans from outlying areas. There is also a significant amount of commuting outbound from New Orleans to the petrochemical and oil refining industries up and down the Mississippi River, as well as the shipbuilding industry. I-10 crosses toward the southern end of the 17th Street Canal.

Interstate 610

I-610 is a six lane roadway serving as a bypass from downtown New Orleans. I-610 crosses the southern portion of the 17th Street, Orleans Avenue, and London Avenue Canals.

3.2.11.1.3 Principal Roads

Hammond Highway **–** A four-lane highway providing access to areas on the east and west sides of the 17th Street Canal and is the northernmost highway crossing the canal.

Veterans Boulevard **–** A four-lane highway providing access to areas on the east and west sides of the 17th Street Canal.

Metairie Road **–** A four-lane highway providing access to areas on the east and west sides of the 17th Street Canal.

Lakeshore Drive **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue and Orleans Avenue canals and is the northernmost highway crossing the canal running along the southern bank of Lake Pontchartrain.

Robert E Lee Boulevard **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue and Orleans Avenue canals.

Filmore Avenue **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue and Orleans Avenue canals.

Figure 37. Local Transportation Network

Harrison Avenue **–** A four-lane highway providing access to areas on the east and west sides of the Orleans Avenue Canal.

Gentilly Boulevard **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue Canal.

Mirabeau Avenue **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue Canal.

Leon C. Simon Drive **–** A four-lane highway providing access to areas on the east and west sides of the London Avenue Canal.

3.2.11.1.4 Local Roads

17th Street Canal **–** There are several local access roads in the vicinity of the 17th Street Canal. Parallel to the east side of the canal are Breakwater Drive, West End Park Road, West Roadway Street, Bellaire Drive, Maryland Drive, and Bamboo Road. Parallel to the west side of the canal is Orpheum Avenue.

Orleans Avenue Canal **–** There are several local access roads in the vicinity of the Orleans Avenue Canal. Parallel to the east side of the canal is Marconi Drive. Parallel to the west side of the canal is Crystal Street, General Haig Street, and Orleans Avenue.

London Avenue Canal **-** There are several local access roads in the vicinity of the London Avenue Canal. Parallel to the east and west side of the canal is London Avenue. Parallel to the east side of the canal is London Drive and Warrington Drive. Parallel to the west side of the canal is Pratt Drive.

3.2.11.1.5 Transportation Plans and Congestion

Statewide transportation planning is required by Federal law under guidelines established by the Intermodal Surface Transportation Efficiency Act of 1991. The state's eligibility for Federal transportation funding is dependent on compliance with the statewide transportation planning requirement. Federal funding is critical to providing transportation facilities and services that cannot be funded solely with state and local money. Numerous state roadway improvement projects along with localized signal improvements have been completed in recent years, and many more improvements are proposed. The improvements in the project area mostly include the principal roads and the interstates.

The primary area of congestion in the project area is along I-10 and I-610, mainly during rush hour. The principal roads in the project area are subject to mainly localized congestion varying throughout the roadways.

3.2.11.1.6 Railroad Network

Railroads in the United States are separated into three broad categories—Class I, II, and III operators. Class I carriers have annual gross revenues of more than $250 million. Class II carriers have annual gross revenues of at least $20 million but no more than $250 million. Class III carriers have less than $20 million in gross annual revenues. Louisiana is one of only two sites in the United States where all six of North America's Class I railroads converge, providing great capacity for the area. New Orleans is a central hub for many of the area's railroads supporting all three classes of railroads, according to the Federal Railroad Administration. The Southern Railroad crosses the southern portion of the 17th Street, Orleans Avenue, and London Avenue Canals. Also, CSX Transportation Railroad and Norfolk Southern Railroad are in the vicinity of the project area.

3.2.11.1.7 Marinas

There are several small marinas adjacent to the three outfall canals. The majority of marina activity is in the vicinity of the 17th Street Canal. Orleans Marina, near the mouth of the 17th Street Canal, is a sheltered harbor and port available to resident and transient vessels. Orleans Marina supports several local marine service companies, along with being a municipal yacht harbor. South Shore Harbor Marina is on the south side of Lake Pontchartrain just east of the IHNC, adjacent to Lakefront Airport. South Shore Harbor Marina is a sheltered harbor and yacht harbor. Two USCG stations are also near the project area. One is directly east of the 17th Street Canal and Orleans Marina, and the other is west of the mouth of the Orleans Avenue Canal.

3.2.11.2 Discussion of Impacts

Local traffic generated by the construction of the new pump stations would be the result of a significant number of construction activities. These activities could include the arrival and departure of construction labor personnel each day, the delivery of construction materials to the project site, the mobilization and demobilization of construction equipment to and from the site as needed, the disposal of waste materials or construction debris, the transfer of materials and equipment within the project site, and the manipulation of earthwork materials around the site and transport to off-site locations. Among the traffic-generating activities anticipated, most are likely to occur in sporadic or even "one time only" patterns, while the disposal of excess earth material could be the most likely largest single sustained source of construction traffic to adjacent neighborhoods.

Traffic and transportation has been previously identified as a data gap in section 1.6. The CEMVN is performing a transportation study, and those results will be incorporated in the CED. Therefore, discussion of impacts to this resource should be considered general in nature and applicable to all alternatives.

3.2.11.2.1 Direct Impacts to Traffic and Transportation

Direct impacts would include temporary road closures and congestion in those areas where project construction is occurring. The principal and local roads discussed in sections 3.2.11.1.3 and 3.2.11.1.4 would be most likely impacted. Roads could be temporarily closed during transportation of construction materials or because of construction activities (i.e. bridge reconstruction or replacement). These temporary closures would result in increased congestion of those roads in the vicinity not directly impacted by construction activities. The impacts would be considered temporary, lasting only as long as the time frame necessary to complete the construction activity. After construction has been completed, the local road network would be expected to return to its normal condition.

Roads directly impacted by the proposed action at the 17th Street Canal could include Hammond Highway, Pontchartrain Boulevard, West End Boulevard, and I-10/I-610. Roads directly impacted by the proposed action at the Orleans Avenue Canal could include Lakeshore Drive, Robert E. Lee Boulevard, Canal Street, Marconi Drive, and I-10/I-610. Roads directly impacted by the proposed action at the London Avenue Canal could include Lakeshore Drive, Paris Avenue, Elysian Fields Avenue, and I-10/I-610.

3.2.11.2.2 Indirect Impacts to Traffic and Transportation

Indirect impacts could involve damage to those roads used during transportation of construction materials by heavy truck equipment. Additional heavy truck traffic during construction activities could contribute to additional degradation of roads beyond existing conditions.

3.2.11.2.3 Cumulative Impacts to Traffic and Transportation

Additional wear-and-tear of pavement on roads within the project's vicinity could occur from increased truck traffic, causing an additive effect of the ongoing construction related to other HSDRRS projects in the project vicinity, IERs #3, #4, and #6, which could also contribute to the increase of truck traffic and increase the wear-and-tear on the pavement of the roads.

3.2.12 Aesthetics

3.2.12.1 Existing Conditions

3.2.12.1.1 17th Street Canal

Located on the Orleans Parish boundary with Jefferson Parish, the 17th Street Canal project area is less residential and park-like in setting than the Orleans Avenue and London Avenue Canals. The early 20th century lake reclamation project along the New Orleans lakefront resulted in the construction of the west end marina complex along the eastern side of this canal. The western (Jefferson Parish) side of the canal is closely tied to the historic Bucktown community that has existed in the area for over a hundred years.

The visual setting of the 17th Street project area is diverse. South of Hammond Highway, the project area includes Orleans Avenue and London Avenue Canals. Adjoining land uses include restaurants, several marinas, boat houses, a USCG Station, public recreation areas, and multilevel residential structures. North of Hammond Highway, the New Orleans side of the 17th Street Canal project area is primarily residential and the Jefferson Parish side is a mixture of residential and service oriented commercial development. Much of the project area is still in disrepair due to damage sustained during the aftermath of Hurricane Katrina. Flood protection measures including the ICS and floodwalls made of concrete, or metal sheet-piling are evident throughout the project area. The residents living adjacent to the current ICS have voiced concerns about its aesthetics and how it contrasts with the adjacent Mariners Cove residential area. Currently, a design team is working towards an interim solution to shield the current ICS from surrounding viewsheds.

3.2.12.1.2 Orleans Avenue Canal

The Orleans Avenue Canal project area is located within the public green space that extends from the Lake Pontchartrain shoreline to the Robert E. Lee Boulevard Bridge crossing. The entire landscape is man-made, all part of a massive early 20th century reclamation project that created new land northward from the historic lakeshore near the current location of Robert E. Lee Boulevard. The mix of public green spaces, extensions of existing drainage canals to resemble natural streams, new residential neighborhoods, public streets and other facilities were all designed and constructed over the last 80 years.

This green corridor is centered along the meandering footprint of the Orleans Avenue Canal and provides a visual and physical connection from the public park areas along the lakeshore to the main east-west roadway setback from the shore. Grass-covered levees topped with concrete, or metal sheet-pile floodwalls line both banks of the canal and the ICS is prominently located in the meander of the canal. The residents living adjacent to the current ICS have voiced concerns about its aesthetics and how it contrasts with the adjacent public green space and residential areas. Currently, a design team is working towards an interim solution to shield the current ICS from surrounding viewsheds.

The public green space along the Orleans Avenue Canal corridor is expansive and holds great value as a visual and physical connection to the lakeshore recreation areas. On the east side of the canal, the underlying ownership is City Park and Marconi Drive has a parkway visual setting

as it heads northward from the middle of the city, passes along the western edge of City Park, crosses Robert E. Lee Boulevard and continues on to connect with Lakeshore Drive. The adjoining Lake Vista neighborhood enjoys a park-like setting highlighted by wide open grassy expanses broken up by mature live oak and pine trees. The western side of the Orleans Avenue Canal from Robert E. Lee Boulevard to the lakefront includes the Lakeshore neighborhood bordering the corridor of undeveloped green space that extends to the public road providing access to the lakefront. Consisting of single-family homes, the Lakeshore neighborhood enjoys the benefits of a park-like setting regularly maintained by the Orleans Levee District.

3.2.12.1.3 London Avenue Canal

The London Avenue Canal project area is located within the public green space that extends from the Lake Pontchartrain shoreline to the Leon C. Simon Boulevard Bridge crossing. This green corridor is centered along the meandering footprint of the London Avenue Canal and provides a visual and physical connection from the public park areas along the lakeshore to the main east-west roadway setback from the shore. Grass-covered earthen levees topped with concrete or metal sheet-pile floodwalls line both banks of the canal and the ICS is prominently located just south of the canal's meander.

The residents living adjacent to the current ICS have voiced concerns about its aesthetics and how it contrasts with the public green space and adjacent residential area. Currently, a design team is working towards an interim solution to shield the current ICS from surrounding viewsheds.

Like Orleans Avenue Canal, the entire landscape is man-made, all part of the massive early 20th century reclamation project that created new land (from pumped Lake Pontchartrain dredge material) northward from the historic lakeshore near the current location of Robert E. Lee Boulevard. The mix of public green spaces, extensions of existing drainage canals to resemble natural streams, new residential neighborhoods, public streets and other facilities were all designed and constructed over the last 80 years.

By the time Hurricane Katrina struck in August 2005, the former lake bottom was a mature landscape with grass-covered hurricane protection levees lining both banks of the canal and a varied mix of mature trees (mostly live oaks, cypress, and pines) and shrubs scattered throughout the wide expanses of public spaces between the levees and private spaces. On the east side of the canal is the main campus of the University of New Orleans. Most of the adjoining land uses are utilitarian (parking areas and maintenance and storage facilities) with some three story and of low aesthetic quality. The northern reach, however, is the location of student housing, some in disrepair. Other areas of the campus contain multilevel buildings including some seven to eight story buildings.

On the west side of the canal is a corridor of undeveloped green space that extends from the lake to Pratt Drive, a public road that provides access to the lakefront. A well-designed and maintained residential neighborhood of single-family homes, Lake Terrace, borders the east side of Pratt Drive. The homes fronting Pratt Drive and neighboring homes enjoy the park-like setting provided by the London Avenue corridor. These public green spaces are regularly maintained by the Orleans Levee District.

3.2.12.2 Discussion of Impacts

3.2.12.2.1 No Action Alternative

Direct and Indirect Impacts to Aesthetic Resources

The visual resources of the project corridor would be temporarily impacted by construction activities related to raising the floodwalls to authorized grade and by transport activities needed

to move equipment and materials to and from the site. The proposed floodwall structure would replace existing similar flood protection measures in areas where they currently exist. The floodwall would be designed with an architectural treatment to the floodwall concrete and the adjacent area would be landscaped where appropriate, treatments which are strongly recommended in urbanized areas (EM 1110-2-2504, Design of Sheet Pile Walls). The long-term direct impacts on aesthetics resources would be minimal as the project area would be returned, as much as possible, to existing conditions after floodwall construction.

Cumulative Impacts to Aesthetic Resources
The Canal floodwalls exhibit contrasting architectural elements in most areas where emergency repairs were done after Hurricane Katrina. One example is the Orleans Ave floodwall from the lakefront to Robert E. Lee Boulevard and then from Robert E. Boulevard to the pumping station located just past I-610. The Robert E. Lee Boulevard to the pumping station floodwalls were designed with architectural concrete features, especially prevalent on the canal's western side where concrete urns, placed on top of the floodwall, are connected by extruded concrete wreaths on the floodwalls face. The lakefront to Robert E. Lee Boulevard floodwalls exhibit rusted sheet-piling protruding from a concrete base. The residents living adjacent to the outfall canals have voiced concerns surrounding the floodwall's aesthetics because of its contrast with the residential areas and the greenspace along the outfall canal.

3.2.12.2.2 Proposed Action

17th Street Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
The visual and aesthetic impacts of the proposed action would be localized and directly related to its proximity to adjoining land uses. The most significant impacts could be felt by the Mariner's Cove residential complex immediately adjoining the site to the east and the recreational setting surrounding the proposed action footprint. The scale and proximity of the new pump station and closure structure could intrude into this residential and recreational area and introduces an industrial aesthetic that could be considered inconsistent with the surrounding area.

The impacts on the western side would be related to altered views from the Bucktown Marina complex and the impacts to the general aesthetic setting of the historic Bucktown area. The scale of the new pump station and closure structure would create a dominating industrial presence at one of the prime viewsheds in the area, the Hammond Highway Bridge crossing. Prior to construction of the ICS, the views from the bridge were of an open connection to Lake Pontchartrain. The view of the lake would continue to be disrupted by the new pump station and closure structure.

The construction, operation and maintenance of the new pump station and closure structure could also significantly affect the planning and implementation of restoration and redevelopment plans for both the Jefferson Parish lakefront and the West End complex. Post-Katrina planning and design efforts are underway for the adjoining lakefront areas, demonstrating their significance to the future of the metropolitan area. The scale and location of the new facilities could complicate the efforts to reestablish pedestrian connections across the 17th Street Canal. In addition, the location of the new permanent station and closure structure could result in delays to the redevelopment and restoration efforts, which could negatively affect the restoration of the area.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
The new pump station and closure structure could be industrial-type structures situated in an existing residential and park setting. The architectural elements and aesthetics could be more typical of an industrial park and stand in stark contrast to their surrounding setting. The

construction, operation, and maintenance of the new structure could be considered disruptive to the public's use of the green space and the private use and enjoyment of adjoining residential properties. The new structure could exhibit little unity in color or texture.

The aesthetic impacts to the Lakeshore community on the west side of the canal would be greater than those to the Lake Vista neighborhood on the east due to the closer proximity to residential properties and the narrower public green space on the west side. The new pump station and closure structure would be much closer to the residences on the west side than any other portion of either Orleans or London Canals. Both residential areas, however, have experienced negative aesthetic impacts as well as disruptions to public use of the corridors along the levees.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
The new pump station and closure structure could be industrial-type structures situated in an existing residential and park setting. The architectural elements and aesthetics could be more typical of an industrial park and stand in stark contrast to their surrounding setting. The construction, operation, and maintenance of the new structure could be considered disruptive to the public's use of the green space and the private use and enjoyment of adjoining residential properties. The new structure could exhibit little unity in color or texture. The aesthetic impacts to the Lake Terrace community on the west side of the canal would be greater than those to the UNO campus due to its proximity to residential properties and disruption of the public green space along Pratt Drive.

3.2.12.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

17th Street Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
For all other layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.12.2.2.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
For all other layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.12.2.2.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
For all other layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.12.2.2.

3.2.12.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in section 3.2.12.2.2.

3.2.12.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

17th Street Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources for all Alternatives
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.12.2.2.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources for all Alternatives
Direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.12.2.2.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources for all Alternatives
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.12.2.2.

3.2.12.2.6 Concrete-Lined Canals

The impacts for this alternative would be similar for 17th Street, Orleans Avenue, and London Avenue Canals.

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
Replacing the existing floodwall and lining the canals with concrete would have minimal adverse effects on aesthetic and visual resources. The aesthetics of the project corridor would be temporarily impacted by construction activities at the project site and by transport activities needed to move equipment and materials to and from the site. The long-term impacts on aesthetics resources would be minimal. The floodwall structure would be similar in design and scale to the existing conditions.

The visual character of the area adjacent to the protected side of the existing floodwall should be enhanced when designed and built. The floodwall would be designed with an architectural treatment to the floodwall concrete and the adjacent area should be landscaped, which is strongly recommended in urbanized areas (EM 1110-2-2504, Design of Sheet Pile Walls).

3.2.12.2.7 Replace I-walls with T-walls

The impacts for this alternative would be similar for 17th Street, Orleans Avenue, and London Avenue Canals.

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
The direct, indirect, and cumulative impacts for this alternative would be similar for each canal to the impacts described for the no action alternative in section 3.2.12.2.1.

3.2.12.2.8 ICS Gates with Parallel Protection

The impacts for this alternative would be similar for 17th Street, Orleans Avenue, and London Avenue Canals.

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
The direct, indirect, and cumulative impacts for this alternative would be similar for each canal to the impacts described for the proposed action and the Concrete-Lined Canals alternative in section 3.2.12.2.6.

3.2.12.2.9 Upgrade ICS to Permanent System

17th Street Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.12.2.2.

Orleans Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.12.2.2.

London Avenue Canal

Direct, Indirect, and Cumulative Impacts to Aesthetic Resources
Direct, indirect, and cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.12.2.2.

3.2.13 Land Use

3.2.13.1 Existing Conditions

The land use in the vicinity of the 17th Street, Orleans Avenue, and London Avenue Canals is mainly urban, developed, and characterized as residential homes intermixed with commercial businesses and community services. Residential neighborhoods in the project area include Lakeview, Gentilly, Bywater, Mid-City, French Quarter/Central Business District, Central City/Garden District, and Uptown/Carrollton (GNOCDC 2007) (figure 38). Nearly 94 percent of the project area is classified as developed, with the remaining 6 percent divided among upland forest, upland scrub/shrub, agriculture/pasture, and water (USACE 2007b).

Figure 38. New Orleans Planning Districts
Source: GNOCDC 2007

A major landmark in the project area is City Park, between the Orleans Avenue Canal and Bayou St. John. The 1,500-acre park was founded in 1854 and is one of the largest and oldest urban parks in the nation. It contains a golf course, the New Orleans Museum of Art, Besthoff Sculpture Garden, New Orleans Botanical Garden, Tad Gormley Stadium, Storyland, Equest Farms horse stables, an amusement park, tennis courts, and a historic carousel and pavilion. The park stretches from City Park Avenue on the south, Wisner Boulevard on the east, Robert E. Lee on the north, and Orleans Avenue and the Orleans Canal on the west. Other parks in the project area include the London Park and Orleans Park near the outfalls of their respective canals and West End Park at the lakefront on the east side of the 17th Street Canal. The Fairgrounds Race Track is west of the London Avenue Canal, south of I-610. Pontchartrain Beach is on the lakefront, approximately 4,000 feet to the east of the London Avenue Canal.

Major universities in the project area include UNO, Southern University of New Orleans, and Dillard University. UNO is on the east side of the London Avenue Canal at the lakefront. Southern University of New Orleans is farther to the east on Leon C. Simon Boulevard. Dillard University is adjacent to the London Avenue Canal at Gentilly Boulevard. Delgado Community College is adjacent to City Park, on the southwest side, near City Park Avenue and Orleans Avenue. Numerous cemeteries are found within the project area. Metairie, Lake lawn, and Greenwood cemeteries are near I-10 and Metairie Road. Several smaller cemeteries, including two listed on the NRHP and one within a historic district listed on the NRHP, exist within the project vicinity.

3.2.13.2 Discussion of Impacts

It should be noted that none of the alternatives discussed in this section would impact any prime or unique farmland.

3.2.13.2.1 No Action Alternative

Direct Impacts to Land Use
Land use would not be directly impacted because the alternative footprint would remain within the confines of the existing canal ROW. The majority of the land adjacent to and in the vicinity of the canals is classified as developed and would not be expected to change with implementation of the no action alternative.

Indirect Impacts to Land Use
Short-term impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements, briefly changing land use from developed to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their pre-construction condition after construction has been completed.

Cumulative Impacts to Land Use
Cumulative impacts to land use are not expected because this alternative falls within the current footprint of the canal and would not result in any land use changes.

3.2.13.2.2 Proposed Action

17th Street Canal

Direct Impacts to Land Use
Under the proposed action, land use would be directly impacted. The layout alternative footprint would require the demolition of damaged structures on the east side of the canal and some commercial property on the west side, and require ROW acquisitions. The majority of the land adjacent to and in the vicinity of the canal is classified as developed with a mix of residential and commercial buildings. This layout alternative footprint includes some land used as green space

for recreation. Land use could change from developed and green space to light industrial within the proposed action's footprint. Long-term, direct impacts on land use and landowners could be expected; including up to eight residential and six commercial properties, and loss of commercial and recreational interests. Note that during design of the new pump station, measures would be implemented to minimize the impacts to residential and commercial interests so that the final site design could actually be smaller than presented in section 2.3.1 and have fewer land use impacts when completed.

Indirect Impacts to Land Use
Temporary impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements briefly changing land use from developed to light industrial. Long-term, indirect impacts to areas south of Hammond Highway would not be expected because these areas would be expected to return to their pre-construction condition after construction has been completed.

Cumulative Impacts to Land Use
Impacts to land use under the proposed action would be cumulative with other land use impacts resulting from other HSDRRS projects and rebuilding efforts within the region. The proposed action, in combination with other rebuilding efforts, could take previously developed land but would provide a long-term beneficial impact because these properties are used to provide a hurricane protection system that protects the local area and entire region.

Orleans Avenue Canal

Direct Impacts to Land Use
Under this alternative, land use would be directly impacted. The layout alternative footprint would require no significant demolition of existing structures but would require ROW acquisitions of property currently used as green space—mainly Lakeshore Park. The majority of the land adjacent to and in the vicinity of the canal is classified as developed with a mix of residential and commercial buildings. This alternative footprint includes a vast majority of green space and open water. Land use could change from developed and green space to light industrial within the alternative footprint. Long-term, direct impacts on land use would be expected. Note that during design of the new pump station, measures would be implemented to minimize the impacts so that the final site design could actually be smaller and have fewer land use impacts when completed.

Indirect Impacts to Land Use
Short-term impacts during construction could impact land use in the vicinity of the canal because some areas could be used for construction easements, temporarily changing land use from developed and green space to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their pre-construction condition after construction has been completed.

Cumulative Impacts to Land Use
The cumulative impacts to land use would be similar as those discussed for the 17th Street Canal proposed action.

London Avenue Canal

Direct Impacts to Land Use
Under the proposed action, land use would be directly impacted. The layout alternative footprint would require permanent ROW acquisition of green space and UNO property on the east bank of the canal and green space on the west bank, avoiding direct impacts to residential structures on the west bank. Land use could change from developed and green space to light industrial within the alternative footprint. Note that during construction of the new pump station, measures would

be implemented to minimize the impacts to residential interests so that the final site design could actually be smaller and have fewer land use impacts when completed.

Indirect Impacts to Land Use
Temporary impacts during construction could affect land use in the vicinity of the canal as some areas could be used for construction easements briefly changing land use from green space to light industrial. Long-term indirect impacts would not be expected, as these areas would be expected to return to their pre-construction condition after construction has been completed.

Cumulative Impacts to Land Use
In addition to the cumulative impacts discussed for the 17th Street Canal proposed action, the canal levee from the new pump station and closure structure and Lake Pontchartrain would be classified as green space, which results in an overall net beneficial impact for the project area.

3.2.13.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Station – Alternative Layouts

17th Street Canal

Layout Alternative B
Direct Impacts to Land Use
Under this alternative, land use would be directly impacted. The layout alternative footprint would require the demolition of commercial structures on the west side of the canal and require ROW acquisitions of property in the Bucktown area. Acquisition of property on the east bank of the canal would not be necessary under this layout alternative; therefore, land use would not change on the east bank. The majority of the land adjacent to and in the vicinity of the canal is classified as developed with a mix of residential and commercial buildings. This layout alternative footprint includes some property classified as green space. Land use could change from developed and green space to light industrial within the alternative footprint. Long-term, direct impacts on land use would be expected. Note that during construction of the new pump station, measures would be implemented to minimize the impacts to residential interests so that the final site design could actually be smaller and have fewer land use impacts when completed.

Indirect and Cumulative Impacts to Land Use
Indirect and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action in section 3.2.13.2.2.

Layout Alternative C
Direct, Indirect, and Cumulative Impacts to Land Use
This alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the 17th Street Canal proposed action in section 3.2.13.2.2. However, this layout alternative would acquire more residences (approximately 40) on the east bank of the canal compared to the proposed action. Less green space is required for ROW acquisition when compared to the 17th Street Canal proposed action.

Orleans Avenue Canal

Layout Alternative A
Direct, Indirect, and Cumulative Impacts to Land Use
This layout alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.13.2.2.

Layout Alternative C

Direct Impacts to Land Use

Under the proposed action, land use could be directly impacted. The layout alternative footprint would require no significant demolition of existing structures but would require ROW acquisitions of property currently used as green space. The majority of the land adjacent to and in the vicinity of the canal is classified as developed with a mix of residential and commercial buildings. This alternative footprint would impact those areas along the canal levee currently used as green space and the ICS. Land use could change from developed and green space to light industrial within the alternative footprint along with the possibility of converting some light industrial. Long-term, direct impacts on land use would be expected. Note that during design of the new pump station, measures would be implemented to minimize the impacts to residential interests so that the final site design could actually be smaller than presented in section 2.3.2 and have fewer land use impacts when completed.

Indirect Impacts to Land Use

Temporary impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements, briefly changing land use from green space to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their normal condition after construction has been completed.

Cumulative Impacts to Land Use

Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.2.13.2.2.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to Land Use

This layout alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the Orleans Avenue Canal layout alternative C. In addition, approximately 3 acres of cypress stand in City Park would be directly impacted and land use would change to light industrial.

London Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Land Use

This layout alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the Orleans Avenue Canal layout alternative A.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Land Use

This layout alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the Orleans Avenue Canal layout alternative B.

Layout Alternative D

Direct, Indirect, and Cumulative Impacts to Land Use

This layout alternative would have similar direct, indirect, and cumulative impacts to the impacts described for the London Avenue Canal proposed action. In addition, this layout alternative would require more acquisition of UNO property when compared to other layout alternatives. Land use could change from developed and green space to light industrial within the alternative footprint. Note that during design of the new pump station, measures would be implemented to minimize the impacts to residential interests so that the final site design could actually be smaller than presented in section 2.3.3 and have fewer land use impacts when completed.

Layout Alternative E

Direct Impacts to Land Use

Under the proposed action, land use would be directly impacted. The layout alternative footprint would require permanent ROW acquisition of green space on the east bank of the canal, avoiding impacts to residential structures on the west bank. A portion of UNO property could be used as a temporary construction easement during construction of the new pump station. Land use could change from developed and green space to light industrial within the alternative footprint. Note that during design of the new pump station, measures would be implemented to minimize the impacts to residential interests so that the final site design could actually be smaller than presented in section 2.3.3 and have fewer land use impacts when completed.

Indirect Impacts to Land Use

Temporary impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements, briefly changing land use from green space to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their normal condition after construction has been completed.

Cumulative Impacts to Land Use

Cumulative impacts would be similar to the impacts described for the London Avenue Canal proposed action in section 3.2.13.2.2.

3.2.13.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

Direct, Indirect, and Cumulative Impacts to Land Use

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.2.13.2.2 and 3.2.13.2.3.

3.2.13.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

Direct, Indirect, and Cumulative Impacts to Land Use

This alternative should have similar direct, indirect, and cumulative impacts to the impacts described in sections 3.2.13.2.2 and 3.2.13.2.3 for the 17th Street, Orleans Avenue, and London Avenue Canals' layout alternatives.

3.2.13.2.6 Concrete-Lined Canals

The impacts for this alternative would be similar for 17th Street, Orleans Avenue, and London Avenue Canals.

Direct Impacts to Land Use

Land use would not be directly impacted because the alternative footprint would remain within the confines of the existing canal ROW. The majority of the land adjacent to and in the vicinity of the canals is classified as developed and would not be expected to change with implementation of this alternative. The current location of the ICS, which was previously used as green space, would return to green space once the ICS is removed upon completion of the project.

Indirect Impacts to Land Use

Short-term impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements, briefly changing land use from developed to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their normal condition after construction has been completed.

Cumulative Impacts to Land Use
Cumulative impacts to land use are not expected because this alternative falls within the current footprint of the canal and would not result in any land use changes.

3.2.13.2.7 Replace I-walls with T-walls

Direct, Indirect, and Cumulative Impacts to Land Use
This alternative would have direct, indirect and cumulative impacts for 17th Street, Orleans Avenue, and London Avenue Canals similar to the impacts described in section 3.2.13.2.1.

3.2.13.2.8 ICS Gates with Parallel Protection

Direct, Indirect, and Cumulative Impacts to Land Use
This alternative would have direct, indirect and cumulative impacts for 17th Street, Orleans Avenue, and London Avenue Canals similar to the impacts described in section 3.2.13.2.6.

3.2.13.2.9 Upgrade ICS to Permanent System

Direct Impacts to Land Use
Land use would not be impacted under this alternative because the land use in the vicinity of the ICS was already impacted during construction of the ICS. Land use changed from undeveloped green space to developed during ICS construction, and upgrading the ICS to a permanent system would keep the land as developed with no additional direct impacts.

Indirect Impacts to Land Use
Short-term impacts during construction could affect land use in the vicinity of the canal because some areas could be used for construction easements, briefly changing land use from developed to light industrial. Long-term, indirect impacts would not be expected because these areas would be expected to return to their normal condition after construction has been completed.

Cumulative Impacts to Land Use
Cumulative impacts to land use are not expected because this alternative falls within the current footprint of the ICS and would not result in any land use changes.

3.3 SOCIOECONOMIC RESOURCES

3.3.1 Existing Conditions

This section describes the social and economic environment that implementing the proposed action and alternative actions could impact. The social and economic environment of the project area is characterized by its demographic composition, the structure and size of its economy, and the types and levels of public service available to its citizens. Accordingly, this study evaluates potential impacts of the proposed action on the region's population growth, employment and income levels, business activities, housing stock, public services, and community and regional growth post-Katrina.

The project area is in the Greater New Orleans area in Jefferson and Orleans Parishes, Louisiana. Orleans Parish and the city of New Orleans operate as a merged city-parish government; consequently, socioeconomic data for the parish and city are identical.

A joint collaboration between the Brookings Institution Metropolitan Policy Program and the GNOCDC monitors the social and economic recovery of the Gulf Coast region through the use of 40 indicators, known as the *New Orleans Index* (Brookings Institution 2008).[2] Socioeconomic

[2] Unless otherwise noted, all data cited in this section, including tables and figures, were taken from the New Orleans Index.

data from the New Orleans Index is broken up primarily by data for the city of New Orleans (Orleans Parish) and the New Orleans metro statistical area (MSA). The New Orleans MSA includes Jefferson Parish, Orleans Parish, Plaquemines Parish, St. Bernard Parish, St. Charles Parish, St. John Parish, and St. Tammany Parish. In using this data, where possible, we have further categorized it for the Region of Influence (ROI) using Jefferson Parish, ZIP Code, and neighborhood boundaries.

3.3.1.1 Business, Industry, Employment and Income

Both the New Orleans MSA and the city of New Orleans have continued to recover lost employers and labor force in the 3 years following Hurricane Katrina.

3.3.1.1.1 Jefferson Parish and New Orleans MSA

Median household income in Jefferson Parish was $41,773 (in 2005 inflation-adjusted dollars) in 2005. Average per capita income for 2005 was $22,454. Approximately 12 percent of families and 15 percent of all residents were below the poverty level. The labor force for Jefferson Parish was 230,173, with 21,318 (9.3 percent) unemployed.

Management, professional, sales, and office professions accounted for approximately 62 percent of all jobs in the parish. Service occupations accounted for approximately 15 percent of jobs, and construction and production-related activities accounted for approximately 12 percent and 10 percent of jobs, respectively.

Jefferson Parish has nearly recovered its number of total employers, retaining 93 percent of pre-Katrina numbers. In the second quarter of 2005, there were 11,416 employers, versus 10,582 employers in the third quarter of 2006. Table 15 shows the change in total employers from 2005 Quarter 2 to 2006 Quarter 3, along with an explanation of cumulative net change activity.

Table 15. Net Change in Total Employers, Jefferson Parish

Quarter	Total employers	Cumulative net change	Explanation of cumulative net change activity		
			Closed/moved out	New/moved in	No report 2005 Q2, but reported later
2005 Q2	11,416				
2005 Q3	10,149	-1,267	-1,774	239	268
2005 Q4	10,213	-1,203	-2,330	649	478
2006 Q1	10,342	-1,074	-2,590	1,211	305
2006 Q2	10,803	-613	-2,471	1,502	356
2006 Q3	10,582	-834	-2,782	1,644	304

Source: Brookings Institution 2008

Further economic indicators have not been broken up by Parish but divided into New Orleans and the New Orleans MSA. While it is not possible to fully detail the characteristics of the Jefferson Parish economy, considering economic data of the New Orleans MSA provides an indication of how the region, including Jefferson Parish, is recovering post-Katrina.

The New Orleans MSA labor force has now reached 81 percent of pre-Katrina levels. The pre-Katrina labor force was 635,588 in July 2005, which dropped to a low of 465,018 in January

2006 before rising to a high of 515,130 in June 2007. The latest figures by the Louisiana Department of Labor, Bureau of Labor Statistics in May 2008 show that the labor force consists of 511,471 employees in the New Orleans MSA.

While the labor force has risen in the 3 years following Katrina, the unemployment rate in the New Orleans MSA has dropped dramatically. Pre-Katrina, the unemployment rate was 5.3 percent, which fell to a low of 3.0 percent in October of 2007. The latest figure available in May 2008 shows the unemployment rate at 3.3 percent, which is well below both the state rate of 4.0 percent and the national rate of 5.5 percent for the same time period. The growing economy, accompanied by a relatively smaller workforce, has served to keep the unemployment rate of the New Orleans MSA comparatively low (Brookings Institution 2008).

The service sector is of vital importance to the MSA, and service-providing jobs made up 87 percent of all jobs in the region pre-Katrina. The majority of the jobs lost following Hurricane Katrina were in this sector; between July 2005 and October 2005, 167,300 service jobs were lost in the MSA. As of May 2008, the New Orleans MSA had recovered 85 percent of the pre-Katrina service-providing jobs, to reach a total of 445,800 jobs. Figure 39 provides a broader breakdown of non-farm employees by both source and type of employment.

3.3.1.1.2 *Orleans Parish*

Median household income in Orleans Parish was $30,711 (in 2005 inflation-adjusted dollars) in 2005. Average per capita income for 2005 was $21,998. Approximately 22 percent of families and 25 percent of all residents were below the poverty level. The labor force for Orleans Parish was 214,525, with 28,312 (13.2 percent) unemployed.

Management, professional, and sales and office professions accounted for approximately 63 percent of all jobs in the parish. Service occupations accounted for approximately 24 percent of jobs, and construction and production-related activities each accounted for approximately 6 percent and 8 percent of jobs, respectively.

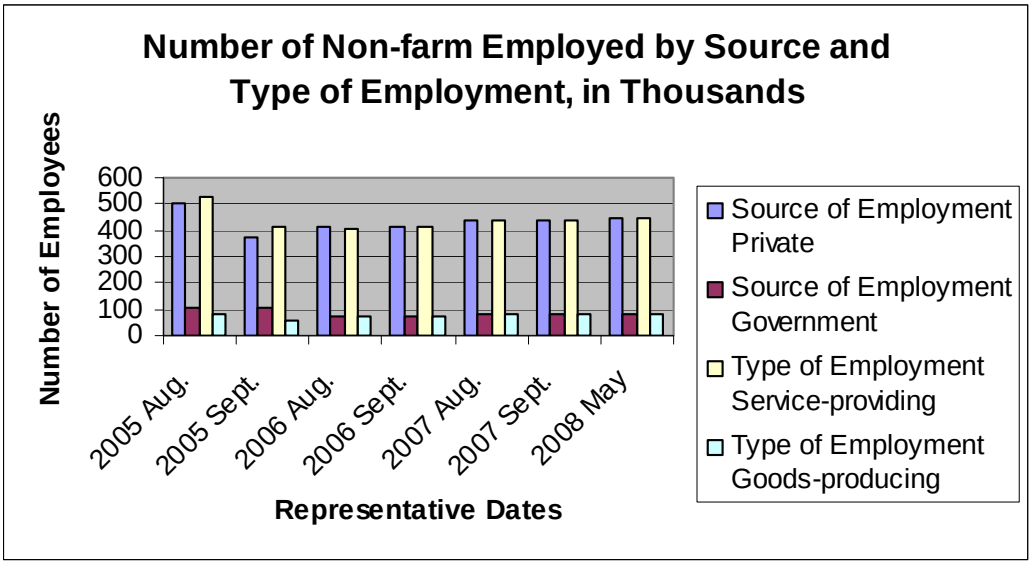


Figure 39. Number of Non-farm Employed by Source and Type of Employment, New Orleans MSA
Source: Brookings Institution 2008

Following Katrina, the city of New Orleans lost 32 percent of its workforce between July 2005 and August 2006. Labor force numbers have risen, and New Orleans has regained 78 percent of pre-Katrina levels as of August 2007.

There has been a cumulative net change in total employers in Orleans Parish, with a 23 percent loss from pre-Katrina numbers. In the second quarter of 2005 there were 9,592 employers, versus 7,376 employers in the third quarter of 2007. Table 16 shows the change in total employers from 2005 Quarter 2 to 2007 Quarter 3, along with an explanation of cumulative net change activity.

A vignette of industry recovery in the project area—the Bucktown fishing fleet returned in November of 2007 to a floating dock near the USCG patrol station, just east of the 17th Street Canal. The Bucktown fishing fleet, a total of 28 boats, had been at the Bonnabel Boat Launch in Metairie since the construction of the temporary pump stations post-Katrina. This commercial fishing fleet had been operating out of the 17th Street Canal for more than a century (Waller 2007).

These economic indicators, while incomplete, show that Orleans Parish is recovering at a slower rate than the New Orleans MSA.

3.3.1.2 Population and Housing

The most recent year for which U.S. Census data was available for both parishes was 2005. These data reflect the population of the area before Hurricane Katrina; consequently, the data do not represent current socioeconomic conditions in the project area. Data from the New Orleans Index will be used to provide a snapshot of recovery in the project area. U.S. Postal Service delivery statistics and indicators of housing unit occupancy for the fall 2007 suggest that the populations in Jefferson and Orleans parishes continue to increase post-Katrina (Brookings Institution 2008).

Table 16. Net Change in Total Employers, Orleans Parish

Quarter	Total employers	Cumulative net change	Explanation of cumulative net change activity		
			Closed/moved out	New/moved in	No report 2005 Q2, but reported later
2005 Q2	9,592				
2005 Q3	7,545	-2,047	-2,439	183	209
2005 Q4	7,011	-2,581	-3,602	416	605
2006 Q1	6,641	-2,951	-3,827	663	213
2006 Q2	7,039	-2,553	-3,683	897	233
2006 Q3	6,991	-2,601	-3,845	1,031	213
2006Q4	7,781	-1,811	-3,698	1,331	556
2007Q1	7,336	-2,256	-3,954	1,464	234
2007Q2	7,482	-2,110	-3,985	1,636	239
2007Q3	7,376	-1,988	-4,075	1,851	236

Source: Brookings Institution 2008

3.3.1.2.1 Jefferson Parish

The population of Jefferson Parish in 2005 was 448,578. Approximately 66 percent of Jefferson Parish residents identified themselves as white; approximately 27 percent identified themselves as black or African American; approximately 3 percent identified themselves as Asian.

Approximately 8 percent of Jefferson Parish residents identified themselves as Hispanic or Latino (of any race). A total of 192,373 housing units were present in the parish, and average family size was 3.30 individuals. The median age of residents was 37.9 years. Detailed population demographics for the post-Katrina population of Jefferson Parish are not readily available; however, the U.S. Census Bureau has estimated the 2006 population of Jefferson Parish as 411,305.

The Louisiana Health and Population Survey, overseen by The Louisiana Recovery Authority in the summer of 2006,[3] provides further estimates of Jefferson Parish post-Katrina demographics. The household survey population estimate of Jefferson Parish was 434,666, and responses were received between June and October 2006. Approximately 61 percent of respondents identified themselves as white; approximately 30 percent as black or African American; approximately 3.5 percent as Asian; approximately 0.1 percent as American Indian; approximately 9.7 percent as Latino; and approximately 1 percent as Native Hawaiian/Other Pacific Islander (LPHI et al. 2006a). This information provides indicative data of the demographics immediately following Hurricane Katrina.

The Brookings Institution Metropolitan Policy Program and the Greater New Orleans Community Data Center have gathered statistics from various sources in an effort to determine the number of occupied housing units in Jefferson Parish. According to the U.S. Postal Service's Delivery Statistics product, the proportion of households actively receiving mail in Jefferson Parish is 97.9 percent of pre-Katrina levels as of June 2008 (GNOCDC 2007). Road Home applications provide a gauge of the intent of former residents to remain in Jefferson Parish post-Katrina. As of June 2008, 99 percent of the 34,703 Jefferson Parish Road Home applicants had declared their intent to keep their home and of the total number of Road Home applications, 21,645 applications had been closed.[4]

The U.S. Census Bureau released population estimates for Jefferson Parish in 2007. These estimates showed the population of Jefferson Parish dropped from 449,640 in July 2005 to 423,520 in July 2007, a loss of 26,120 people. These figures have been challenged by Jefferson Parish.

The number of single-family home sales in East Jefferson is also an important characteristic of the area's recovery and demographic shifts. Figure 40 shows a stark decrease in this number in September 2005, immediately following Katrina. Despite this sharp dip, the number of single-family home sales rose to 298 in March of 2007, which is almost double the most recent number of home sales available for East Jefferson Parish, that of 156 in May 2008.

[3] Results are estimated to have a 10.4 percent margin of error (+/–)

[4] Statistics updated on the Road Home Program website: http://www.road2la.org/media/stats/RH_Program_Update_091008.pdf

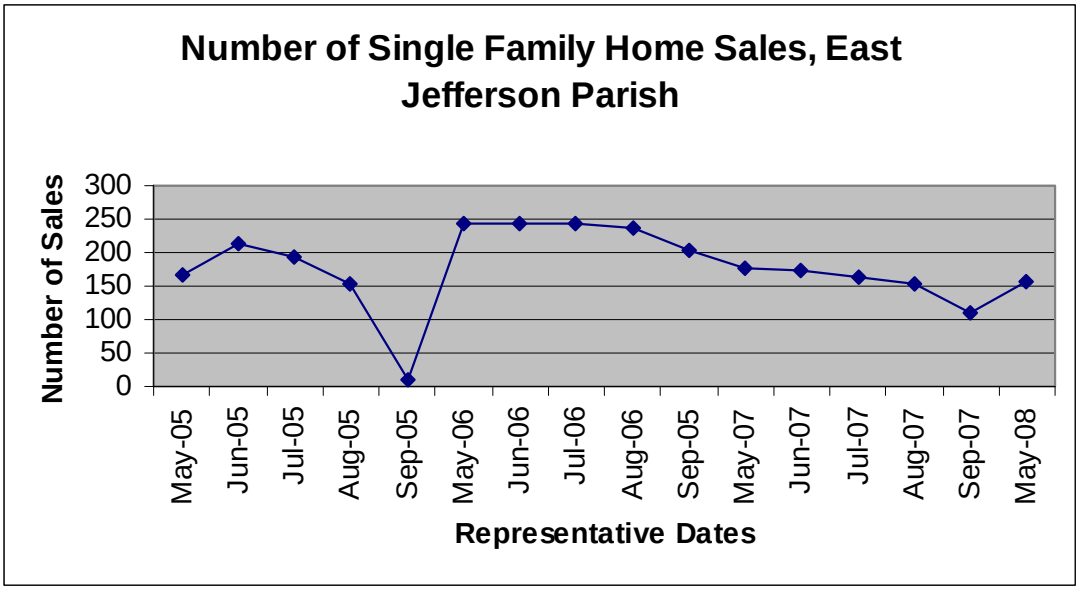


Figure 40. Number of Single-family Home Sales, East Jefferson
Source: Brookings Institution 2008

The number of active listings of single family homes in East Jefferson Parish saw almost steady increase over the last three years, from 708 listings in the first quarter of 2005, to 1,736 in the first quarter of 2008. The rise reached its peak in the third quarter of 2007, with 1,913 listings.

Public school enrollment and demographics also shed light on population trends post-Katrina. Jefferson Parish public school enrollment is down from 51,666 students in the fall of 2004 to 43,602 students in the spring of 2008; a loss of over 8,000 students. Louisiana Department of Education statistics from February 2007 show that the percentage of African American students and white students has dropped slightly, from 52 percent to 49 percent, and 34 percent to 33 percent respectively. The Asian population has risen slightly, from 4 percent to 5 percent, while the Hispanic population has risen from 9 percent to 12 percent (Brookings Institution 2008).

3.3.1.2.2 *Orleans Parish*

The population of Orleans Parish in 2005 was 453,726. Approximately 28 percent of Orleans Parish residents identified themselves as white; approximately 68 percent identified themselves as black or African American; and approximately 3 percent identified themselves as Asian. Approximately 3 percent of Orleans Parish residents identified themselves as Hispanic or Latino (of any race). A total of 213,137 housing units were present in the parish, and average family size was 2.68 persons. The median age of residents was 35.2 years. Detailed population demographics for the post-Katrina population of Orleans Parish are not readily available; however, the U.S. Census Bureau has estimated the 2006 population of Orleans Parish as 158,353.

The Louisiana Health and Population Survey received surveys from Orleans Parish between June and October 2006.[5] The estimated household survey population was 191,139. Approximately 42 percent of respondents categorized themselves as white; 47 percent as black or African American; 3.5 percent as Asian; 0.4 percent as Native American; and 1 percent as Native Hawaiian/Other Pacific Islander. Five percent of respondents did not select a race. This survey

[5] Results are estimated to have a 9.6 percent margin of error (+/–)

indicates that a potential population shift of an increased white population and decreased black or African American population might have occurred immediately following Katrina (LPHI et al. 2006b).

Statistics gathered from the Greater New Orleans Community Data Center prove the difficulty in accurately assessing population demographics and home occupancy in the three years following Hurricane Katrina. U.S. Postal Service data show that households actively receiving mail in Orleans Parish dropped from 198,232 households in July 2005 to 116,276 households in December 2006, which represents 58 percent of the pre-Katrina total. However, Entergy reported a change in its customer base in Orleans Parish of negative 52.6 percent; from 205,466 customers pre-Katrina to 97,357 as of December 2005. The most recent data from the U.S. Postal Service show that households actively receiving mail in Orleans Parish have reached 71.8 percent of pre-Katrina levels as of June 2008. This represents only a 5.8 percent increase from 2007, compared to a 16 percent increase in the households actively receiving mail between 2006 and 2007 (for further breakdown of postal data, see figure 41). The largest share of the Road Home applicants live in Orleans Parish and of those, 91 percent expressed their intent to stay in their current home and by June 2008, 39,964 applications for rebuilding assistance have been closed (GNOCDC 2007). According to analysis performed by the Greater New Orleans Community Data Center from HUD Aggregated USPS Administrative data on address vacancies, 71,657 residential addresses across New Orleans were unoccupied as of March 2008. Of this number, 6,000 are vacant according to the post office, indicating that they are likely habitable residences that have not been purchased or rented (Brookings Institution 2008).

Population estimates were released by the U.S. Census Bureau for Orleans Parish in July 2007. According to these estimates, the population of Orleans Parish dropped from 453,726 in July 2005 to 239,124 in July 2007, a loss of almost half the pre-Katrina population. These figures have been challenged by Orleans Parish.

Authorizations of housing units, residential building permits, and demolitions in Orleans Parish represent other statistics indicative of reconstruction activities post-Katrina. The cumulative number of new residential housing units authorized in Orleans Parish since Katrina by May 2008 is 5,008, which is an increase of 3,377 from May 2007. In May 2008, the city of New Orleans has also reported issuing a cumulative number of 61,119 residential building permits. Permits issued by City Hall to March 2008 show that 10,541 properties have been demolished.

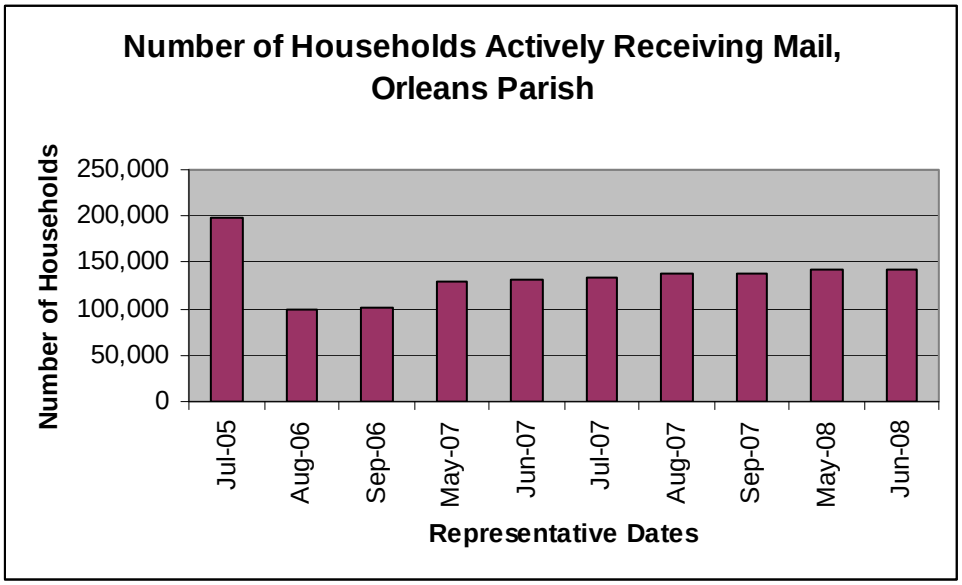


Figure 41. Number of Households Actively Receiving Mail, Orleans Parish
Source: Brookings Institution 2008

Population indicators for individual ZIP Code boundaries are a way to further break down population data relevant to the project area. Figure 42 maps ZIP Code boundaries for New Orleans and the surrounding parishes.

ZIP Codes in the ROI include Jefferson Parish (70005) and Orleans Parish (70112, 70113, 70115, 70116, 70118, 70119, 70122, 70124, 70125, and 70130). Figure 43 illustrates the number of households actively receiving mail in these ZIP Codes.

As figure 43 illustrates, the largest drops in the number of households receiving mail in the ZIP Code areas from July 2005 to August 2006 were 70119 or Mid-City (from 19,594 to 8,704); 70122 or Gentilly (from 18,233 to 4,462); and 70124 or Lakeview (from 11,278 to 2,288). The number of households receiving mail in each of these areas has continued to increase post-Katrina and, as of May 2008, stand at 14,978; 10,276; and 6,059, respectively.

GCR & Associates released New Orleans resettlement numbers in November 2007 that rely heavily on utility use to track population changes post-Katrina (figure 43). For the report, GCR calculated the number of active utility accounts on each of New Orleans' 10,000 blocks to quantify the number of residents returning to all areas of the city. Specific to the project area, the ZIP Code areas of Lakeview (70124), Gentilly (70122), and Mid-City (70199) were between 40 to 50 percent of their pre-Katrina populations as of October 2007. Lakeview decreased from 21,655 households in July 2005 to 10,026 in October 2007; Gentilly from 43,601 to 20,186; and Mid-City from 46,731 to 26,237 (GCR & Associates 2007).

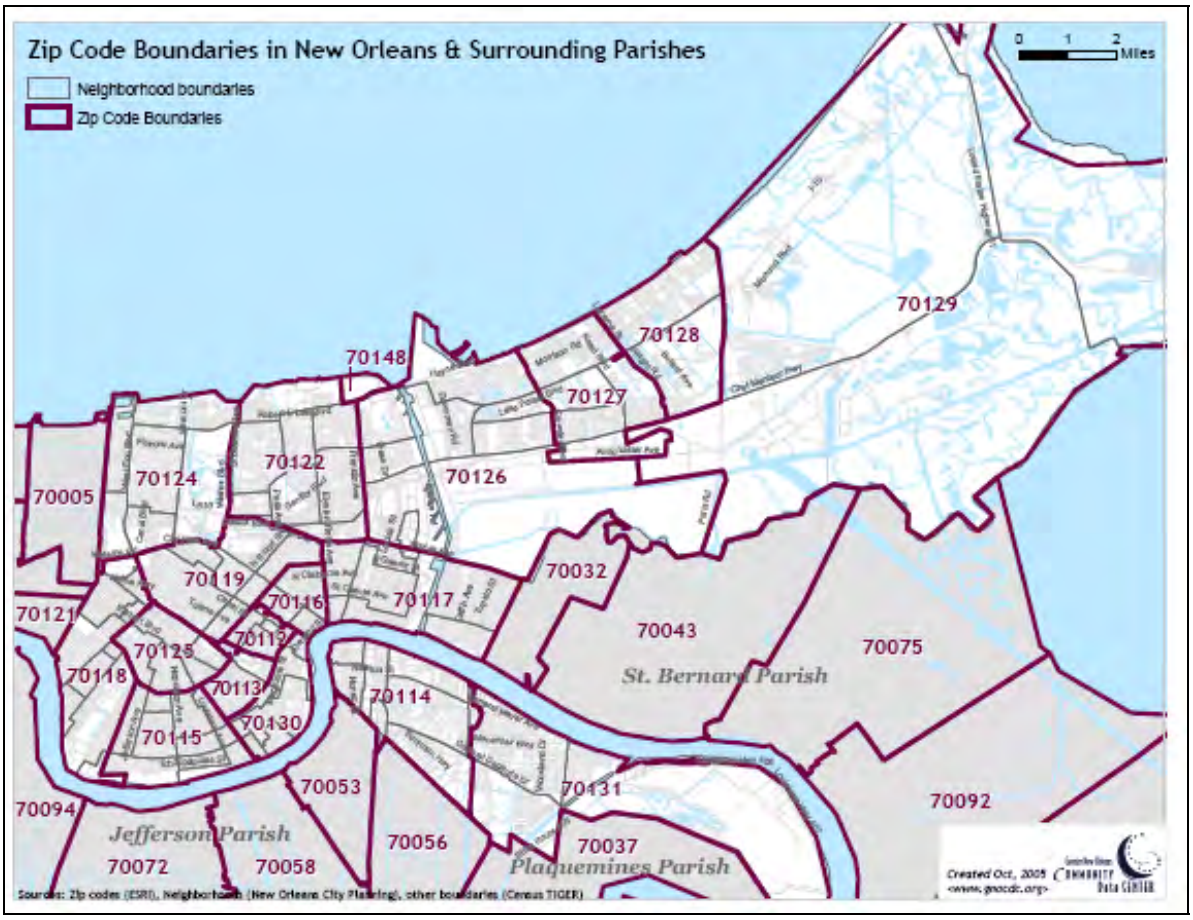


Figure 42. ZIP Code Boundaries in New Orleans and Surrounding Parishes
Source: Brookings Institution 2008

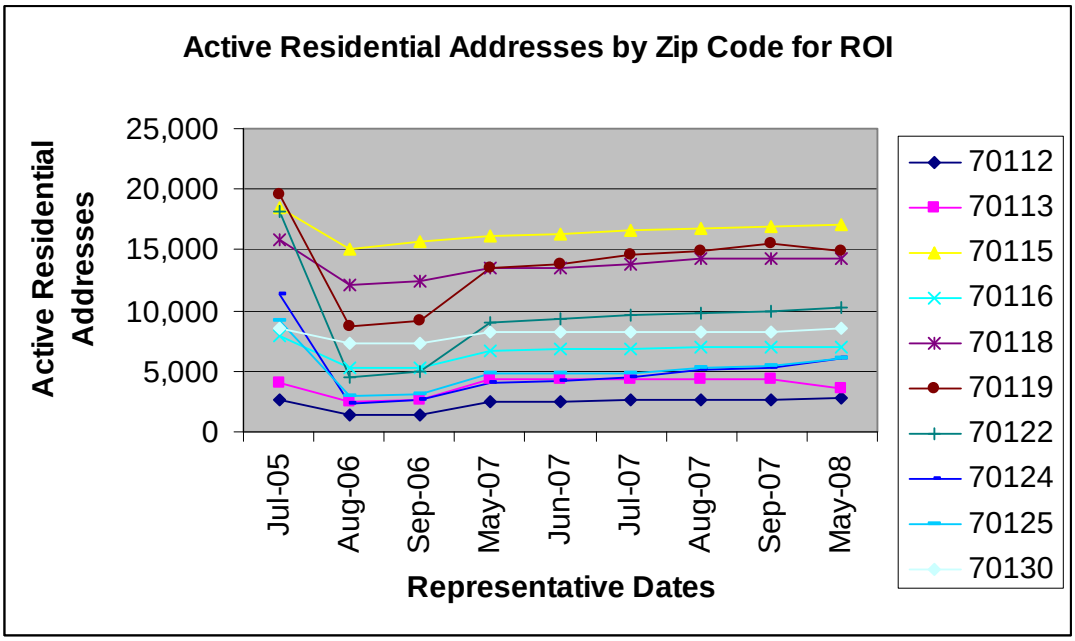


Figure 43. Number of households actively receiving mail in ROI ZIP Code areas
Source: Brookings Institution 2008

The GCR & Associates' population numbers vary from the GNOCDC numbers of households receiving mail. GCR & Associates' lead author, Gregory Rigamer, addressed these discrepancies in a *Times Picayune* article on the subject:

> ...while [Rigamer] consults mail delivery statistics, he suspects that in many cases mail is delivered to addresses where no one is actually living. [Rigamer's] analysis is founded on Entergy data showing active electric and gas accounts…utilities may be turned on at homes where no one is living, in many cases to serve construction purposes…[thus] power use patterns are consulted and population figures are adjusted downward on a block if figures are far less than what residents normally would record. (Warner 2007)

The number of single-family home sales for the Orleans East Bank showed a dramatic decrease following Hurricane Katrina, falling to just 1 in September 2005 (figure 44). Single-family home sales have subsequently risen, reaching a high of 298 in May 2007. As of May 2008, that high had dropped to 214 home sales.

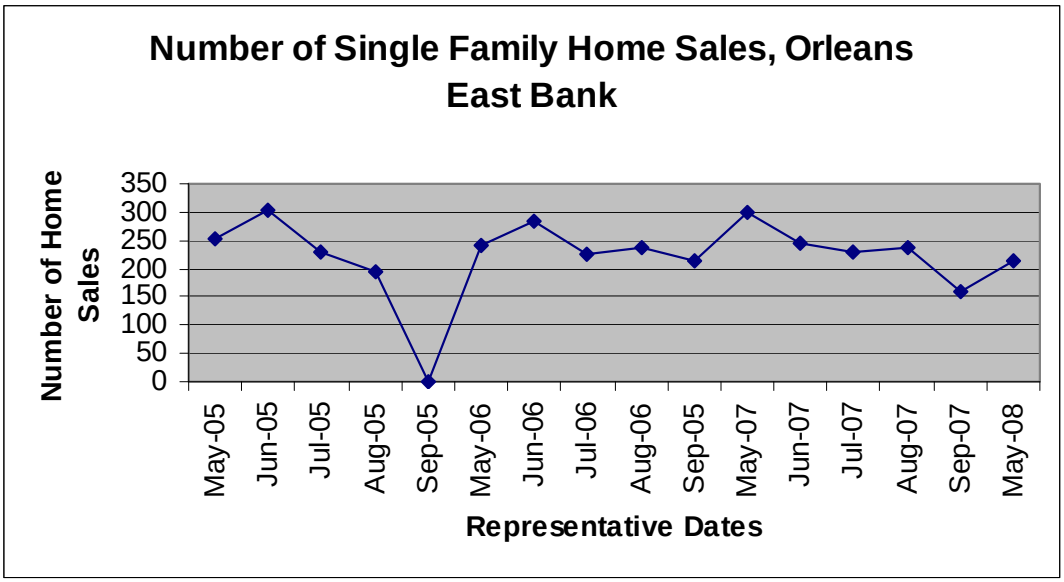


Figure 44. Number of single-family home sales, Orleans East Bank
Source: Brookings Institution 2008

Student population in the public schools in Orleans Parish has reached only 50 percent of pre-Katrina levels, with a total number of students down from 66,372 pre-Katrina to 32,887 in February 2008. However, the total number of students in 2008 has grown from a low of 6,242 students in spring 2006. The demographics of the student body served by public schools have not changed significantly between fall 2004 and spring 2008[6]. The percentage of African American students has dropped from 93 percent to 90 percent, and the percentage of white students has risen to 5 percent from 4 percent. The Hispanic population has also risen, from 1 percent to 2 percent, while the Asian population has remained at 2 percent of the total population.

[6] As public schools were not open in 2005 due to damage from Hurricane Katrina, 2004 data is used to compare pre-Katrina demographics with the most recent data available in spring of 2008.

The number of students attending institutions of higher learning in Orleans Parish also shows signs of growth. The latest data available for Tulane University and Xavier University is from fall of 2007, which indicates that the student body population of Tulane is at 80 percent and Xavier is at 70 percent of pre-Katrina levels. More recent data is available for the other area Universities, from spring 2008, which shows that Loyola is 79 percent; UNO is 65 percent; Southern University of New Orleans is 76 percent; while Dillard's student body population represents the lowest recovery rate, at 43 percent of pre-Katrina levels (GNOCDC 2007).

3.3.1.3 Property Values, Tax Revenues, Public Facilities, and Services

3.3.1.3.1 Jefferson Parish

The average sale price for a single-family home in East Jefferson Parish[7] jumped in the month proceeding Katrina but leveled off in the subsequent months. Average sale prices are now slightly lower than pre-Katrina levels. Figure 45 tracks the average sale price of single-family homes in East Jefferson Parish.

Data detailing fair market rents is available for the MSA from the U.S. Department of Housing and Urban Development, broken up by unit bedrooms. Fair market rent rose 39 percent from 2005 to 2006, most likely due to the decreased size of the available housing market. Rent stabilized at the higher numbers in 2007 and rose slightly in 2008 (figure 46).

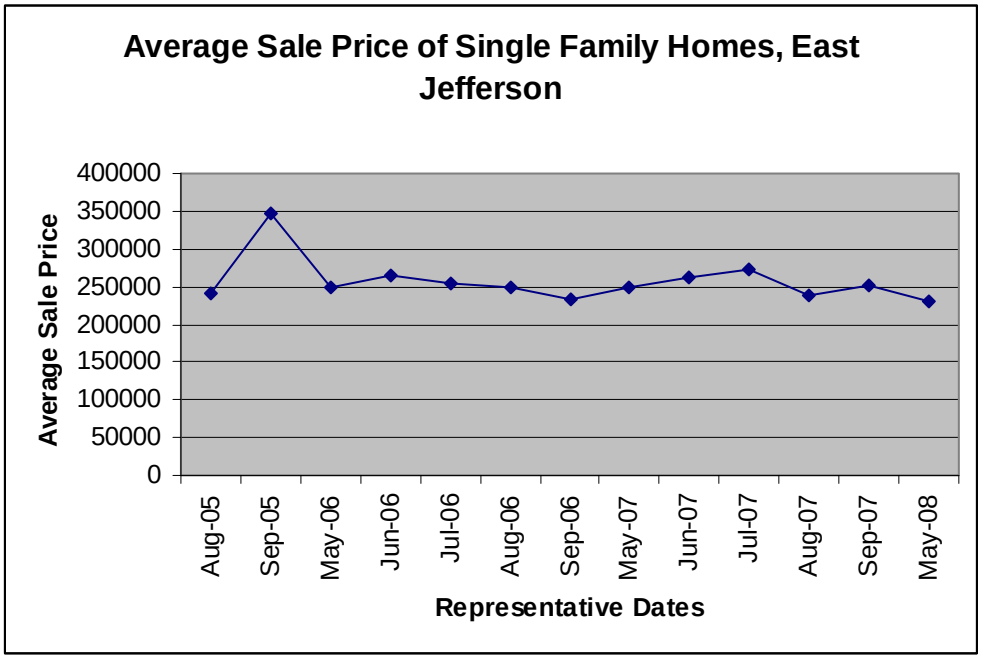


Figure 45. Average Sale Price of Single-family Homes in East Jefferson Parish
Source: Brookings Institution 2008

[7] Statistics from the New Orleans Metropolitan Association of Realtors divide Jefferson Parish data into East and West Jefferson. The ROI encompasses East Jefferson; thus, West Jefferson data is not included.

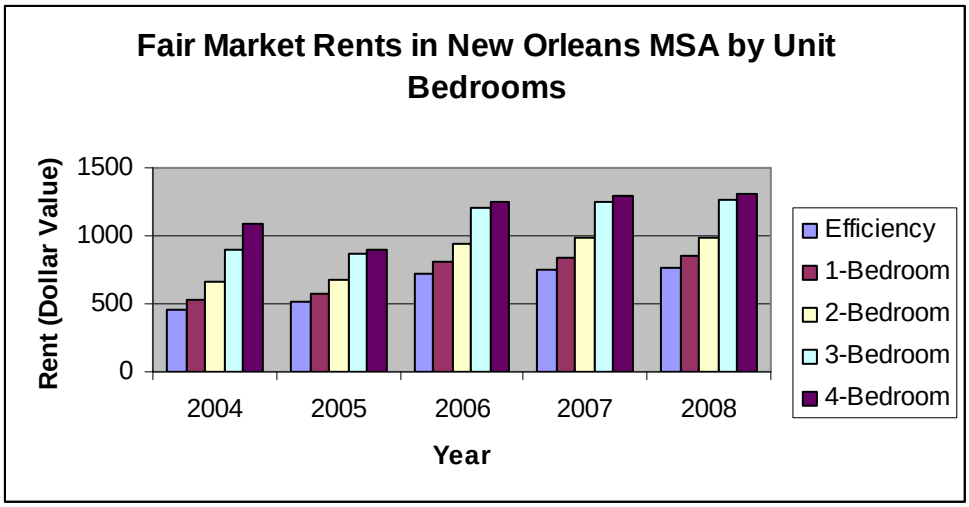


Figure 46. Fair Market Rents in New Orleans MSA
Source: Brookings Institution 2008

Local sales, license, and property taxes provide the major source of funding for Jefferson Parish. Jefferson Parish sales tax averaged $26 million monthly in 2004 and 2005 (January to July). For the same time period in 2006, monthly collections averaged $37 million. The Jefferson Parish finance director has stated that the amount collected in 2006 was an unusual year for retail because of the fact that many Orleans Parish stores were closed during that time period, and area residents were replacing goods lost during Hurricane Katrina (Guillet 2007). The average Jefferson Parish sales tax collected in 2007 dropped to $33 million, which is still higher than the amount collected in 2005.

The public facilities and services available in Jefferson Parish have nearly rebounded to pre-Katrina levels. Jefferson Parish has succeeded in reopening all public schools after losing 5 (out of 84) in the semester following Katrina. Not all private schools have reopened however, and as of fall 2008, 3 private schools (out of a total of 60) remained closed. Thirteen out of sixteen public libraries are open, or 81 percent of pre-Katrina levels. As of July 2008, 174 out of 197 child care centers (88 percent) were open in Jefferson Parish.

3.3.1.3.2 *Orleans Parish*

The average sale price of single-family homes in Orleans East Bank[8] has increased from $190,152 pre-Katrina to $241,439 in May of 2008, with an outlier of $1,050,00 in September 2005. Figure 47 charts the average sale price of single-family homes in Orleans East Bank.

The city of New Orleans' fiscal base has strengthened since Katrina, with revenues from sales taxes slightly higher than pre-Katrina levels. The city relies on revenue from a variety of sources, including tax receipts, intergovernmental revenues, and revenues from licenses and fees. Tax receipts and intergovernmental revenue contribute the bulk of the revenue. Table 17 shows the sales tax collections by source for select months.

[8] Statistics from the New Orleans Metropolitan Association of Realtors divide Orleans Parish data into Orleans East and West Banks. The ROI encompasses Orleans East.

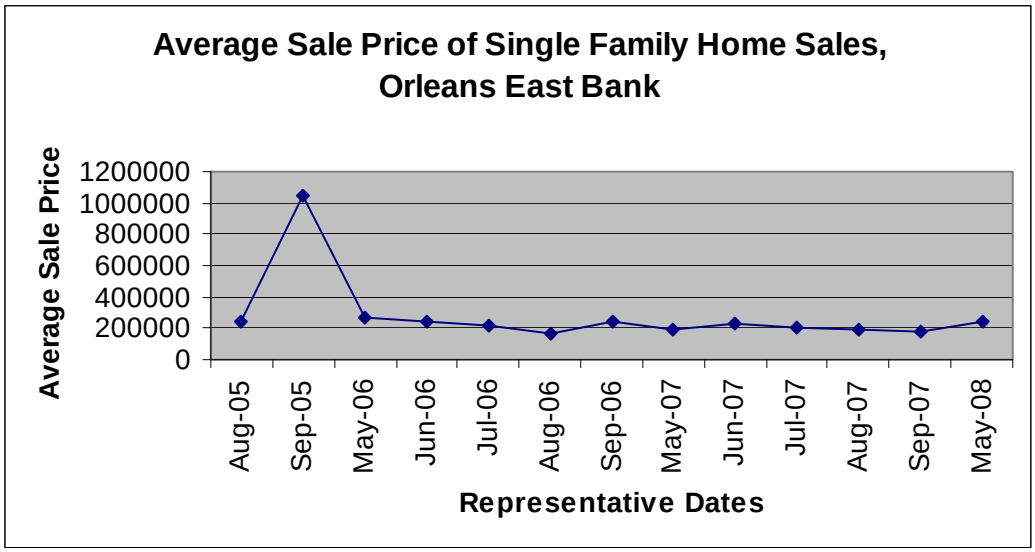


Figure 47. Average sale price of single-family homes in Orleans East Bank
Source: Brookings Institution 2008

Table 17. City of New Orleans Sales Tax Collections by Source (select months)

Date	General sales	Hotel and motel	Motor vehicle	Total
Aug-05	9,758,559	768,185	984,785	11,511,529
Sep-05	120,007	143,481	860,071	1,123,559
May-06	8,521,345	638,060	986,197	10,145,601
Jun-06	856,733	581,828	1,037,042	10,175,602
Jul-06	8,829,018	448,612	1,055,762	10,333,391
Aug-06	8,447,090	409,604	887,290	9,743,984
Sep-05	7,840,364	391,791	974,215	9,206,371
May-07	9,746,353	948,057	772,671	11,467,082
Jun-07	9,150,188	691,177	817,736	10,659,101
Jul-07	9,677,312	454,682	911,637	11,043,631
Aug-07	9,037,609	508,944	875,916	10,422,469
Sep-07	9,138,572	375,279	954,383	10,468,234
May-08	10,467,662	1,004,116	851,552	12,323,330

Source: Brookings Institution 2008

The public facilities and service available in Orleans Parish have not recovered to pre-Katrina levels. Spring 2008 numbers show that only 62 percent of the public schools will be open for the school year, or 79 out of a pre-Katrina level of 128. Relative to the project area are the planning districts of Lakeview, Gentilly, and Mid-City. Lakeview District has 4 schools that remain closed and 1 public school that is open. Gentilly District has 6 schools that are closed; 3 public schools open; and 5 charter schools open. Mid-city has 15 schools still closed; 9 public schools open; and 8 charter schools open.

Of 13 libraries, 2 remain closed in Orleans Parish. There are two libraries serving the project area—one in the Lakeview District and one open in the Mid-City District.

There is a shortage of child care services in Orleans Parish because only 117 out of 276 childcare facilities were opened in July 2008 (43 percent of original capacity). There are 4 open child care centers in the Lakeview District; 7 in the Gentilly District; and 18 in the Mid-City District.

The status of public transportation in New Orleans is one of the most afflicted areas of public service. The number of open routes is 48 percent of pre-Katrina levels, from 62 open routes in July 2005 to 30 routes in June 2008. The number of operational buses is down from a pre-Katrina number of 368 to 76 in July 2008, which represents only 21 percent of pre-Katrina standards.

3.3.1.4 Community and Regional Growth

There are several plans that have been developed to guide recovery efforts at both the state and municipal level. Two independent, yet interrelated state plans for coast-wide restoration and protection planning efforts were developed in conjunction with the LACPR. Louisiana directed the Coastal Protection and Restoration Authority (CPRA) to develop a Comprehensive Master Plan with the guiding principles being (1) integration of protection and restoration, (2) public and stakeholder involvement, (3) adaptive management and other processes, (4) recognition of constraints, and (5) land use (CPRA 2007). The CPRA held a series of stakeholder meetings and conducted public outreach between August and October 2006. The Final Plan was presented in April 2007, titled *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast*. Louisiana also established the LRA to formulate alternative redevelopment scenarios to develop a sustainable, long term vision for South Louisiana. The LRA commissioned the *Louisiana Speaks Regional Plan: Vision and Strategies for Recovery and Growth in South Louisiana*, and it was completed in May 2007 (LRA 2007).

At the municipal level, the Unified New Orleans Plan (UNOP), also referred to as the *Citywide Strategic Recovery and Rebuilding Plan*, was released in January 2007 and is a cumulative plan that integrates the individual recovery plans for the 49 officially recognized neighborhoods that had experienced severe flooding as well as the Bring New Orleans Back Plan (BNOP). In December 2006, the mayor created the Office of Recovery Management to spearhead the city's recovery effort. The Office of Recovery Management incorporated elements of UNOP and in March 2007 announced 17 *Target Recovery Zones*[9] that will be built around public assets in key business corridors in an effort to generate further private investment from developers (Times-Picayune 2007). Approved by the LRA, this grants the city access to $117 million in LRA rebuilding funds. The city also will be able to take advantage of a $300 million state revolving loan fund, a $260 million bond issue—approved by voters before Hurricane Katrina—$514 million in the Gulf Opportunity (GO) Zone Bonds for local projects, $54 million from the Federal Highway Administration (FHWA), and $77 million in Federal fund matching for roadway projects. In total, the city plans $363 million in roadway projects (City of New Orleans 2007). Three of the recovery areas are in the project area. Redevelopment areas or corridors have been mapped for Harrison Avenue, from Canal Boulevard to City Park, and Gentilly Boulevard at Elysian Fields. Robert E. Lee at Paris Avenue is slated for renewal, specifically Lake Terrace Center improvements.

The West End Redevelopment Land Use and Site Plan Analysis, sponsored by the Regional Planning Commission (RPC), presents a conceptual land use and site plan analysis in the project area, at the mouth of the 17th Street Canal (RPC 2006). The West End refers to an area bordered by Lake Pontchartrain to the north, West Roadway to the east, the flood protection levee to the south, and the 17th Street Canal and Lake Pontchartrain to the west. The EPA awarded the RPC

[9] The 17 Target Recovery Zones outlined on the City of New Orleans Web site, at http://www.cityofno.com/portal.aspx?tabid=95

a Smart Growth grant to fulfill the first phase of the redevelopment process, which includes developing a conceptual land use and site plan analysis.

As detailed in section 3.3.1, it is difficult to determine the exact population levels of the ROI post-Katrina. The U.S. Census Bureau has estimated that Jefferson Parish has reached 95 percent of pre-Katrina population, while Orleans Parish stands at just 50 percent. Gaps also remain in the economic base and public services between Jefferson and Orleans Parishes. While the state and municipal plans provide strategic frameworks for recovery, there are many such gaps in the short term including uncertainties in the availability of Road Home program monies, property valuation, and insurance availability, which make further extrapolation of these indicators as to direction and size of project area and regional growth untenable.

Louisiana State University's (LSU's) Department of Economics has developed figures that broadly address community and regional growth. According to the *Louisiana Economic Outlook* (LSU 2007), which forecasts economic conditions for the New Orleans MSA for 2008 and 2009, repopulation of the MSA is slowing down, according to trends seen in employment, building permits, public school enrollments, enrollments at the six largest universities, and in estimated population following the sharp decline in each of these areas caused by Hurricane Katrina. The outlook projects that New Orleans will add jobs at a rate of 1,000 per month or 24,000 jobs over the next 2 years. This forecast predicts that at the end of 2009, the MSA's employment will almost reach the employment numbers of 1979.

3.3.1.5 Health and Safety

3.3.1.5.1 Jefferson Parish

There are 13 open state-licensed hospitals in Jefferson Parish, down from 14 hospitals pre-Katrina. The major hospitals serving East Jefferson Parish include Ochsner Kenner, East Jefferson Medical Center, and Tulane Lakeside. There are 12 primary clinics serving Jefferson Parish.

The four police districts, or stations, serving Jefferson Parish are also fully operational.

3.3.1.5.2 Orleans Parish

Orleans Parish has retained only 57 percent of state-licensed hospitals, from 23 in 2004 to 13 open in June 2008. The major hospitals open in Orleans Parish East include Children's Hospital, Touro, Ochsner Baptist, Tulane University, and Medical Center of Louisiana in New Orleans—previously known as Charity Hospital in New Orleans. Charity Hospital, the largest charity hospital in the region, remains closed. There are 15 primary care clinics serving Orleans East Bank.

Seven police stations are open in Orleans East Bank. The Lakeview, Bywater, and Mid-City districts all have a single police station operating out of a FEMA trailer, with Mid-City also hosting police headquarters in a FEMA trailer. The Garden District and French Quarter have police stations still in need of repair. There is one fully operational station in the French Quarter.

3.3.2 Discussion of Impacts

The social and economic considerations discussed in this section are those immediately within the project area. The project area is in the Greater New Orleans area in Jefferson and Orleans Parishes, Louisiana and, where applicable, impacts to the ROI will also be evaluated.

3.3.2.1 No Action Alternative

Direct Impacts to Socioeconomics

Under the no action alternative, the project area and surrounding neighborhoods could remain at a greater risk for storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents. Short-term and long-term, direct socioeconomic impacts could occur because of the costs for such items as evacuation, cleanup, debris removal, building and infrastructure repair, damaged vehicles, and reoccupation of homes and businesses.

The recovery of the labor force, specifically in Orleans Parish, has been linked to (1) the availability and affordability of housing and (2) the confidence of the population in the reconstruction process, which influences their desire to live in the project area (Brookings Institution 2008, LSU 2007). Short-term and long-term, direct impacts could occur if the available housing units in the area were further reduced by storm events and associated flooding. Although there is no current data regarding the confidence of the population, it is reasonable to anticipate that the level of risk associated with the no action alternative would be perceived as greater than that of the proposed action.

Indirect Impacts to Socioeconomics

The project area sustained a significant amount of damage from Hurricane Katrina and, to the impacts described in section 3.3.1, still faces a shortage in labor force, housing, and public services, as compared with pre-Katrina levels. The community economy has suffered as a result of investment going toward infrastructure repairs and relocations as opposed to development and expansion. Without the proposed action, job opportunities and property values could further decline if storm activity and associated flooding continues to disrupt reconstruction efforts. Further, a reduced population means that there are fewer people to cover costs such as utilities, thus resulting in a higher economic burden on the existing population. The combination of these costs and the higher risks under the no action alternative could have a negative *wealth effect* on the community. That is, these costs could generate changes in consumer spending or other behavior that would affect the economy of the area—a long-term, indirect socioeconomic impact.

Cumulative Impacts to Socioeconomics

The temporary impacts from construction and construction-related activities of all present and future projects could result in increased traffic congestion and elevated noise levels in the project area. The no action alternative would present fewer short-term inconveniences from construction activities than the proposed action. The no action alternative poses an increased risk to the socioeconomic resilience of the New Orleans MSA, however, because the project area would not have extended 100-year level of flood protection under this alternative. The project area would not receive 100-year certification and therefore would not be eligible under the NFTP past the project life of the ICS.

3.3.2.2 Proposed Action

3.3.2.2.1 17th Street Canal

Direct Impacts to Socioeconomics

Short-term impacts could be expected under this alternative. Construction activities associated with this alternative would provide jobs in the project area and could increase the level of spending, labor, and capital expenditures in the ROI.

Long-term impacts could occur from the 100-year level of flood protection afforded under this alternative because the risk of storm surge and flooding posed to housing units and businesses in the project area from severe flood events is reduced in comparison to the no action alternative.

This alternative decreases the storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents to the impacts described in section 3.3.2.1.

Permanent ROW acquisition could directly impact approximately eight residential and six commercial properties under this alternative. This alternative footprint could directly impact the West End Redevelopment Land Use and Site Plan Analysis because some features outlined in this plan fall in the layout footprint. A proposed development of four stories of residential development with a single floor of neighborhood-oriented retail could be impacted by the permanent ROW acquisition of this layout alternative. The temporary construction easement of this layout alternative could impact proposed retail restaurants, a boardwalk alongside the 17th Street canal, and an amphitheatre.

Indirect Impacts to Socioeconomics
The proposed action could be expected to have long-term, indirect, socioeconomic impacts. As detailed in section 3.3.1, the project area is still recovering from Hurricane Katrina and faces a shortage in areas such as labor force, housing, and public services, as compared with pre-Katrina levels. Providing the 100-year level of flood protection could increase the confidence level of the citizens and encourage investment and repopulation in the project area.

Long-term impacts could be expected from the loss of portions of the historic Bucktown area and developed commercial property because this would impact the number of available jobs and commerce in the project area.

A significant amount of demolition and earthwork are required under this layout, which could have a short-term impact due to temporary road closures and increased traffic in the project area. Road closures and increased traffic could impact project area commerce and traffic patterns.

Cumulative Impacts to Socioeconomics
The cumulative impact of the proposed action combined with all the other projects in the study area on human, economic, and community resources could be beneficial because of the decreased risks of storm surge-induced flooding. Extreme peaks in demand for workers, housing, and services could strain public systems still in recovery, but socioeconomic conditions could adjust as the projects moved forward. The New Orleans MSA could experience elevated noise levels, increased traffic, and other impacts from the large number of simultaneous construction projects, but the overall economy could benefit from such growth.

Future inclusion of additional features and other improvements/enhancements by the local government or due to potential future Congressional authorization could result in canal modifications along the entire length of the canal. The canal modifications would require substantial bridge modifications along the length of the canal. Road closures and increased traffic during construction activities could temporarily impact the project area commerce and traffic patterns.

3.3.2.2.2 <u>Orleans Avenue Canal</u>

Direct Impacts to Socioeconomics
Short-term impacts could be expected under this alternative. Construction activities associated with this alternative would provide jobs in the project area and could increase the level of spending, labor, and capital expenditures in the ROI.

Long-term impacts could occur from the 100-year level of flood protection afforded under this alternative because the risk of storm surge and flooding posed to housing units and businesses in the project area from severe flood events is reduced in comparison to the no action alternative.

This alternative decreases the storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents to the impacts described in section 3.3.2.1.

Indirect Impacts to Socioeconomics
Road closures or increased traffic could be expected under this alternative, which could impact project area commerce and traffic patterns.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

3.3.2.2.3 London Avenue Canal

Direct Impacts to Socioeconomics
Short-term impacts could be expected under this alternative. Construction activities associated with this alternative would provide jobs in the project area and could increase the level of spending, labor, and capital expenditures in the ROI.

Long-term impacts could occur from the 100-year level of flood protection afforded under this alternative because the risk of storm surge and flooding posed to housing units and businesses in the project area from severe flood events is reduced in comparison to the no action alternative. This alternative decreases the storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents to the impacts described in section 3.3.2.1.

Property required for ROW acquisition would include UNO-owned property. As a result, future expansion by UNO would be precluded as this property would be occupied by the new pump station and/or auxiliary features and equipment.

Indirect Impacts to Socioeconomics
A significant amount of demolition and earthwork are required under this layout, which could have a short-term impact due to temporary road closures and increased traffic in the project area. Road closures and increased traffic could impact project area commerce and traffic patterns.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

3.3.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

Direct, Indirect, and Cumulative Impacts to Socioeconomics
Direct, indirect, and cumulative socioeconomic impacts are similar to those discussed for the proposed action for each canal in section 3.3.2.2.

3.3.2.3.1 17th Street Canal

Layout Alternative B

Direct Impacts to Socioeconomics
This layout alternative requires a significant ROW acquisition of active, fully developed commercial property, including much of the historic Bucktown area. It also requires demolition and replacement of the recently completed Hammond Highway Bridge, and it could impact

property on the west bank currently in active use by the USCG. Under this layout alternative, approximately 23 commercial properties, 6 residential properties and 1 apartment complex could be directly impacted.

This layout alternative could directly impact the West End Redevelopment Land Use and Site Plan Analysis because some features outlined in this plan fall in the layout footprint. The proposed walkway along 17th Street Canal could be impacted by the permanent ROW acquisition of this layout alternative. The retail developments proposed along the 17th Street canal could also be impacted by this layout alternative.

Indirect Impacts to Socioeconomics
Long-term impacts could be expected from the loss of a portion of the historic Bucktown area and developed commercial property because this would impact the number of available jobs and commerce in the project area.

A significant amount of demolition and earthwork are required under this layout, which could have a short-term impact due to temporary road closures and increased traffic in the project area. Road closures and increased traffic could impact project area commerce and traffic patterns.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to those discussed for the 17th Street Canal proposed action in section 3.3.2.2.1.

Layout Alternative C

Direct Impacts to Socioeconomics
Permanent ROW acquisition would occur on both banks of the canal for this proposed layout, affecting approximately 40 residential properties on the east bank and primarily undeveloped property on the west.

Indirect Impacts to Socioeconomics
A significant amount of demolition and earthwork are required under this layout, which could have a short-term impact due to temporary road closures and increased traffic in the project area. Road closures and increased traffic could impact project area commerce and traffic patterns. A significant volume of erosion protection armoring is also required under this layout, which could impact lakeshore recreation in the project area—a short-term impact. It is not expected that Orleans Marina would be impacted in the long term under this alternative.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to those discussed for the 17th Street Canal proposed action in section 3.3.2.2.1.

3.3.2.3.2 Orleans Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Socioeconomics
Direct, indirect, and cumulative impacts of this alternative would be similar to those discussed for Orleans Avenue Canal proposed action in section 3.3.2.2.2, with the following exceptions. Permanent ROW acquisition would occur almost exclusively for undeveloped property on the east bank of this proposed layout and temporary construction easement is assumed to be necessary.

Layout Alternative C

Direct Impacts to Socioeconomics
ROW acquisition would be necessary in the vicinity of residential properties; however, this area is currently being used as green space.

Indirect Impacts to Socioeconomics
This layout requires no significant demolition or removal of existing structures of any kind; therefore, road closures or increased traffic would pose less of a short-term impact than for other alternative layouts.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.3.2.2.2.

Layout Alternative D

Direct Impacts to Socioeconomics
Direct impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.3.2.2.1.

Indirect Impacts to Socioeconomics
This layout could require flood proofing improvements for the Robert E. Lee Boulevard bridge, which could have a short-term impact due to temporary road closures and increased traffic in the project area. Road closures and increased traffic could impact project area commerce and traffic patterns.

Cumulative Impacts to Socioeconomics
Cumulative impacts would be similar to the impacts described for the Orleans Avenue Canal proposed action in section 3.3.2.2.1.

3.3.2.3.3 London Avenue Canal

Layout Alternative A

Direct, Indirect, and Cumulative Impacts to Socioeconomics
Direct, indirect, and cumulative impacts of this alternative would be similar to those discussed for Orleans Avenue Canal layout alternative A.

Layout Alternative B

Direct, Indirect, and Cumulative Impacts to Socioeconomics
Direct, indirect, and cumulative impacts of this alternative would be similar to those discussed for Orleans Avenue Canal layout alternative B.

Layout Alternative D

Direct and Indirect Impacts to Socioeconomics
Direct and indirect impacts of this alternative would be similar to those discussed for the London Avenue Canal proposed action in section 3.3.2.2.3, with two exceptions. Permanent ROW acquisition would directly impact approximately 9 University of New Orleans' buildings, and areas currently being used as green space and parking lots on the University of New Orleans campus.

Cumulative Impacts to Socioeconomics

Cumulative Impacts of this alternative would be similar to those discussed for the London Avenue Canal proposed action in section 3.3.2.2.3.

Layout Alternative E

Direct and Indirect Impacts to Socioeconomics

Direct and indirect impacts of this alternative would be similar to those discussed for the London Avenue Canal proposed action in section 3.3.2.2.3, with the following exceptions. Permanent ROW acquisition would directly impact areas currently being used as green space and parking lots on the UNO campus.

Cumulative Impacts to Socioeconomics

Cumulative Impacts of this alternative would be similar to those discussed for section 3.3.2.2.3.

3.3.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in section 3.3.2.3. It should be noted for this alternative that O&M activities would increase when compared to the proposed action because the local sponsor will be operating the three new pump stations any time it rains, not just during tropical storm events.

3.3.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

Direct, Indirect, and Cumulative Impacts to Socioeconomics

Direct, indirect, and cumulative socioeconomic impacts are similar to those discussed in section 3.3.2.3, with two exceptions. The banks of each of the project area canals would be reshaped to lower elevations, essentially reconstructing the canal system. The canal modifications for this alternative would also require substantial bridge modifications along the length of each canal. Road closures and increased traffic could impact project area commerce and traffic patterns, a short-term, indirect impact.

Because the ROW acquisition and construction footprints are relatively identical to those presented in section 3.3.2.3, it is assumed that the direct and indirect impacts are applicable for each respective layout alternative for the project canals.

3.3.2.6 Concrete-Lined Canals

The impacts on socioeconomic conditions discussed below are equally applicable to the 17th Street, Orleans Avenue, and London Avenue canals, with the exception that the 17th Street Canal could experience a slightly greater impact from disruption of recreational activities, given the location of Orleans Marina at the mouth of 17th Street Canal.

Direct Impacts to Socioeconomics

Short-term impacts could be expected under this alternative. Construction activities associated with this alternative would provide jobs in the project area and could increase the level of spending, labor, and capital expenditures in the ROI. Operations and maintenance activities are not expected to require a significant workforce; thus, there would not be a quantifiable, future, permanent increase in economic activities associated directly with construction-related labor and expenditures.

Construction activities would take place in the existing ROW and are not expected to have an impact on private properties.

Long-term impacts could occur from the 100-year level of flood protection afforded under this alternative because the risk of storm surge and flooding posed to housing units and businesses in the project area from severe flood events would be reduced in comparison to the no action alternative. This alternative would decrease the storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents to the impacts described in section 3.3.2.1.

Indirect Impacts to Socioeconomics
Lining the canals with concrete and upgrading them to the 100-year level of flood protection could be expected to have long-term, indirect socioeconomic impacts. As detailed in section 3.3.1, the project area is still recovering from Hurricane Katrina and faces a shortage in areas such as labor force, housing, and public services, as compared with pre-Katrina levels. Providing the 100-year level of flood protection could increase the confidence level of the citizens and encourage investment and repopulation in the project area.

An increase in investment and population could also increase recreation activities in the project area. As such, Orleans Marina could see long-term economic impacts.

Cumulative to Socioeconomics
Cumulative impacts are similar to those discussed in section 3.3.2.2.

3.3.2.7 Replace I-walls with T-walls

Direct and Cumulative Impacts to Socioeconomics
The direct and cumulative impacts on socioeconomics under this alternative would be similar to those discussed in section 3.3.2.5, as well as applicable for each of the outfall canals.

Indirect Impacts to Socioeconomics
Upgrading the canals to the 100-year level of flood protection could be expected to have long-term, indirect socioeconomic impacts. As detailed in section 3.3.1, the project area is still recovering from Hurricane Katrina and faces a shortage in areas such as labor force, housing, and public services, as compared with pre-Katrina levels. Providing the 100-year level of flood protection could increase the confidence level of the citizens and encourage investment and repopulation in the project area.

3.3.2.8 ICS Gates with Parallel Protection

Direct, Indirect, and Cumulative Impacts to Socioeconomics
The direct, indirect, and cumulative impacts on socioeconomics under this alternative would be similar to those discussed in section 3.3.2.5, as well as applicable for each of the outfall canals.

3.3.2.9 Upgrade ICS to Permanent System

Presented below are the general direct, indirect, and cumulative impacts that apply to each of the outfall canals. Detailed impacts to each outfall canal are presented in sections 3.3.2.9.1, 3.3.2.9.2, and 3.3.2.9.3.

Direct Impacts to Socioeconomics
Long-term impacts would be expected from the 100-year level of flood protection provided under this alternative because the risk of storm surge and flooding posed to housing units and businesses in the project area from severe flood events would be reduced in comparison to the no action alternative. This alternative would decrease the storm-related flooding and the associated damage to buildings and infrastructure, disruption of economic activity, and displacement of residents discussed in section 3.3.2.1.

Indirect Impacts to Socioeconomics
Short-term and long-term impacts could occur from upgrading the ICS to a permanent system. Features under this alternative include providing enhanced protection from wind blown debris to adjacent homes and business during severe storm events.

Cumulative Impacts to Socioeconomics
Cumulative impacts are similar to those discussed in section 3.3.2.2.

3.3.2.9.1 17th Street Canal

Short-term and long-term, direct impacts would be expected under this alternative. The removal and reconstruction of the floodwall along the 17th Street Canal at the proposed intake could disrupt businesses and traffic in the project area. Specifically, Orleans Marina could be temporarily impacted. Some developed property could be relocated by the intake basin, which could have long-term impacts.

Long-term, direct impacts would be expected to occur under this alternative from the construction of a bridge over the proposed canal at Hammond Highway. This could help to alleviate traffic in the project area, but would not be expected to have a significant impact on the socioeconomic environment.

3.3.2.9.2 Orleans Avenue Canal

Short-term and long-term, direct impacts would be expected under this alternative. Construction could disrupt traffic and recreation in the project area, but this would be expected to have temporary impacts.

3.3.2.9.3 London Avenue Canal

Short-term direct impacts would be expected under this alternative from removing the existing cofferdam and constructing the permanent pump station. Construction could disrupt traffic and recreation in the project area, but this would be expected to have temporary impacts.

3.4 ENVIRONMENTAL JUSTICE

Environmental justice analysis was developed following the 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)

Following the above directives, environmental justice analysis will identify and address, as appropriate, human health or environmental effects of the HSDRRS project on minority and low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the study area by demographic analysis followed by drive-by surveys. Interested citizens had the opportunity to comment on environmental justice issues during 37 public meetings held during 2007 and 2008. Additional small-group meetings will be held to allow minority and low-income people the opportunity to participate in the decision-making process for the HSDRRS.

Census Block Group statistics from the 2000 Census and ESRI estimates were utilized for environmental justice data analysis. Detailed discussion of demographic and income data along with pertinent maps, tables and photographs are available and will be included in the CED.

3.4.1 Existing Conditions

The pumping stations located at the 17th Street Canal, Orleans Avenue Canal, and London Avenue Canal directly affect the neighborhoods within the Planning Districts 1 through 7, which include Gentilly, Lakeview, Mid City, Uptown/Carrollton, Bywater, French Quarter/Central Business District, and Central City/Garden District. These planning districts were defined by the City of New Orleans in 1999 as a part of the 1999 Land Use Plan, and their geographic boundaries can be viewed through the GNOCDC's website (www.gnocdc.org).

According to the 2000 Census (SF1 P4 and SF3 P87 files), the majority of these neighborhoods can be defined as low income and/or minority communities (table 18). The minority population for Planning Districts 1 through 7, which includes all persons who define themselves as Black/African American, Asian, Native American/Alaska Native, Pacific Islander/Native Hawaiian, Other, Two or More Races, and persons of Hispanic descent, was 66.3 percent, and the poverty rate was 28.7 percent, far greater than the state's poverty rate of 19.6 percent or the New Orleans metro area's poverty rate of 18.4 percent.

The 2007 estimates produced by ESRI suggest that the Orleans East Bank's population has a higher income and a smaller minority population than what is reported in the 2000 Census (table 19). It is unlikely this change will be permanent, as many of the displaced residents that intend to return are lower income and minority households. So long as state recovery efforts are successful in their mission of bringing back displaced families who wish to return, the current demographic and income profile of Orleans East Bank will shift closer to its pre-Katrina profile. Even with the demographic and income changes of the area due to Hurricane Katrina, the ESRI estimates indicate that Orleans East Bank remains a minority and lower income community.

Table 18. Orleans East Bank 2000 Census Data

		Poverty		Minority	
Planning District	**Total Population**	**Count**	**Percentage**	**Count**	**Percentage**
Gentilly	44,133	6,598	15.0%	33,272	75.4%
Lakeview	25,897	1,631	6.3%	2,224	8.6%
Mid City	79,441	31,673	39.9%	70,069	88.2%
Bywater	51,819	15,484	29.9%	35,301	68.1%
French Quarter/CBD	5,970	959	16.1%	1,230	20.6%
Central City/Garden District	51,819	21,703	41.9%	38,926	75.1%
Uptown/Carrollton	67,083	15,564	23.2%	35,245	52.5%
Total	**326,162**	**93,612**	**28.7%**	**216,267**	**66.3%**

Table 19. Orleans East Bank 2007 ESRI Estimates

		*Households earning less than $15,000 annually		Minority	
Planning District	**Total Population**	**Count**	**Percentage**	**Count**	**Percentage**
Gentilly	17,732	992	15.8%	12,879	72.6%
Lakeview	8,810	424	10.5%	669	7.6%
Mid City	34,895	4,312	34.9%	29,166	83.6%
Bywater	16,787	2,232	32.3%	12,631	75.2%
French Quarter/CBD	5,617	773	20.9%	1,076	19.2%
Central City/Garden District	34,574	4,699	30.7%	12,892	37.3%
Uptown/Carrollton	55,420	4,955	22.8%	24,099	43.5%
Total	**173,835**	**18,387**	**26.1%**	**93,412**	**53.7%**

*Poverty rates not available at census tract geography for 2007 estimates.

3.4.2 Discussion of Impacts

The proposed actions and alternatives were evaluated for potential disproportionately high, environmental effects on minority or low-income populations. Aerial photos were utilized to confirm the presence of habitation in the various project areas, and are utilized in environmental justice analysis. As the project planning process advances, environmental justice impacts will be analyzed further in the CED.

3.4.2.1 No Action Alternative

Direct Impacts on Environmental Justice

Under the no action alternative, the status quo condition would remain, including the ICS, with no additional construction for flood damage-reduction measures. Current pumping capacity at the 17th Street, Orleans Avenue, and London Avenue Canals would not be increased, and the ICS would not be modified for a reasonable life cycle.

The no action alternative would not cause direct impacts that would be disproportionately borne by any significant minority or low-income population. Under the no action alternative, the impacts of the 100-year storm would be borne by all populations and communities within the project area. Therefore, no environmental justice issues would be anticipated.

Indirect Impacts on Environmental Justice

Under the no action alternative, the lack of change in increasing the pumping capacity of the ICS would not cause any indirect impacts that would be disproportionately borne by any significant minority or low-income population. Therefore, no environmental justice issues would be anticipated. Impacts from construction related environmental pollution do not apply to the no action alternative.

Cumulative Impacts on Environmental Justice
Details on cumulative environmental justice impacts will be analyzed when further project planning data become available at conclusion of small-group neighborhood focus public meetings and will be included in the CED.

3.4.2.2 Proposed Action

3.4.2.2.1 17th Street Canal

Direct Impacts on Environmental Justice
The proposed action would not be expected to have disproportionate impacts on minority or low-income residents.

Indirect Impacts on Environmental Justice
Temporary construction related activities including noise, air quality and related issues may have a short-term, non-disproportionate impact on minority and low-income residents. However, the conditions would return to pre-construction conditions after the construction is completed.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.2.2 Orleans Avenue Canal

Direct and Cumulative Impacts on Environmental Justice
The direct and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

3.4.2.2.3 London Avenue Canal

Direct and Cumulative Impacts on Environmental Justice
The direct and cumulative impacts would be similar to the impacts described for the 17th Street Canal proposed action.

Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

3.4.2.3 Permanent Pump Stations and Closures (Gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations – Alternative Layouts

3.4.2.3.1 17th Street Canal

Layout Alternative B
Direct and Indirect Impacts on Environmental Justice
This layout alternative would not be expected to have disproportionate impacts on minority or low-income residents.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative C
Direct and Indirect Impacts on Environmental Justice
This alternative would not be expected to have disproportionate impacts on minority or low-income residents.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.3.2 Orleans Avenue Canal

Layout Alternative A
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative C
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative D
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.3.3 London Avenue Canal

Layout Alternative A
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative B
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative D
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative E
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.4 Permanent Pump Stations (no gates) at the Mouths of the Outfall Canals Operating in Series with the Existing SWBNO Pump Stations

For all outfall canals and layout alternatives, the direct, indirect, and cumulative impacts would be similar to the impacts described in sections 3.4.2.2 and 3.4.2.3.

3.4.2.5 Permanent Pump Stations at the Mouths of the Outfall Canals

3.4.2.5.1 17th Street Canal

Layout Alternative A
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative B
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative C
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.5.2 Orleans Avenue Canal

Layout Alternative A
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative B
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative C
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative D
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.5.3 London Avenue Canal

Layout Alternative A
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative B
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative C
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative D
Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

Layout Alternative E

Direct and Indirect Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.6 Concrete-Lined Canals

Direct Impacts on Environmental Justice
Because the project site is located within existing right-of-way, but in neighborhoods with minority and low-income residents, it is anticipated that the structural and levee work could cause disproportionate impacts to minority and low-income communities. Environmental justice issues will be addressed following the guidance in EO 12898.

Indirect Impacts on Environmental Justice
This project will have indirect impacts on minority and low-income residents due to temporary construction related activities, however, these impacts would be resolved at the conclusion of the construction project.

Cumulative Impacts on Environmental Justice
The impacts caused by the proposed action for this alternative would have positive cumulative effects to protect low-income and minority individuals from flooding. Details on cumulative environmental justice impacts will be analyzed at the conclusion of small neighborhood focus group meetings and will be included in the CED.

3.4.2.7 Replace I-walls with T-walls

Direct Impacts on Environmental Justice
Because the project site is located within existing right-of-way, the replacement floodwall work would not be expected to have disproportionate impacts on low-income or minority residents.

Indirect Impacts on Environmental Justice
This project will have indirect impacts on minority and low-income residents due to temporary construction related activities, however, these impacts would be resolved at the conclusion of the construction project.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.8 ICS Gates with Parallel Protection

Direct Impacts on Environmental Justice
Minority or low-income populations that have been identified would not be adversely impacted by the proposed alternative as determined above.

Indirect Impacts on Environmental Justice
This project will have indirect impacts on minority and low-income residents due to temporary construction related activities, however, these impacts would be resolved at the conclusion of the construction project.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

3.4.2.9 Upgrade ICS to Permanent System

Direct Impacts on Environmental Justice
Because the project site is located within footprint of the existing ICS facilities, this alternative would not be expected to have disproportionate impacts on minority or low-income residents.

Indirect Impacts on Environmental Justice
This project will have indirect impacts on minority and low-income residents due to temporary construction related activities, however, these impacts would be resolved at the conclusion of the construction project.

Cumulative Impacts on Environmental Justice
Details on cumulative impacts on low-income and minority residents will be analyzed when further project planning data become available at conclusion of small group neighborhood focus group meetings and will be included in the CED.

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), will be treated as project costs if the requirement is the result of a validly promulgated Federal, state or local regulation.

3.5.1 November 2006 Phase I ESA Reports

In March 2006, sediments within the three outfall canals were sampled and analyzed. The results of the this effort were reported by Gulf Engineers & Consultants (Certified Industrial Hygienist investigation, Orleans Avenue, London Avenue and 17th Street Outfall Canals. Orleans Parish, Louisiana, 21 March 2006). A copy of the report is maintained on file at the CEMVN. Sites of Concern (SOCs) and Constituents of Concern (COCs) were identified in the report. SOCs near the 17th Street Canal contained COCs of ignitable waste, silver, petroleum products, cadmium, dichlorobenzene, benzene, tetrachloro-ethylene, lead, and trichloroethylene. COCs identified at the SOCs near the Orleans Avenue Canal include petroleum products, benzene, and ignitable waste. COCs identified at the SOCs near the London Avenue Canal include petroleum products, trinitrobenzene, lead, methyl benzenamine, bromoform, dimethyl-benzene, benzyl chloride, benzisothiazol, cadmium, arsenic, dinitrotoluene, mercury, chromium, sodium cyanide, selenious acid, reactive waste, hydrazine, mercury, arsenic oxide, corrosive waste, ignitable waste, cresol, napthalenamine, phenol, and petroleum products.

An American Society for Testing and Materials (ASTM) E 1527-05 Phase I Environmental Site Assessment (ESA) was completed for each of the three outfall canals in November 2006 (GEC 2006b, 2006c, 2006d). A copy of the Phase I ESAs is maintained on file at the CEMVN. The Phase I ESA evaluated SOCs within one-eighth mile of the centerline of the 17th Street, Orleans Avenue, and London Avenue Canals and identified the findings of the previous CIH Investigation as the Recognized Environmental Concerns (RECs) for the canals. If a REC

cannot be avoided, because of the necessity of construction requirements, the CEMVN may further investigate the REC; to confirm presence or absence of contaminants, actions to avoid possible contaminants, and if local, state or Federal coordination is required. Because the CEMVN plans to avoid RECs, the probability of encountering HTRW in the project area is low.

Copies of the CIH Report and the Phase I Reports are available at www.nolaenvironmental.gov.

3.5.2 Phase I ESA Update Reports

The three outfall canals were inspected to assess current conditions and to determine if any changes have occurred since the November 2006 Phase I ESAs. The following Phase I ESA updates were prepared following inspection of the canals on 3 January 2008. The updates included visual inspection and review of environmental data. Relevant and significant findings and recommendations are summarized below.

3.5.2.1 Phase I ESA Update Report – 17th Street Canal

Changes since the 2006 ESA include the completion of construction of a canal closure structure at the outlet of the canal into Lake Pontchartrain. Six aboveground storage tanks (ASTs), approximately 10,000 gallons each, are at the canal closure structure. In addition, an approximately 1,000-gallon AST was observed at the canal closure structure. Three different areas containing formerly leaking underground storage tanks (LUST) are along the project corridor, multiple PCB-containing transformers were also observed. March 2006 sampling documentation provided by the USACE indicated that sediments in the canal outlet contained lead, polycyclic aromatic hydrocarbons, and petroleum contamination.

3.5.2.2 Phase I ESA Update Report – Orleans Avenue Canal

Changes to the site since 2006 include the completion of construction of a canal closure structure. The area surrounding the site to the west is mostly residential land with intermittent public and commercial lands. Investigation findings included two approximately 3,000-gallon unused ASTs that are scheduled for removal and two additional ASTs approximately 10,000-gallons in capacity near a canal closure structure. A heavily used oil-absorbent barrier was also observed traversing the canal. Multiple PCB-containing transformers were also observed. March 2006 sampling documentation provided by the USACE indicated that sediments in the canal contained lead and petroleum contamination.

3.5.2.3 Phase I ESA Update Report – London Avenue Canal

Changes since the 2006 ESA include the completion of construction of a canal closure structure south of the outlet of the canal into Lake Pontchartrain. Four ASTs, approximately 10,000-gallons each, are at the canal closure structure and two oil-absorbent barriers were observed traversing the canal. Other observations included two approximately 3,000-gallon ASTs, which appeared to be in disrepair or possibly unused and one approximately 1,000-gallon AST containing diesel. March 2006 sampling documentation provided by the USACE indicated that sediments in the canal outlet contained lead and petroleum contamination.

3.5.3 March 2009 Limited Phase II ESA Reports

An American Society for Testing and Materials (ASTM) E 1903-97 Phase II ESA was completed for each of the three permanent pump station locations on the outfall canals in March 2009 (SPA-MMG 2009). A copy of the Phase II ESAs is maintained on file at the CEMVN. This Limited Phase II Assessment included sediment sampling of the proposed permanent pump station locations for each of the three outfall canals.

COCs within the canal sediments were compared with the state of Louisiana RECAP Standards for evaluation of the risk to human health and the environment. While the RECAP Screening

Standards are not directly applicable to the sediment matrix, the standards provide a good indication of the level of contamination and associated risk of chemical concentrations in the sediments. COC concentrations of low risk were determined to exist at each in the sediment in each of the canals. SOCs near the 17th Street Canal contained COCs of trichloroethylene TPH-D, TPH-O, benz(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, phenanthrene, pyrene, carbon disulfide, arsenic, barium, chromium, and lead. COCs identified at the SOCs near the Orleans Avenue Canal include petroleum products, benzo(k)fluoranthene, arsenic, barium, chromium, and lead. COCs identified at the SOCs near the London Avenue Canal include TPH-D, TPH-O, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, n-nitrosodi-n-propylamine,4,4'-DDT, arsenic, barium, chromium, and lead.

Copies of the Phase II ESAs are at www.nolaenvironmental.gov.

3.5.4 Addendum to the Phase I ESA Reports

The three outfall canals were inspected to assess current conditions and to determine if any changes have occurred since the November 2006 Phase I ESAs. The following Phase I ESA Addendums were prepared following inspection of the canals on 14 April 2009. The inspections included visual inspection and review of environmental data. Relevant and significant findings and recommendations are summarized below.

3.5.4.1 Phase I ESA Report Addendum – 17th Street Canal

Changes since the 2006 ESA include the completion of construction of a canal closure structure at the outlet of the canal into Lake Pontchartrain. Four ASTs, of 20,000 gallons each, are located at the temporary pump station. The March 2009 sediment sampling report provided by SPA-MMG indicated that sediments in the canal outlet, in the area the where permanent pump station will be constructed, contain low concentrations of lead, polycyclic aromatic hydrocarbons, and petroleum. No contaminants were detected above the limiting RECAP screening standard(s).

3.5.4.2 Phase I ESA Report Addendum – Orleans Avenue Canal

Changes to the site since 2006 include the completion of construction of a canal closure structure. The area surrounding the site to the west is mostly residential land with intermittent public and commercial lands. Investigation findings included two ASTs, of 20,000-gallons in capacity, located at the pump station. The March 2009 sampling report provided by the SPA-MMG indicated that sediments, where permanent pump station will be constructed, contain low levels of benzo(k)fluoranthene, arsenic, barium, chromium, and lead, that are all below the limiting RECAP screening standard(s).

3.5.4.3 Phase I ESA Report Addendum – London Avenue Canal

Changes since the 2006 ESA include the completion of construction of a canal closure structure south of the outlet of the canal into Lake Pontchartrain. Two ASTs, of 20,000-gallons each, and two ASTs, of 14,000-gallons each, are located at the pump station. The March 2009 sediment sampling report provided by the SPA-MMG indicated that sediments in the canal outlet, where permanent pump station will be constructed, contain low levels of petroleum, arsenic, barium, chromium, and lead contamination. No contaminants were detected above the limiting RECAP screening standard(s).

3.5.5 Additional Project Features Initial Site Investigations

In addition to the updated Phase I ESAs, initial site investigations (ISI) were prepared for the Additional Project Features described in section 2.5.8. The ISIs were prepared following inspection of the project corridors on 8 February 2008. The project corridors were inspected to assess current conditions, and the investigation included visual inspection and review of

environmental data. Relevant and significant findings and recommendations are summarized below.

3.5.5.1 ISI – Pump to the Mississippi River – Jefferson Parish Option

ISI findings included four separate tank farms each containing tanks greater than 100,000 gallons. An approximately 1,000-gallon AST was also observed in a storage yard adjacent to the Hoey's Canal. The industrial facilities in the central portion of the site appear abandoned; however, surface water sheens and chemical containers greater than one gallon were observed adjacent to the site. According to the LDEQ's Electronic Document Management System (LDEQ-EDMS) multiple chemical manufacturing and distribution companies are within the investigation area. At least one of the facilities in this area is known to be negatively impacting the subject site.

3.5.5.2 ISI – Pump to the Mississippi River – Orleans Parish Option

This corridor is bordered by residential land to the west in the southern half of the corridor and commercial properties in the northern half. Residential land is to the east along the entire corridor, except in the central portion, which borders a water treatment plant. A review of available environmental records on the water treatment plant did not identify any negative impacts.

3.5.5.3 ISI – London Avenue Canal to IHNC – Alternatives 1 and 2

According to environmental records obtained from LDEQ some sites have violated LDEQ regulations including a landfill and a pump station. The landfill is listed on the National Priorities List and was remediated in 2001; however, elevated levels of lead and other contaminants are still present within a buffer area that abuts the subject site. Because of the proximity of these sites and the unremediated area, negative impacts to the subject site are suspected.

3.5.5.4 Add Additional Drainage Pump Stations

3.5.5.4.1 ISI – Add Additional Drainage Pump Stations – Orleans Avenue Canal Option

The ISI findings include two approximately 3,000-gallon unused ASTs that are scheduled for removal and two additional ASTs approximately 10,000-gallons in capacity. A heavily used oil-absorbent barrier was also observed traversing the canal. Multiple PCB-containing transformers were also observed. According to environmental records obtained from LDEQ-EDMS some of the commercial facilities in the southern portion of the corridor along the drainage canal have had environmental compliance issues. A LUST facility requiring no further action was identified adjacent to the site.

3.5.5.4.2 ISI – Add Additional Drainage Pump Stations – London Avenue Canal Option 1

The ISI findings include two approximately 3,000-gallon unused ASTs that are scheduled for removal and two additional ASTs approximately 10,000-gallons in capacity. Multiple PCB-containing transformers were also observed. According to environmental records obtained from LDEQ-EDMS some of the commercial facilities in the southern portion of the corridor along the drainage canal have had environmental compliance issues. A LUST facility requiring no further action was identified adjacent to the site.

3.5.5.4.3 ISI – Add Additional Drainage Pump Stations – London Avenue Canal Option 2

The ISI findings include two approximately 3,000-gallon ASTs that appeared to be in disrepair or unused. On an adjacent property, approximately 20 80,000 to 100,000-gallon ASTs and 5 20,000-gallon ASTs were observed at the eastern terminus of the subject property. No stained soils or stressed vegetation were observed in the subject site vicinity.

4.0 CUMULATIVE IMPACTS

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

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.

This section describes the cumulative impact analysis methodology; details the projects that compose the past, present, and future actions considered in the analysis; and provides a summary of the cumulative impacts that were discussed in sections 3.2, 3.3, and 3.4.

4.1 METHODOGY

To successfully assess cumulative impacts, a broad range of activities and patterns of environmental changes that are occurring in the vicinity of the project were considered. The following items (Klein and Kingsley 1994) are guidelines used for the cumulative impact analyses in this document:

- Proximity of the projects to each other either geographically or temporally
- Probability of actions affecting the same environmental resource, especially systems that are susceptible to development pressures
- Likelihood that the project will lead to a wide range of effects or lead to a number of associated projects
- Whether the effects of other projects are similar to those of the project under review
- Likelihood that the project will occur
- Temporal aspects, such as the project being imminent

4.2 DESCRIPTIONS OF PROJECTS CONSIDERED

The Metropolitan New Orleans HSDRRS is divided into three authorized project areas: LPV; WBV; and New Orleans to Venice (NOV). The set of projects for improved protection on the three outfall canals that is the subject of this analysis are in the LPV; therefore, projects within

the WBV and the NOV areas have not been included in the cumulative analyses because they are not within the geography of the study area and are not expected to cause an impact, cumulative or otherwise, on the majority of the significant resources addressed in this IER. Note, however, that the WBV and NOV projects would be expected to have a cumulative impact on regional resources such as transportation networks, medical and other regional facilities, and the economy of the area. These cumulative impacts will be more thoroughly discussed in the CED.

The CEMVN has proposed numerous projects to improve the LPV HSDRRS to the 100-year level of hurricane protection. The majority of the 100-year level of hurricane protection projects are currently in the planning and design stages, and impacts from these component projects will be addressed in separate IERs. These projects all occur within the greater New Orleans area, within the Lake Pontchartrain Basin, and within the designated coastal zone for Louisiana, so these projects were considered collectively (as appropriate) when evaluating cumulative impacts.

Additionally, the CEMVN is planning large-scale mitigation IERs to plan mitigation for impacts caused by these hurricane protection projects and numerous IERs evaluating the impacts of borrow acquisition projects to support the LPV and WBV HSDRRS projects.

A summary of the project features that fall within the Orleans East Bank, Jefferson East Bank, and New Orleans East is provided below.

- **IER #3 – LPV, Jefferson East Bank** investigated the potential impacts associated with rebuilding of 9.5 miles of earthen levees, upgrading the foreshore protection, replacing two floodgates, and constructing fronting protection for four pump stations in Jefferson Parish.

- **IER #4 – LPV, Orleans East Bank, New Orleans Lakefront Levee, West of IHNC to East bank of 17th Street Canal, Orleans Parish, Louisiana** investigates improvement of the levees and floodwalls extending from the 17th Street Canal to the IHNC. It also investigates the improvement, replacement or removal of the Bayou St. John Sector Gate.

- **IER #6 – LPV, New Orleans East, New Orleans Lakefront Levee to Citrus Lakefront Levee, N.O. Airport Floodwall to Paris Road, Orleans Parish, Louisiana** investigates improvement of approximately 6 miles of levees, floodwalls, and floodgates that extend from the IHNC and the New Orleans Lakefront Airport east to Paris Road (locally known as the Citrus Lakefront). Foreshore protection enhancements along this reach could include the dredging of access channels in Lake Pontchartrain.

- **IER #7 – LPV, New Orleans East Levee, Maxent Canal to Michoud Slip, Orleans Parish, Louisiana** investigates improvement of approximately 19 miles of levees and three floodgates. Foreshore protection enhancements for the reaches along Lake Pontchartrain in this IER could include the dredging of access channels in the lake.

- **IER #11, Tier 1 – Improved Protection on the Inner Harbor Navigation Canal, Orleans and St. Bernard Parishes, Louisiana** investigated improved hurricane protection on the IHNC. The proposed action consists of constructing approximately two miles of a new floodwall/gated system extending from the Michoud floodwall north of the GIWW to the levee on the west side of the Mississippi River-Gulf Outlet (MRGO). The floodwall/gates system would cross the GIWW, Bayou Bienvenue, the MRGO, and the Golden Triangle marsh. The system consists of a flood control sector gate and bypass barge gate at the GIWW, a new navigable flood control sector gate at Bayou Bienvenue, a braced concrete wall across the MRGO, and a concrete floodwall across the marsh between these waterways.

- **IER #11, Tier 2 Borgne – Improved Protection on the Inner Harbor Navigation Canal, Orleans and St. Bernard Parishes, Louisiana** investigated alternative alignments and designs within the Tier 1 selected location range and explain the impacts of these alignments and footprints, construction materials and methods, and other design details.

4.3 SUMMARY OF CUMULATIVE IMPACTS

This analysis establishes the magnitude and significance of cumulative impacts by comparing the existing environment with the expected impacts of the alternative considered in the proposed action when combined with the impacts of other proximate actions. The primary impact of the HSDRRS projects discussed in section 4.2 is that low-lying areas on the protected side of the HSDRRS would experience reduced storm surge flooding impacts. Those projects in combination with the IER #5 proposed action would significantly reduce storm surge-induced flooding from Lake Pontchartrain and protect the neighborhoods and commercial businesses in the vicinity of the three outfall canals. These HSDRRS projects would provide a 100-year level of risk reduction that has previously not existed in the area.

Short-term localized impacts to water quality in Lake Pontchartrain could occur during construction of the HSDRRS projects. A temporary increase in the concentration of fine sediments within the water column due to upland erosion or sediment disturbance could lead to increased turbidity and possible reductions in DO levels in the vicinity of the projects. These impacts in turn could affect Gulf sturgeon habitat and EFH. Implementing construction BMPs and SWPPPs would help reduce these potential impacts. These impacts would be expected to cease after constructing the HSDRRS features.

Temporary impacts to the local traffic and transportation network in the project area would be expected during construction of the HSDRRS projects. Impacts would include increased traffic due to construction vehicles and temporary detours and road closures. The impacts would be expected to be temporary and the traffic and transportation network would return to normal operation after constructing the HSDRRS features.

Temporary impacts to noise and air quality would be expected during construction of the HSDRRS projects. Because of the close proximity of residences and businesses, noise and air quality levels would be expected to exceed local ordinances but would be expected to return to normal levels upon completion of the HSDRRS projects.

Table 20 provides a summary of the cumulative wetland and bottomland hardwood impacts to be mitigated for the HSDRRS projects completed (draft or final) to date. In addition to the impacts shown in table 20, approximately 170.5 acres of impacts to forested habitats, requiring mitigation would occur as part of projects for the raising of the Mississippi River Levee. Impacts associated with IER #5 would not contribute additional cumulative impacts to wetlands and bottomland hardwoods to those IERs listed in table 20. However, it would contribute to the cumulative impact to EFH.

Cumulative impacts could also result from the new pump stations' incorporation to support additional future programmed capacity as proposed in the SWBNO Master Plan for Orleans Parish Drainage Improvements. Future construction elements may include deepening of the canals to achieve gravity flow to the new pump station, permanently closing the bypass gates, and decommissioning the existing SWBNO pump stations. In addition, future expansion could include ROW expansion within the maximum footprints (figures 2, 3, and 4), larger power supplies (including tank farms), and larger pump motors.

Deepening the outfall canals and permanently closing the bypass gates would be expected to result in additional cumulative impacts to some of the resource areas described in section 3. During construction activities, there could be short-term impacts to water quality, air, and noise. Increases in water turbidity and decreases in DO could be expected during canal deepening. These impacts would be temporary and localized to areas where construction would occur. After construction has been complete, increased water turbidity could remain as the new pump stations continuously pump water out of the canal into Lake Pontchartrain. These impacts in turn could

Table 20. 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)
1: LPV, La Branche Wetlands Levee	St. Charles	Protected Side	-	-	-	-	137.05	73.99	-	-	-
		Flood Side	-	-	11.33	8.09	143.57	110.97	-	-	-
2: LPV, West Return Floodwall	St. Charles, Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	33.40	9.00	-	-	-
3: LPV, Lakefront Levee	Jefferson	Protected Side		-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	26.00
4: LPV, Lakefront Levee	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
5: LPV, Outfall Canals	Jefferson, Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	3.20
6: LPV, Lakefront Levee	Orleans	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
7: LPV, New Orleans East Levee	Orleans	Protected Side	-	-	151.7	79.3	-	-	100.4	36.8	-
		Flood Side	-	-	30.0	11.9	-	-	70.0	37.2-	-
8: LPV, Chalmette Loop Basin	St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
9: LPV, Caernarvon Floodwall	St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
10: LPV, Chalmette Loop Levee	St. Bernard	Protected Side	-	-	38.32	16.44	-	-	106.55	57.31	-
		Flood Site	-	-	35.31	14.22	-	-	323.04	209.94	-
11: LPV, IHNC Borgne	Orleans, St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	15.00	2.59	-	-	186.00	24.33	-
11: LPV, IHNC Pontchartrain	Orleans, St. Bernard	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
12: WBV, Gretna-Algiers Basin	Jefferson, Plaquemines	Protected Side	-	-	251.70	177.30	-	-	-	-	-
		Flood Side	-	-	2.30	1.90	74.90	38.50	-	-	-

Table 20. HSDRRS Impacts and Compensatory Mitigation to be Completed (continued)

IER	Parish		Non-wet BLH (acres)	Non-wet BLH AAHUs	BLH (acres)	BLH AAHUs	Swamp (Acres)	Swamp AAHUs	Marsh (Acres)	Marsh AAHUs	EFH (Acres)
13: WBV, Belle Chasse Basin	Plaquemines	Protected Side			40.00	24.01	1.00	0.66			
		Flood Side			4.00	2.23			20.00		
14: WBV, Westwego to Harvey Levee	Jefferson	Protected Side	-	-	45.00	30.00	-	-	-	-	-
		Flood Side	-	-	45.50	18.58	29.75	17.02	-	-	-
15: WBV, Lake Cataouatche Levee	Jefferson	Protected Side	-	-	23.50	6.13	-	-	-	-	-
		Flood Side	-	-	3.60	1.35	-	-	-	-	-
16: WBV, Lake Cataouatche Basin	Jefferson	Protected Side	-	-	-	-	-	-	-	-	-
		Flood Side	-	-	24.10	11.30	-	-	62.00	29.85	-
17: WBV, Company Canal Floodwall	Jefferson	Protected Side	-	-	5.50	2.69	-	-	-	-	-
		Flood Side	-	-	-	-	19.00	17.09	-	-	-
18: GFBM	Jefferson, Plaquemines, Orleans, St. Bernard	Protected Side	300.30	112.38	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
22: GFBM	Jefferson, Plaquemines	Protected Side	244.69	118.54	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
25: GFBM	Jefferson, Plaquemines, Orleans	Protected Side	969.00	284.00	-	-	-	-	-	-	-
		Flood Side	-	-	-	-	-	-	-	-	-
Totals		Protected Side	1528.89	507.22	662.80	194.26	146.90	79.41	145.00	-	111.1
		Flood Side	-	-	113.10	43.70	173.75	128.02	301.00	63.18	35.3
		Both	1528.89	507.22	775.90	237.96	320.65	207.43	446.00	63.18	146.40

- Not applicable to the IER or number impacted is 0
GFBM: Government Furnished Borrow Material
CFBM: Contractor Furnished Borrow Material
Numbers highlighted in green are preliminary estimates.

affect Gulf sturgeon habitat and EFH. Residual impacts to fisheries within the canal from increased turbidity would not be expected as the canal would no longer be hydraulically connected to the lake. Impacts to air and noise due to continuous operation of the new pump stations would not be expected to contribute additional cumulative impacts when considered with other HSDRRS projects in the area.

The IER #5 proposed action and other HSDRRS projects would have beneficial impacts to the region by reducing flood risk and storm damage to residences, businesses, and infrastructure. This reduced risk would result in greater confidence in the storm protection system, which would aid in the recovery and rebuilding of the region. As confidence increases, more residents and businesses would be expected to return to the region, which would stimulate the local and regional economy by providing jobs, income, and increased economic growth.

5.0 SELECTION RATIONALE

The proposed action, construction of permanent pump stations and closures (gates) at or near the mouths of the outfall canals operating in series with the existing SWBNO pump stations, is the alternative most responsive to the project's purpose and need. It is an effective engineering solution that would minimize uncertainty and risk to acceptable levels in a reasonable period of time. The proposed action is compatible and would work in concert with other projects that have been completed, are in progress, or will be implemented to improve the damage reduction provided by the HSDRRS.

The no action alternative does not meet the project's purpose and need of providing the 100-year level of hurricane risk reduction to the project area. Therefore, it did not compare favorably with the proposed action, which is a reliable, stand-alone solution to 100-year protection in the project area.

5.1 ALTERNATIVE SELECTION RATIONALE

Every alternative at each outfall canal was evaluated based on criteria that included cost effectiveness and schedule, O&M, risk and reliability, constructability, adaptability, and human and environmental impacts.

5.1.1 Cost Effectiveness and Schedule

When compared to other alternatives, the costs associated with construction of the proposed action are comparable. The cost for Permanent Pump Stations at the Mouths of the Outfall Canals is greater than the proposed action due to the channel deepening requirements and removal of the existing SWBNO pump stations. All of the alternatives, except Permanent Pump Stations at the Mouths of the Outfall Canals, could be constructed within a four year timeframe. The Permanent Pump Stations at the Mouths of the Outfall Canals alternative would take 8-12 years for full implementation.

5.1.2 Operation and Maintenance

Although this project is 100 percent Federally-funded, O&M would remain the responsibility of the non-Federal sponsor. Alternatives that involve operating two pump stations (the new permanent pump station and the existing SWBNO pump station) would have greater O&M requirements than those alternatives that involve operating one pump station. New pump stations would require less O&M compared to the existing SWBNO pump stations. The Permanent Pump Stations at the Mouths of the Outfall Canals alternative would require the least O&M because it involves operating one new pump station, with minimal canal maintenance. The Concrete-lined Canals and Improve Parallel Protection alternatives would require less O&M than the proposed action, with more canal maintenance and slightly less pump station O&M.

The proposed action would require additional O&M because there would be a new pump station at the mouth of each canal and existing SWBNO pump station operating in series, in addition to canal maintenance requirements. It should be noted that the proposed action has gates so it would only be operating in series for 100-year storm events not every rainfall event.

5.1.3 Risk and Reliability

More risk and reliability issues arise with an increase in the length of parallel protection and exposure to storm surge. Those alternatives that have the least amount of parallel protection would be considered to have fewer risk and reliability issues. The Concrete-lined Canals and Improve Parallel Protection alternatives would have greater risk and reliability issues when compared to the proposed action. The raised canal floodwalls would provide 100-year level of risk reduction, but there could be greater exposure to storm surge and overtopping if the existing SWBNO pump stations cannot pump water out of the canals against the storm surge. In addition, these alternatives would not have structures in place to prevent storm surge from entering the canals.

Alternatives with pump stations at the mouths of the outfall canals with no gates would be the least vulnerable to storm surge as there is no route available for storm surge to enter the canals. Those alternatives with gates, including the proposed action, would be slightly more vulnerable to storm surge due to the presence of the bypass gates and complexity associated with operating the new pump station and existing SWBNO pump station in series.

5.1.4 Constructability

Compared to the other alternatives, the proposed action would have fewer constructability issues. The Convert ICS to Permanent System alternative would have more constructability issues than the proposed action because the ICS would need to remain in operation during the conversion, which would require a complex phased construction process not necessary for the proposed action. Permanent Pump Stations at the Mouths of the Outfall Canals would have greater construction complexity issues than the proposed action due to the required deepening of the canals and removal of the existing SWBNO pump stations. Constructing new pump stations at the mouth of the canals limits constructability issues to the area in the immediate vicinity of the pump stations. The Concrete-lined Canals and Improve Parallel Protection alternatives requiring construction along the entire length of the canal increases the size of the construction area and could lead to greater constructability issues when compared to the proposed action. For example, those alternatives requiring construction along the entire length of the canal would require multiple site access locations, whereas alternatives located at the mouth of the canal would require only one site access location.

5.1.5 Adaptability

Adaptability of the proposed action to future conditions is greater when compared to the other alternatives. The proposed action would allow for the new pump stations' incorporation to support additional future programmed capacity as proposed in the SWBNO Master Plan for Orleans Parish Drainage Improvements that the other alternatives could not meet. The new pump stations would be incorporated to support future improvements with minimal additional construction, whereas the Concrete-lined Canals and Improve Parallel Protection alternatives would not allow for future improvement of canal deepening. The Convert ICS to Permanent System alternative could be adaptable, but there would be increased construction complexity issues to provide such adaptability when compared to the proposed action.

5.1.6 Human and Environmental Impacts

The human and natural environment impacts associated with the proposed action and other alternatives would be similar, but there would be a difference in the size of the area impacted.

The impacts associated with the proposed action and Convert ICS to Permanent System alternative would be localized near the mouth of the outfall canal, whereas the impacts associated with Permanent Pump Stations at the Mouths of the Outfall Canals, Concrete-lined Canals, and Improve Parallel Protection would include the entire length of the canal. The proposed action also offers the opportunity to minimize impacts within the construction footprint, which is not available with the other alternatives.

5.1.7 Alternative Selection Summary

A summary of the specific rationale as to why the proposed action was selected over other alternatives includes the following:

- Ability to maintain canal operations during construction.
- Increases flexibility during construction by allowing the gated section to serve as a construction bypass, which leads to less construction complexity.
- Relocates the primary line of protection for the project area at or near the lake front, which protects the outfall canals from lake storm surge.
- The remaining repaired floodwalls provide partial compartmentalization (sub-division of the project area) that could reduce overall flooding risk.
- Uses the existing infrastructure, including existing SWBNO pump stations, canals, and floodwalls.
- Most of the ROW is publicly owned, minimizing delays from property acquisition.
- Provides additional drainage capacity by reducing the water surface elevations on the downstream side of the existing SWBNO pump stations during a storm surge event.
- Increasing future storm surge protection at the lake is limited to improvement at the lakefront, which alleviates the need for additional modification to the interior floodwalls and levees, and decreases risk and reliability issues.
- Reduces the cost of operations by allowing bypass of the new pump station for most combinations of flow and storm surge.
- Allows existing flow regime in the canals to continue during construction.
- The new pump stations can be constructed using conventional construction methods and within a reasonable timeframe (four years).
- Human and environmental impacts would be limited to the mouths of the canals.
- Allows potential incorporation to support additional future programmed capacity.
- Excavations required are not expected to produce significant contaminated sediments requiring special handling and disposal.

5.2 LAYOUT ALTERNATIVE SELECTION RATIONALE

For the proposed action, multiple layout alternative locations for the permanent pump stations and closures were considered at each outfall canal. Layout alternative locations that were located in close proximity to the lakeshore line of protection minimize both the length of the canal wall subject to hydrostatic loading and the construction of new walls or modifications of existing walls. Thus, although all locations would provide 100-year protection, locations that were located any significant distance from the lakeshore line of protection were considered to have a somewhat increased risk and accompanying reduction in reliability. Similar to the alternative selection criteria, each layout alternative at each outfall canal was evaluated based on cost effectiveness and schedule, O&M, risk and reliability, constructability, and human and environmental impacts. In the following sections, a summary of the selected layout alternative for each outfall canal and advantages and disadvantages for each individual layout alternative are presented.

5.2.1 17th Street Canal

5.2.1.1 Selected Layout Alternative

Layout alternative A (figure 2) was selected as the proposed site location for the new pump station and closure structure at the 17th Street Canal. This location would not require the need to rebuild the Hammond Highway Bridge, which is an advantage over layout alternatives B (figure 5) and C (figure 6) that would require reconstruction or modification of the bridge. There would be fewer constructability issues for layout alternative A when compared to the other two site locations because it would be easier to construct the diversion channel into the marina area across Orpheum Avenue where the state has already acquired property. Under layout alternatives B and C, it would be necessary to acquire additional property to construct the diversion channel.

Layout alternative A would have less impact on commercial and residential properties when compared to layout alternatives B and C. Layout alternative A offers the best opportunity to maximize optimization by taking measures to minimize impacts to the environment, residents, and commercial interests so that the final design could actually be smaller and have fewer impacts when completed. The site location would offer the ability to site the pump station and closure structure so that local businesses and recreational areas could possibly remain in their present location. Layout alternatives B and C provide less of an opportunity for optimization and could likely result in greater acquisition of commercial and residential properties, which would be expected to result in more socioeconomic impacts when compared to layout alternative A.

5.2.1.2 Layout Alternative A

5.2.1.2.1 Advantages

- Constructability – Construction of the new pump station and closure structure would not be restricted by phasing of installation and removal of a canal bypass. Construction phasing would not be restricted by existing facilities or structures. The only construction phasing required would be to perform final closure of the bypass, anticipated on the north side of the project site, to be closed after the installation of the new pump station and closure structure. Access to the project site via waterways is available for supply and offloading of construction materials by barge. In addition, the project site is accessible via Hammond Highway. Flood-proofing modifications to the Hammond Highway Bridge would not be required because the bridge would be located south of the new pump station and closure structure.

- Risk and reliability – The new pump station and closure structure would not impact the existing level of hurricane protection because the layout alternative is located north of the existing line of protection. The new construction would not require removal of any existing levees or floodwalls. This layout alternative provides good access to the project site from the protected side of the flood damage reduction system.

- Human and environmental impacts – All property that would be acquired for construction is levee district, state, or city-owned. Construction of the new pump station and closure structure would take place outside of existing residential areas and construction traffic would not be required to travel through residential neighborhoods.

5.2.1.2.2 Disadvantages

- Constructability – The majority of the new pump station and closure structure would be located in water and would require a freestanding cofferdam to facilitate the dry construction

of the pump station. This would be considered a more complex cofferdam construction system than a shore-side system, and would expose the cofferdam to storm events from Lake Pontchartrain. A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately two acres of Gulf sturgeon critical habitat and essential fish habitat.

- Risk and reliability – Construction activities would have no storm protection other than those installed as part of temporary construction activities until the final construction is completed.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure results in a higher cost when compared to layout alternatives B and C.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, which could result in maintenance issues during operation.

- Human and environmental impacts – Local businesses and recreational areas could be temporarily or permanently impacted during construction, which could limit public availability of these services.

5.2.1.3 Layout Alternative B

5.2.1.3.1 Advantages

- Constructability – The length of additional levee/floodwall construction required for this layout alternative is the shortest when compared to other layout alternatives. Access to the project site via waterways would be available for supply and offloading of construction materials by barge.

- Cost Effectiveness – The cost associated with this layout alternative would be lower than layout alternative A.

5.2.1.3.2 Disadvantages

- Constructability – It would be necessary to lengthen the Hammond Highway Bridge in order to construct the new pump station and closure structure. This could require closure of Hammond Highway during construction and significant traffic lane closures, impacting commercial and residential traffic. This could also limit access to the project site during construction. The intake channel for the new pump station would pass through the existing ICS facilities, which would require a phased construction of the new pump station in order to not impact the ICS operations. In order to reuse the ICS gates as part of the new pump station and closure structure, the gates would require modifications for corrosion protection and gate operation. This would require a complete closure of the ICS to construct the modifications, and the new pump station would be required to operate during this process. A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately two acres of Gulf sturgeon critical habitat and essential fish habitat.

- Risk and reliability – New construction activities would interfere with the existing level of risk reduction, specifically construction of the new pump house. This would impact ICS operation and require additional temporary protection during new construction. Construction

activities would have no storm protection other than those installed as part of temporary construction activities until the final construction is completed.

- Human and environmental impacts – Private property southwest of the Hammond Highway Bridge, as well as public property, would be acquired. Acquisition of private property could lengthen the proposed construction schedule. Local businesses could be temporarily or permanently impacted, which could limit public availability of these services.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure would result in a higher cost than layout alternative C.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, resulting in maintenance problems during operation.

5.2.1.4 Layout Alternative C

5.2.1.4.1 Advantages

- Constructability – The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required.

- Cost effectiveness – The cost would be less than layout alternatives A and B due to a breakwater not being necessary.

5.2.1.4.2 Disadvantages

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The exposed parallel protection length would be greater than the other layout alternatives. New construction activities would interfere with the existing level of protection, and require the existing floodwall to be maintained during construction.

- Human and environmental impacts – Acquisition of private residential property east of the project site, as well as public property, would be required. Acquisition of private property could lengthen the construction schedule. Access to the project site would be from the east, through adjacent residential communities.

- Constructability – The Hammond Highway Bridge would require flood proofing to meet the 100-year level of risk reduction. This could require closure of Hammond Highway during construction and significant traffic lane closures, impacting commercial and residential traffic. The construction of the canal bypass could require phased construction of the new pump house, which could impact constructability and the project schedule. In addition, there could be insufficient area at the project site to provide the canal bypass around the pump house construction area. The bypass would pass through the location of the pump house, which would require coordination with the pump house construction so that flow would be maintained at all times.

5.2.2 Orleans Avenue Canal

5.2.2.1 Selected Layout Alternative

Layout alternative B (figure 3) was selected as the site location for the new pump station and closure structure at the Orleans Avenue Canal. This location is considered the most favorable

due to the ease of construction and minimal impacts on existing hurricane protection when compared to other layout alternatives. Layout alternative B would require less new parallel protection construction than layout alternatives C (figure 8) and D (figure 9), thereby reducing risk and reliability issues. In addition, there would be no impact to the existing level of hurricane protection, unlike layout alternative C, which would have complications of beginning new pump station operations while maintaining ICS protection currently in place.

The ease of construction for layout alternative B would be more favorable than layout alternatives A and C. Layout alternative A (figure 7) would require construction in Lake Pontchartrain, which would require a complex cofferdam construction system to facilitate dry construction of the new pump station, and an extension of the canal into the lake in order to tie-in to the existing lakeshore levee system. In addition, layout alternative A would require flood proofing modifications to the Lakeshore Drive Bridge, which would increase construction complexity and impacts to traffic when compared to layout alternative B. Layout alternative C would require complex construction phasing that could impact operation of the ICS. Modifications of the ICS gate would be required under layout alternative C, which would also increase construction complexity when compared to layout alternative B. In addition to significant parallel protection requirements, layout alternative D would require flood proofing modifications to the Robert E. Lee Bridge, which would increase construction complexity and traffic impacts when compared to layout alternative B.

5.2.2.2 Layout Alternative A

5.2.2.2.1 Advantages

- Risk and reliability – The new pump station and closure structure would not impact the existing level of hurricane protection because the layout alternative is located north of the existing line of protection. The new construction would not require removal of any existing levees or floodwalls.

- Constructability – The bypass for the existing canal drainage system is not restricted by the project site limits, and would not require phasing of the new pump house or any other facility construction. Changes to the operation of the ICS would not be expected. Access to the project site via waterways would be available for supply and offloading of construction materials by barge. In addition, the project site would be accessible via Lakeshore Drive.

- Human and environmental impacts – Property acquisition would be required for construction, however no commercial or residential property would be required for permanent or temporary acquisition. All property to be acquired is levee district, state, or city-owned. Construction of the new pump station and closure structure would take place outside of existing residential areas and construction traffic would not be required to travel through residential neighborhoods.

5.2.2.2.2 Disadvantages

- Constructability – The majority of the new pump station and closure structure would be located in water and would require a freestanding cofferdam to facilitate the dry construction of the pump station. This would be considered a more complex cofferdam construction system than a shore-side system, and would expose the cofferdam to storm events from Lake Pontchartrain. It would be necessary to perform flood proofing modifications to the Lakeshore Drive Bridge, which would close Lakeshore Drive during construction. This could require significant traffic lane closures, impacting commercial and residential traffic.

This could also limit access to the project site during construction. A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately four acres of Gulf sturgeon critical habitat and essential fish habitat.

- Risk and reliability – Construction activities would have no storm protection other than those installed as part of temporary construction activities until the final construction is completed.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure would result in a higher cost when compared to other layout alternatives.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, resulting in maintenance problems during operation.

5.2.2.3 Layout Alternative B

5.2.2.3.1 Advantages

- Constructability – Access to the project site via waterways would be available for supply and offloading of construction materials by barge. In addition, the project site would be accessible via Lakeshore Drive. The Lakeshore Drive Bridge would not require reconstruction. Compared to layout alternative A, this layout alternative would be easier to construct since construction would not take place in Lake Pontchartrain.

- Risk and reliability – The new pump station and closure structure would not impact the existing level of hurricane protection because the layout alternative is located north of the existing line of protection. The new construction would not require removal of any existing levees or floodwalls. When compared to other layout alternatives, this layout alternative would require the least amount of new parallel protection construction.

- Human and environmental impacts – Property acquisition would be required for construction, however no commercial or residential property would be required for permanent or temporary acquisition. All property to be acquired is levee district, state, or city-owned.

5.2.2.3.2 Disadvantages

- Constructability – A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately 3.5 acres of Gulf sturgeon critical habitat and essential fish habitat.

- Risk and reliability – Construction activities would have no storm protection other than those installed as part of temporary construction activities until the final construction is completed.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure would result in a higher cost when compared to layout alternatives C and D.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, resulting in maintenance problems during operation.

5.2.2.4 Layout Alternative C

5.2.2.4.1 Advantages

- Constructability – Deep soil mixing was performed during the construction of the ICS, and this may provide some foundation support for the new pump house construction. The Lakeshore Drive Bridge would not require reconstruction. The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required. The canal bypass would use existing gates as a bypass, therefore no additional bypass would be required.

- Human and environmental impacts – Property acquisition would be required for construction, however no commercial or residential property would be required for permanent or temporary acquisition. All property to be acquired is levee district, state, or city-owned.

5.2.2.4.2 Disadvantages

- Constructability – In order to reuse the ICS gates as part of the new pump station and closure structure, the gates would require modifications for corrosion protection and gate operation. This would require a complete closure of the ICS to construct the modifications, and the new pump station would be required to operate during this process. Construction phasing would be complex due to the transfer from the ICS to the new pump station. The construction of the new pump station and closure structure could impact the ICS, and would require phased construction to allow completion of the new pump house without impacting the ICS operation.

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The parallel protection length is greater when compared to layout alternatives A and B.

- Human and environmental impacts – Access to the project site would be from the east, through adjacent residential communities.

5.2.2.5 Layout Alternative D

5.2.2.5.1 Advantages

- Constructability – The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required. The project site would be accessible via Robert E. Lee Boulevard.

- Human and environmental impacts – Property acquisition would be required for construction, however no commercial or residential property would be required for permanent or temporary acquisition. All property to be acquired is levee district, state, or city-owned, and would include portions of City Park. The road access and public land adjacent to the east of the project site could reduce traffic impacts on commercial and residential areas.

5.2.2.5.2 Disadvantages

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The parallel protection

length is greater when compared to other layout alternatives.

- Constructability – It would be necessary to perform flood proofing modifications to the Robert E. Lee Boulevard Bridge, which would close Robert E. Lee Boulevard during construction. This could require significant traffic lane closures, impacting commercial and residential traffic. This could also limit access to the project site during construction.

- Human and environmental impacts – Permanent ROW acquisition of 35 acres of property that is primarily green space, and includes property in City Park, would decrease the amount of area available for recreational opportunities.

5.2.3 London Avenue Canal

5.2.3.1 Selected Layout Alternative

Layout alternative C (figure 4) was selected as the site location for the new pump station and closure structure at the London Avenue Canal. This layout alternative provides for convenient connection of existing levees to the new pump station and closure structure. There would be fewer constructability issues and less impact to maintaining canal operations with layout alternative C when compared to layout alternatives A (figure 10) and B (figure 11). Layout alternative A would require construction in Lake Pontchartrain, which would require a complex cofferdam construction system to facilitate dry construction of the new pump station and an extension of the canal into the lake in order to tie-in to the existing lakeshore levee system. Layout alternatives A and B would also require a breakwater that increases constructability issues and cost. In addition, traffic impacts would be greater under layout alternatives A and B because construction could temporarily close the Lakeshore Drive Bridge due to required bridge flood proofing modifications.

Layout alternative C would avoid any impacts to Gulf sturgeon critical habitat, unlike layout alternatives A and B, which would have project features in Lake Pontchartrain that increase the chance for impacts to critical habitat. There could be a loss of green space in Lakeshore Park as a result of layout alternatives A and B.

Layout alternative D (figure 12) would require complex construction phasing that could impact operation of the ICS. Modifications of the ICS gate would be required under layout alternative D, which also increases construction complexity when compared to the proposed site location. Layout alternative E (figure 13) would require more parallel protection when compared to layout alternatives C, which increases risk and reliability issues. In addition, layout alternative E has less canal width available for construction and the gate bypass structure when compared to layout alternative C. Layout alternative C has less frontage exposed to wave action and load compared to layout alternatives D and E.

5.2.3.2 Layout Alternative A

5.2.3.2.1 Advantages

- Constructability – Access to the project site via waterways would be available for supply and offloading of construction materials by barge. In addition, the project site is accessible via Lakeshore Drive.

- Risk and reliability – The new pump station and closure structure would not impact the existing level of hurricane protection because the layout alternative is located north of the existing line of protection. The new construction would not require removal of any existing

levees or floodwalls.

- Human and environmental impacts – Construction of the new pump station and closure structure would take place outside of existing residential areas and construction traffic would not be required to travel through residential neighborhoods.

5.2.3.2.2 Disadvantages

- Constructability – It would be necessary to perform flood proofing modifications to the Lakeshore Drive Bridge, which would close Lakeshore Drive during construction. This could require significant traffic lane closures, impacting commercial and residential traffic. This could also limit access to the project site during construction. The majority of the new pump station and closure structure would be located in water and would require a freestanding cofferdam to facilitate the dry construction of the pump station. This would be considered a more complex cofferdam construction system than a shore-side system, and would expose the cofferdam to storm events from Lake Pontchartrain. A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately four acres of Gulf sturgeon critical habitat and essential fish habitat.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure results in a higher cost when compared to other layout alternatives.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, resulting in maintenance problems during operation.

- Risk and reliability – Construction activities would have no storm protection other than those installed as part of temporary construction activities until the final 100-year level of risk reduction is completed.

5.2.3.3 Layout Alternative B

5.2.3.3.1 Advantages

- Human and environmental impacts – Property acquisition is required for construction, however no commercial or residential property would be required for permanent or temporary acquisition. All property to be acquired is levee district, state, or city-owned.

- Risk and reliability – When compared to other layout alternatives, this layout alternative requires the least amount of new parallel protection construction.

5.2.3.3.2 Disadvantages

- Constructability – The construction of the canal bypass could require phased construction of the new pump house, which could impact constructability and the project schedule. In addition, there could be insufficient area at the project site to provide the canal bypass around the pump house construction area. The bypass must pass through the location of the pump house, which requires coordination with the pump house construction so that flow is maintained at all times. A breakwater could be required in order to minimize the effect of wave action on operation of the pump station. This would be an extensive construction effort in Lake Pontchartrain to resist storm wave action and could impact approximately three acres

of Gulf sturgeon critical habitat and essential fish habitat. It would be necessary to perform modifications to the Lakeshore Drive Bridge, which would close Lakeshore Drive during construction. This could require significant traffic lane closures, impacting commercial and residential traffic. This could also limit access to the project site during construction.

- O&M – The construction of the breakwater could lead to sedimentation problems at the discharge or shoreline, resulting in maintenance problems during operation.

- Risk and reliability – Construction activities would have no storm protection other than those installed as part of temporary construction activities until the final 100-year level of risk reduction is completed. The bypass channel could require penetration of the existing line of hurricane protection, which would require activities during construction to provide closure during hurricane events.

- Cost effectiveness – The construction of the breakwater and location of the new pump station and closure structure results in a higher cost when compared to layout alternatives C, D, and E.

5.2.3.4 Layout Alternative C

5.2.3.4.1 Advantages

- Constructability – The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required. Construction of the bypass channel would not require phased construction of the new pump house. This is a less complex construction activity when compared to layout alternatives A and B. The Lakeshore Drive Bridge would not require reconstruction.

- Risk and reliability – The parallel protection length is less when compared to layout alternatives D and E.

- Cost effectiveness – The lack of a breakwater reduces the construction costs, so that this layout is similar in cost to layout alternatives D and E and less than layout alternatives A and B.

5.2.3.4.2 Disadvantages

- Human and environmental impacts – UNO property would need to be acquired, which could delay the construction schedule during the property acquisition process. Access to the project site would be adjacent to or through UNO property, which could impact some university operations.

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The parallel protection length is greater when compared to layout alternatives A and B. The existing line of hurricane protection would be penetrated to construct the new pump house. This would require temporary protection during construction.

- Constructability – Access to the site is restricted primarily to a road along the east side of the canal. The construction staging area is restricted to adjacent UNO property.

5.2.3.5 Layout Alternative D

5.2.3.5.1 Advantages

- Constructability – The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required. The Lakeshore Drive Bridge would not require reconstruction. The canal bypass would use existing gates as a bypass, therefore no additional bypass would be required. Deep soil mixing was performed during the construction of the ICS, and this may provide some excavation support for the new pump house construction.

5.2.3.5.2 Disadvantages

- Human and environmental impacts – UNO property would need to be acquired, which could delay the construction schedule during the property acquisition process. Access to the project site would be adjacent to or through UNO property, which could impact some university operations.

- Constructability – In order to reuse the ICS gates as part of the new pump station and closure structure, the gates would require modifications for corrosion protection and gate operation. This would require a complete closure of the ICS to construct the modifications, and the new pump station would be required to operate during this process. Construction of the new permanent pump station and closure structure may impact the existing ICS facilities, which would require a phased construction of the new pump station in order to not impact the ICS operations.

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The parallel protection length is greater when compared to layout alternatives A, B, C, or E. The existing line of hurricane protection would be penetrated to construct the new pump house. This would require temporary protection during construction.

5.2.3.6 Layout Alternative E

5.2.3.6.1 Advantages

- Constructability – The project site would be located far enough from Lake Pontchartrain so that wave action would not be a concern, and a breakwater would not be required. The Lakeshore Drive Bridge would not require reconstruction.

5.2.3.6.2 Disadvantages

- Human and environmental impacts – UNO property would need to be acquired, which could delay the construction schedule during the property acquisition process. Access to the project site would be adjacent to or through UNO property, which could impact some university operations..

- Risk and reliability – All levees and floodwalls from Lake Pontchartrain to the project site would require upgrading to the 100-year level of risk reduction. The parallel protection length is greater when compared to layout alternatives A, B, or C, but less than layout alternative D. The existing line of hurricane protection would be penetrated to construct the

new pump house. This would require the canal floodwall to be maintained during construction.

- Constructability – Access to the site is restricted primarily to a road along the east side of the canal. The construction staging area is restricted to adjacent UNO property.

6.0 COORDINATION AND CONSULTATION

6.1 PUBLIC INVOLVEMENT

Extensive public involvement has been sought while 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 web site www.nolaenvironmental.gov. Scoping for this project was initiated on 12 March 2007, through placing advertisements and public notices in *USA Today* and the *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 and 12 April 2008, 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.

Regularly scheduled public meetings have been held within the project area to inform residents and stakeholders of the status of the project. These meetings were held on 24 July 2007; 16 August 2007; 25 September 2007; 29 November 2007; 26 February 2008; 1 July 2008; and 22 October 2008.

The draft IER was distributed for a 30-day public review and comment period on May 4, 2009. Comments were received during the public review and comment period from Federal resource agencies, state resource agencies, non-governmental organizations, and citizens (Appendices B and D). The CEMVN District Commander reviewed public and agency comments, and interagency correspondence. The District Commander's decision on the proposed action is documented in the IER Decision Record.

6.2 AGENCY COORDINATION

Preparation of this IER has been coordinated with appropriate congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in the project planning and alternative analysis phases of the project (members of this team are listed in Appendix C). This interagency environmental team was integrated with the CEMVN PDT to help plan 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 CEMVN IER projects. The following agencies, as well as other interested parties, received copies of the draft IER:

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

Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer

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

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

Programmatic CEMVN Response 1: No wetlands or non-wet bottomland hardwoods would be impacted by the proposed action.

Programmatic 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.

Programmatic CEMVN Response 2: The proposed action does not enclose any additional wetlands than is currently enclosed by the existing LPV Hurricane Protection System.

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

Programmatic CEMVN Response 3: Concur. No bald eagle nests have been recorded in or near the project area.

Programmatic 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.

Programmatic CEMVN Response 4: No forest clearing will occur with implementation of the proposed action.

Programmatic 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.

Programmatic 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.

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

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

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

Programmatic CEMVN Response 7: No refuge or National Park property will be impacted by the proposed action.

Programmatic 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.

Programmatic CEMVN Response 8: Concur

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

Programmatic CEMVN Response 9: Concur

Programmatic 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.

Programmatic CEMVN Response 10: Concur

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

Programmatic CEMVN Response 11: Estuarine dependent fisheries do not use the canals as migration routes.

Programmatic 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.

Programmatic CEMVN Response 12: Acknowledged.

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

Programmatic CEMVN Response 13: Acknowledged.

Programmatic 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.

Programmatic CEMVN Response 14: This recommendation will be considered in the design of the project to the greatest extent practicable.

Programmatic 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.

Programmatic CEMVN Response 15: Not applicable.

Programmatic 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.

Programmatic CEMVN Response 16: Not applicable.

Programmatic 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.

Programmatic CEMVN Response 17: Not applicable.

Programmatic 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.

Programmatic CEMVN Response 18: Concur

Programmatic 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.

Programmatic CEMVN Response 19: Concur

Programmatic 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.

Programmatic CEMVN Response 20: Acknowledged.

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

Programmatic CEMVN Response 21: Not applicable.

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

Programmatic CEMVN Response 22: Not applicable.

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

Programmatic CEMVN Response 23: Concur.

Programmatic 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.

Programmatic CEMVN Response 24: Construction of the project features are not 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.

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

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

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

Programmatic CEMVN Response 26: Concur.

The USFWS reviewed the proposed action to see if it would affect any T&E species under its jurisdiction, or their critical habitat. The USFWS concurred with the CEMVN in letters dated 6 December 2007 and 2 February 2009 that the proposed action would not have adverse impacts on T&E species under its jurisdiction (appendix D).

The USFWS reviewed the proposed action to see if it would affect any fish and wildlife resources or their critical habitat. The USFWS concurred with the CEMVN in a letter dated 4 March 2008 that the proposed action would not have adverse impacts on fish and wildlife resources under its jurisdiction (appendix D).

The LDNR reviewed the proposed action for consistency with the Louisiana Coastal Resource Program (LCRP). The proposed action was found to be consistent with the LCRP, as per a letter dated 17 November 2008 (appendix D).

The LDEQ reviewed the proposed action. The CEMVN received Water Quality Certification (WQC 081110-01/AI 161807/CER 20080001) for the proposed action on 26 January 2009 (appendix D).

Section 106 of the National Historic Preservation Act, as amended, requires consultation with the Louisiana SHPO and Native American tribes. Louisiana SHPO reviewed the proposed action and determined that it would not adversely affect any cultural resources, as per a letter dated 10 November 2008 (appendix D). Eleven Federally recognized tribes that have an interest in the region were given the opportunity to review the proposed action (appendix D).

The USFWS project-specific recommendations, in accordance with the Fish and Wildlife Coordination Act (appendix D), for IER #5 include:

Recommendation 1: The Service shall be provided the opportunity to review and submit recommendations on the draft plans and specifications for all work addressed in this report.

CEMVN Response 1: Concur.

Recommendation 2: Any proposed change in the proposed project features, locations, or plans shall be coordinated in advance with the Service, NMFS, LDWF, and LDNR.

CEMVN Response 2: Concur.

Recommendation 3: If the proposed project has not been construction within 1 year or if changes are made to the proposed project, the USACE should reinitiate the Endangered Species Act consultation with the Service to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their habitat.

CEMVN Response 3: Concur.

Recommendation 4: Avoid adverse impacts to manatee and Gulf sturgeon.

CEMVN Response 4: Concur. The USACE will incorporate the following protective measures into its construction contracts:

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

Siltation barriers used during construction of the new pump station could temporarily displace Gulf sturgeon from the area and temporarily impact critical habitat. The siltation barriers would encircle all construction activities and be in place to prevent short-term impacts to water quality from spreading and may prevent Gulf sturgeon from entering the construction area if the siltation barriers are anchored to the bottom of the canal.

7.0 MITIGATION

Mitigation for unavoidable impacts to the human and natural environment described in this and other IERs will be addressed in separate mitigation IERs. The CEMVN has partnered with Federal and state resource agencies to form an interagency mitigation team that is working to assess and verify these impacts, and to look for potential mitigation sites in the appropriate hydrologic basin. This effort is occurring concurrently with the IER planning process in an effort to complete mitigation work and construct mitigation projects expeditiously. As with the planning process of all other IERs, the public will have the opportunity to give input about the proposed work. These mitigation IERs will, as described in section 1 of this IER, be available for a 30-day public review and comment period.

No impacts have been identified that would require compensatory mitigation.

8.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Construction of the proposed action would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described below.

Environmental compliance for the proposed action will be achieved upon coordination of this IER with appropriate agencies, organizations, and individuals for their review and comments; USFWS and NMFS confirmation that the proposed action would not be likely to affect any endangered or threatened species or completion of Endangered Species Act Section 7 consultation (appendix D); LDNR concurrence with the determination that the proposed action is consistent, to the maximum extent practicable, with the LCRP (appendix D); coordination with the Louisiana SHPO (appendix D); receipt and acceptance or resolution of all Fish and Wildlife Coordination Act recommendations (appendix D); and receipt and acceptance or resolution of all LDEQ comments on the air quality impact analysis documented in the IER.

9.0 CONCLUSION

9.1 FINAL DECISION

The proposed action consists of new permanent pump stations and closures at the mouths of the outfall canals operating in series with the existing SWBNO pump stations. The site locations selected for the new pump stations are layout alternative A for the 17th Street Canal, layout alternative B for the Orleans Avenue Canal, and layout alternative C for the London Avenue Canal. The floodwalls that flank the outfall canals would remain in place, and remain an integral part of the city's internal flood protection system.

The CEMVN has assessed the environmental impacts of the proposed action and has determined that the proposed action would have impacts to significant resources (table 21).

Table 21. Impacts from the Proposed Action

Significant Resource	Impacts from the Proposed Action
Waters of the United States	Short-term impacts during construction. Possible long-term impacts at 17th Street Canal and Orleans Avenue Canal due to breakwater structure.
Wildlife	Short-term impacts during construction.
Threatened and Endangered Species	Short-term impacts to sea turtle habitat and Gulf sturgeon critical habitat during construction. Possible long-term impacts to sea turtle habitat and Gulf sturgeon critical habitat at 17th Street Canal and Orleans Avenue Canal due to breakwater structure.
Essential Fish Habitat	Short-term impacts during construction. Possible long-term impacts to approximately 1.4 acres at 17th Street Canal and 1.8 acres at Orleans Avenue Canal due to breakwater structure.
Cultural Resources	No impacts.
Recreational Resources	Short-term and localized impacts during construction for all three outfall canals. At 17th Street Canal, possible long-term impacts to Coconut Beach Volleyball Complex and West End Park. Long-term impacts at Orleans Avenue Canal and London Avenue Canal due to ROW acquisition of portions of Lakeshore Park. Long-term impacts on green space parallel to each outfall canal.
Noise	Short-term, localized impacts during construction and when pump stations operate at full capacity.

Table 21. Impacts from the Proposed Action (continued)

Significant Resource	Impacts from the Proposed Action
Air Quality	Short-term, localized impacts during construction and when pump stations operate at full capacity.
Water Quality	Short-term, localized impacts during and immediately after tropical storm events.

Hydrology	Short-term impacts during construction, but beneficial long-term impact to the project area.
Aesthetics	Localized long-term impacts directly related to proximity to adjoining land uses.
Traffic and Transportation	Short-term, localized impacts during construction.
Land Use	Short-term impacts at Orleans and London Avenue Canals during construction. Possible long-term impacts at 17th Street Canal.
Socioeconomic Resources	Short-term impacts during construction, but beneficial long-term impacts to the region.
Environmental Justice	Short-term impacts during construction.
HTRW	Low risk of encountering.

9.2 PREPARED BY

The point of contact for preparing this IER is Laura Lee Wilkinson, CEMVN, Hurricane Protection Office. The address of the preparer 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 22 lists the preparers of the various sections and topics in this IER.

Table 22. IER #5 Preparation Team

Title/Topic	Team Member
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APPENDIX A: LIST OF ACRONYMS AND DEFINITIONS OF COMMON TERMS

AAHU	Average Annual Habitat Unit
ADNL	A-weighted Day-Night Sound Level
ANSI	American National Standards Institute
AQCR	Air-Quality Control Region
AQCR 106	Southern Louisiana-Southeast Texas Interstate Air Quality Control Region
AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
BGEPA	Bald and Golden Eagle Protection Act
BLH	Bottomland hardwood
BMP	Best Management Practice
BNOP	Bring New Orleans Back
BOD_5	5-day biochemical oxygen demand
BTU	British thermal unit
CAA	Clean Air Act
CBVC	Coconut Beach Volleyball Complex
CED	Comprehensive Environmental Document
CEMVN	Mississippi Valley Division, New Orleans District
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon Monoxide
CPRA	Coastal Protection and Restoration Authority
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted Decibels
DNL	Day-Night Sound Level
DO	Dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMC	Fishery Management Council

FONSI	Finding of No Significant Impact
FR	Federal Register
GIWW	Gulf Intracoastal Waterway
GMFMC	Gulf of Mexico Fishery Management Council
GNOCDC	Greater New Orleans Community Data Center
GO	Gulf Opportunity Zone
HAP	Hazardous Air Pollutant
HPS	Hurricane Protection System
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HTRW	Hazardous, Toxic, and Radioactive Waste
Hz	Hertz
I-610	Interstate 610
ICS	Interim closure structure
IER	Individual Environmental Report
IHNC	Inner Harbor Navigation Canal
IPCC	Intergovernmental Panel on Climate Change
IPET	Interagency Performance Evaluation Task Force
ISI	Initial Site Investigation
LACPR	Louisiana Coastal Protection and Restoration project
LCRP	Louisiana Coastal Resource Program
LDEQ	Louisiana Department of Environmental Quality
LDEQ-EDMS	LDEQ Electronic Document Management System
LDHH	Louisiana Department Health and Hospitals
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
Leq	Equivalent Sound Level
LPBF	Lake Pontchartrain Basin Foundation
LPV	Lake Pontchartrain and Vicinity
LRA	Louisiana Recovery Authority
LSU	Louisiana State University
LUST	Leaking Underground Storage Tank
MACT	Maximum Achievable Control Technology
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
mi^2	Square mile
MPN	Mean Probable Number
MRGO	Mississippi River-Gulf Outlet
MSA	New Orleans Metro Statistical Area
NAAQS	National Ambient Air Quality Standard
NAVD88	North American Vertical Datum of 1988

NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMFS	National Marine Fisheries Service
NNSR	Nonattainment New Source Review
NOAA	National Oceanographic and Atmospheric Administration
NOV	New Orleans to Venice
NO_x	Nitrous Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NWI	National Wetland Inventory
NWRC	National Wetlands Research Center
O & M	Operation and Maintenance
O_3	Ozone
OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
PA	Programmatic Agreement
PCB	Polychlorinated biphyenls
PDT	Project Delivery Team
PL	Public Law
PM_{10} and $PM_{2.5}$	Particulate Matter
PPA	Project Partnership Agreement
PS	Pump Stations
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RECAP	Risk Evaluation/Corrective Action Program
ROI	Region of Influence
ROM	Rough-order-magnitude
ROW	Right-of-way
RPC	Regional Planning Commission
SELA	Southeast Louisiana Project
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SPH	Standard Project Hurricane
SWBNO	Sewerage and Water Board of New Orleans
SWPPP	Storm water Pollution Prevention Plan
TMDL	Total Maximum Daily Load

tpy	Tons per year
TWA	Time Weighted Average
UNO	University of New Orleans
UNOP	Unified New Orleans Plan
USACE	U.S. Army Corps of Engineers
USC	United State Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
WBV	West Bank and Vicinity
WRDA	Water Resources Development Act

APPENDIX B: PUBLIC COMMENT

-----Original Message-----
From: Burnett.roy@siemens.com [mailto:Burnett.roy@siemens.com]
Sent: Tuesday, May 05, 2009 8:50 AM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

Dear Sir,the old pump stations should be remoed and the old flood walls. the option #2 should be used

Thank you

-----Original Message-----
From: mikedunn1@cox.net [mailto:mikedunn1@cox.net]
Sent: Saturday, May 09, 2009 6:25 PM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

Plans for the pumping station on the 17th Street Canal are still missing a description of the station itself and the immediate landscaping, etc. The report says considerations will be made and residents concerns have been noted, but we are still in the dark about the view, esthetics, etc. All of this weighs heavily on the marketability of my home in Mariners Cove.

We believe in our business, our history, community, patrons, and employees. This is why we ask for your consideration in taking over the land that Two Tony's occupies. After the storm of 2005 we were homeless and without jobs. Katrina had destroyed our home in Lakeview and nearly destroyed our restaurant all of which still seems unbelievable.

It did not take long to decide that Two Tony's needed to be rebuilt for us, our community, our employees, and the work and volunteer crews that inundated the city (including the Corps).Even though we surely needed it, we waited for no handouts. We just used what we had: ourselves and family and friends' helping hands. After several months of blood, sweat, and tears, Two Tony's reopened in December of 2005. The response to our opening was overwhelming. Even though we were surrounded in construction and mess; we knew we had made the right choice. The people let us know with their tears, hugs, cheers, and smiles while saying how wonderful it was to come to a familiar place that feels like home even though half or more had no homes. We will never forget those impressionable times.

Fast forward roughly two years and word starts to spread that they are thinking of taking lots of land to rebuild the pumps which we had just experienced being built. This land of course includes Two Tony's Restaurant. We felt as though we had just been thrown back to square one! The thought of starting over again was and is too much to process. We have been in limbo for two years wondering WHAT IF? Where will we go? What will we do? What about our employees? Where do we get the money? The list continues on.

Please keep all of this in consideration. It isn't just as simple as relocating. It would be an end to a taxpaying, people pleasing, family owned business that has made a mark in history.

Thank you
for <u>all</u> of your
consideration,

Ashley
Montalbano

-----Original Message-----
From: mvnenvironmental@usace.army.mil [mailto:mvnenvironmental@usace.army.mil]
Sent: Tuesday, May 12, 2009 3:50 PM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

Ier5 should only use option # 2, to keep the old floodwalls in place whould be criminal !

-----Original Message-----
From: mvnenvironmental@usace.army.mil
[mailto:mvnenvironmental@usace.army.mil]
Sent: Wednesday, May 13, 2009 8:40 AM
To: MVN Environmental
Subject: NOLA Environmental Comment - General Comment

IER5 should only use option 2

-----Original Message-----
From: mvnenvironmental@usace.army.mil
[mailto:mvnenvironmental@usace.army.mil]
Sent: Thursday, May 14, 2009 9:43 AM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

Ier5 must include new flood walls since the existing one's have already failed

-----Original Message-----
From: Heather & Wayne LaCombe [mailto:heatherandwayne1@cox.net]
Sent: Tuesday, May 19, 2009 9:56 PM
To: MVN Environmental
Subject: Two Tony's Restaurant

Please consider working around Two Tony's Restaurant while building the new pump stations at the 17th Street Canal in Metairie, LA. This small restaurant is an asset to the community and it would be a shame to have the owners relocate after working so hard to reopen after Hurricane Katrina.

Sincerely,
Heather G. LaCombe
13430 S. Trace Drive
Walker, LA 70785
225.791.6015 or 225.572.5819
www.thepreschoolhouse.net

-----Original Message-----
From: Melanie Thompson [mailto:funnymeme@gmail.com]
Sent: Tuesday, May 19, 2009 3:06 PM
To: MVN Environmental
Subject: Please don't destroy Two Tony's at the 17th Street Canal!!!!!!!!!!!!!
--
Melanie Thompson

-----Original Message-----
From: Emily Atol [mailto:emma771@cox.net]
Sent: Tuesday, May 19, 2009 3:33 PM
To: MVN Environmental
Subject: Two Tony's must remain!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Two Tony's is a restaurant that has been passed down generation after generation. It is part of New Orleans that should remain in it's original location. Please help to save part of New Orleans history.

Please build around Two Tony's. Please do not put your pump station in Two Tony's exact location. Thank you for your time and consideration regarding this matter!!!!!!!!

Sincerely,

Emily(Two Tony's fan)

-----Original Message-----
From: jamm4343@aol.com [mailto:jamm4343@aol.com]
Sent: Tuesday, May 19, 2009 3:35 PM
To: MVN Environmental
Subject: Help

Please, please be considerate of and work around 2Tony's Restaurant when you are building the new pumps. This little place has endured noise and dirt and loss of business since the terrible Katrina tragedy and are still holding on. Please consider this when you are making your plans. Thank you.

-----Original Message-----
From: Sherri Thompson [mailto:slthompson31@gmail.com]
Sent: Wednesday, May 20, 2009 9:50 AM
To: MVN Environmental
Cc: Sherri Thompson
Subject: Two Tony's

To Whom It May Concern:

I would like to ask for your true consideration in not destroying Two Tony's Restaurant when preparing for your future levee projects. As a transplant from Minnesota to the New Orleans area, It has been a true blessing to come to an area that is rich in culture and still has the "mom and pop" places like Two Tony's. Over the years I have gotten to know the owners of Two Tony's, Anthony Montalbano Sr and Anthony Montalbano Jr, and can attest to the genuine concern these men have for their customers. So much so that immediately after Katrina, they along with a few family members, worked feverishly to reopen the restaurant in order to serve the people of the area who were in desperate need of both food and familiarity. In fact, they often feed many of the Corp's workers! All this was happening while they too had lost their homes and most of their belongings.

I plea that you please considered all that is involved before making this decision. While I understand the grave necessity of proper levee protection, I also ask that if you absolutely do not need to take Two Tony's please do not! You will be contributing to much public sadness as well as enhance that already troubling economy. Two Tony's has many employees and it is the sole income for a family very rich in New Orleans tradition and spirit.

Thank you for your consideration.

Sincerely,
Sherri Thompson

-----Original Message-----
From: jill varisco <jillvarisco@hotmail.com>
To: mvenviromental@usace.army.mill
Cc: ashley0629@aol.com
Sent: Wed, 20 May 2009 9:14 am
Subject: (no subject)

Please consider working around Two Tony's Restaurant when putting in the new pumps at the 17th Canal. Two Tony's is a wonderful family restaurant that deserves to be able to continue operating in it's location. If at all possible, it should remain where it is today.

Thank you for your consideration.

The Varisco Family

May 20, 2009

Mr. Gib Owen, PM-R
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Subject: Comments on Draft Environmental Impact Statement
Permanent Protection for the Outfall Canals on 17th Street, Orleans Avenue, and London Avenue Canals, Jefferson and Orleans Parishes, Louisiana

Dear Mr. Owen:

As an environmental engineering professional with over two decades of experience with major infrastructure design and environmental review within south Louisiana, I feel obligated to provide the following comments on the subject Draft Environmental Impact Statement (DEIS).

The subject DEIS as prepared by the United States Army Corps of Engineers (USACE) appears to have both underestimated the impacts to recreational facilities and its legal requirement under the National Environmental Policy Act (NEPA) to consider, assess, and mitigate these impacts. The current document indicates the USACE will impact 10 to 100% of the Coconut Beach Volleyball Complex (CBVC) for pump station construction at the 17th Street Canal. This facility should be considered a major public recreational resource based upon the following:

- Weekly use by over 3,000 individuals as stated by the DEIS or one of the highest utilized public recreational facilities in Greater New Orleans
- Over twenty-one (21) years of operation on public property supported by public parking and infrastructure
- 24 hour unrestricted access to the public
- Incorporation into long-term planning efforts for West End by the Regional Planning Commission as a key component of the area's revitalization
- Over $1 million of fundraising support for Children's Hospital
- Documented public support as indicated by correspondence to your office.

Accordingly, any impact to this facility should be considered a significant 4(f) impact to a public recreational facility requiring specific mitigation measures. Given the numerous recreational facilities in Greater New Orleans still not operational due to Hurricane Katrina, even temporary disruption of this facility should be considered a significant 4(f) impact.

The USACE should address in the Final EIS that the impact to the CBVC is a significant 4(f) impact requiring specific mitigation to assure the facility operates at its current full functionality. The document should also include proposed mitigation measures by the USACE at a minimum to include the following:

- Construction measures to avoid impact to the facility or any disruptions of operations.
- If impacts to the facility cannot be avoided, it should be relocated or altered at USACE expense as follows:
  - Replacement of current sand volleyball courts to their current depth and area.
  - Replacement of all overhead court lighting to facilitate nighttime play
  - Replacement of currently available public parking
  - Replacement of concession and support facilities
- Implementation of mitigation measures prior to any potential disruption to the existing facility

If relocation of the facility is absolutely required, relocation to existing public areas within West End would have the least impact on the public. Previous planning efforts by the Regional Planning Commission have presented potential options that may co-exist with the proposed pumping station. Mitigation must be proposed and implemented. As it stands the USACE has significantly under assessed the value of this recreational resource and the affect its removal will have on the local community.

The USACE's critical mission to provide flood protection to the City of New Orleans should not be diminished. However, if this mission requires impact to the CBVC, we expect the USACE to also fulfill their legal requirements under NEPA to adequately consider, assess, and mitigate these impacts.

Sincerely,

Adam Faschan, Ph.D., P.E.
7310 Sardonyz Street
New Orleans, LA 70124
(504) 432-5961

-----Original Message-----
From: ssterbcow@bellsouth.net [mailto:ssterbcow@bellsouth.net]
Sent: Wednesday, May 20, 2009 3:02 PM
To: MVN Environmental
Subject: Two Tony's

My family has been enjoying Two Tony's Restaurant for many years. Please consider working around this special community bistro during your final plans for reconstruction. Your consideration is much appreciated.

Colette & Scott Sterbcow

& Families

-----Original Message-----
From: Peter Hickman [mailto:phickm@gmail.com]
Sent: Wednesday, May 20, 2009 4:20 PM
To: MVN Environmental
Subject: USACE should make safety of city a priority over commercial development at mouth of 17th St canal

Wednesday, May 20, 2009

Good afternoon Mr. Owen,

I'm sure you have received many e-mail messages regarding the proposed pumping station at the mouth of the 17th street canal and how it might impact Coconut Beach, so I will keep this very short. I think you should know that I am leading an effort to have several sand volleyball courts built in Mid-City New Orleans as an alternative to Coconut Beach. I began running leagues in 2000 at a bar/restaurant in the warehouse district that had one sand court, and since Hurricane Katrina I have been attempting to persuade the city to allow development of a small area near my home along the Lafitte corridor. Feel free to visit the website www.midcityvolleyball.org <http://www.midcityvolleyball.org/> for more information about our group, and at your request I will happily send you detailed drawings of proposed locations for sand volleyball courts in Mid-City.

I am an ardent proponent of volleyball and its social benefits, but I believe the safety of the city should have a higher priority than saving Bruce White's monopoly on outdoor volleyball. Regardless of the Core's final decision Mid-City Volleyball Group will attempt to offer an alternative to Coconut Beach that welcomes people from all walks of life.

Sincerely,

Peter J. Hickman
Chair of the Mid-City Volleyball committee of the MotherShip Foundation
131 Sherwood Forest Drive
New Orleans, LA 70119-3716
cell: (504)427-1207

Department of the Army
New Orleans District
Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267
Attn: Gib Owen

May 20, 2009

RE: Coconut Beach

Dear Mr. Owen,

The thought of the Corps of Engineers commandeering the property of Coconut Beach causes my eyes to swell with tears. Hopefully, this letter will illustrate what Coconut Beach means to me. For anyone who does not play volleyball at Coconut Beach, this complex is simply 100,000 square feet of sand. For myself and 4,000 plus citizens of metropolitan New Orleans Coconut Beach is a way of life.

I have regularly played volleyball at Coconut Beach since 1989. At that time, there 5 sand courts and a softball field. Learning the game of sand volleyball was all that interested me. I could never have guessed the impact Coconut Beach would have on my life. My current Thursday night team, Sandy Crotches, is the longest tenured team there. Throughout the past twenty years, I have met most of my very best friends; friends that I can count on, friends that I vacation with, friends who are my second family.

Coconut Beach offers a gathering place for both children and adults to enjoy a social setting, get some exercise and meet some wonderful people. It is a fun-loving, relaxing atmosphere for individuals to have some fun. It is a fitness center for individuals to burn calories and stay in shape. It is a therapy center for individuals to escape the stresses of work and daily life. The same as any community would suffer from their church being demolished, or their hospital closing, the Coconut Beach community would suffer greatly from the closing of this complex.

In a volleyball tournament at Coconut Beach in April, I played with my twin 14 year-old nephews. I was so excited they were finally at an age to play and learn the game of sand volleyball. They were thrilled to play against adults in a tournament, but they were more in awe of the 400 pounds of crawfish that Bruce White had delivered to the complex for all the tournament players. Personally, it excited me to know that my nephews had a place to "hang out" during the summer, meet some friends and stay out of trouble. Honestly, I believe that 20 years from now they will share the same sentiment of Coconut Beach as I do today. Sadness fills my heart when I think this opportunity will be taken away from them.

After Katrina destroyed the complex in 2005, there was a lot of despair to see that the complex was washed away into Lake Pontchartrain. However, in my heart I knew this would be a temporary situation. I knew that Coconut Beach would be re-built and my second family would be back together one day.

With the current situation of a new pumping station built on the property housing Coconut Beach, I cannot help to "re-build", I can only express my sentiment against the effort with words. I hope and pray that I will have opportunities for more memories there over the next 20 years.

Mr. Owen, I am confident that you will do all in your power to save Coconut Beach. We will not surrender.

Sincerely,

Rhonda C. Zimmer

Rhonda C. Zimmer
649 Gelpi Avenue
Jefferson, LA 70121
504-258-1095

-----Original Message-----
From: mikedunn1@cox.net [mailto:mikedunn1@cox.net]
Sent: Thursday, May 21, 2009 9:24 AM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

I understand from IER#5 and the presentations last night (05/20) at St. Dominic that the footprint for the permanent pumping station and temporary staging areas along the 17th St. Canal was chosen to cause the least amount of impact on the surrounding commercial and residential areas, but the plan takes half of the Mariners Cove Townhome Association and leaves half to fend for itself in a depressed housing market. With no clear picture as to what the actual structures will look like, and given the negative impression that homeowners along all three outfall canals have of "what to expect," there is great uncertainty for how home values will trend. And, with the footprint looking like it will extend from the canal to the far side of the street within Mariners Cove, hence abutting up against the end units that remain, the Association loses a vital architectural component that served to enclose the area into the quaint community it was before the storm. This additionally will reduce the flow of movement within the prior community because of the cul-de-sac arrangement it will become. All of this negatively impacts the values of the remaining half of Mariners Cove (let alone runs counter to the intentions of those who own property there now), hence it is more damaging to take just half of the Association, contrary to the purport of the COE's criteria for selecting the footprint.
Since Coconut Beach wants to survive and serves a vaster part of the local population, why not preserve it and build the pumping station on top of Mariners Cove? Those who have rebuilt or are in the process of rebuilding in Mariners Cove would have to move, but the COE would be upsetting less of the local population by forcing them to relocate. The COE could appropriately compensate these owners for their losses, so that they could move on.
I own a property that will be in the remaining half of Mariners Cove and I cannot find a buyer for it even at going prices, largely because of the uncertainty looming over "what is to come" from the new pumping station. What will result from the COE'S plans is not what I intended for my property.
The basic consensus in the crowd last night was that the COE will go forward with Option #1 regardless of demands from concerned residents. It makes the input process seem like window-dressing.
I ask you to buy out all of Mariners Cove and put the area to good use for the better of the entire Greater New Orleans Area.

-----Original Message-----
From: mvnenvironmental@usace.army.mil
[mailto:mvnenvironmental@usace.army.mil]
Sent: Thursday, May 21, 2009 6:23 AM
To: MVN Environmental
Subject: NOLA Environmental Comment - Orleans East Bank

Leaving the existing floodwalls inplace is CRIMINAL !!!

Bubacz
23 Swan Street
New Orleans, LA 70124-4405
May 28, 2009

Army Corps of Engineers
PO Box 60267
N.O., LA 70160
ATTN: Laura Wilkinson (HPO)

Dear Ms Wilkinson,

As residents of the lakefront we have watched the progress of the flood protection along our levee system with great interest.

It has come to our attention that the Army Corps of Engineers is about to make the final determination about the placement of the outflow pumps. It is in regard to this that we take this opportunity to address you.

The immediate concern to us is the Orleans Canal pump. After attending local meetings and reading about it in the press, it seems as though the best location would be at the opening of the canal to Lake Pontchartrain. I realize that many of my neighbors have concerns about the aesthetics of this, we live within sight of it, being able to look straight down Swan Street and can see Marconi and the levee, our primary concern is and should be flood protection. The closer the pumps are to the lake, the less we need to concern ourselves with the adequacy of the outflow canals. If we suffer another catastrophic failure of the levees, we will not need to worry about rebuilding New Orleans. No one will want to risk living here.

The other issue we would like to address is the structure at the end of the 17th Street Canal. Il Tony's Restaurant will certainly be affected by this construction. They have been in operation there for many years, and after the storm was one of the first businesses to reopen. They have been good neighbors, providing a comfortable place to go and supporting local charities. It is a family run restaurant that has helped provide the community with a sense of normalcy. We, therefore, recommend that the Army Corps of Engineers consider doing everything possible to help the community by allowing Il Tony's Restaurant to remain open at its present location.

Sincerely,

Carla & Rex Bubacz

----Original Message-----
From: Matt McBride [mailto:mcbrid35@yahoo.com]
Sent: Friday, May 29, 2009 9:08 AM
To: Accardo, Christopher J MVN
Cc: Holder, Ken MVN; Lee, Alvin B COL MVN; MVN Environmental; Montvai, Zoltan L HQ02
Subject: Re: Questions on Pump Operations at Outfall Canals (relates to IER5)

Dear Mr. Accardo,

I would prefer to keep correspondence with your office in printed form, since it's easy to forget details on the phone. Also, I am copying the mvnenvironmental email address, since I would like this submitted as a comment in response to IER 5.

I have been wondering about your District's inconsistent response regarding the Safe Water Level on the London Avenue canal. I'm sure you saw my email about this, but allow me to reproduce it here. Note I have actually changed the text slightly (in bold), since I have since discovered a tenth incidence of the SWL trigger point getting exceeded.

---> original email--->
"Dear Ms. Allen,

Expanding on my earlier inquiry, I believe there have been 10 instances since 2006 when the water level in the London Avenue canal has gotten within one foot of the Safe Water Level, but in only 2 of those instances were the gates at the interim closure structure closed. According to Corps procedures, aren't the closure structures supposed to be closed when the water level in the canal gets within a foot of the Safe Water Level (SWL)?

During time when Safe Water Level was 4 feet (trigger elevation = 3 feet):
December 21, 2006: Water reached at least 3.36 feet at the Mirabeau gauge.
Gates were not closed.

December 30, 2006: Water reached at least 4.11 feet at the Harrison Avenue gauge, exceeding the SWL in effect at that time.
Gates were not closed, but the Sewerage & Water Board (S&WB) was ordered to turn off pumping.

May 4, 2007: Water reached 4.3 feet at the Harrison Avenue gauge, exceeding the SWL in effect at that time.
Gates were not closed, but the S&WB was ordered to turn off pumping

May 23, 2007: Water reached at least 3.72 feet at the Harrison Avenue gauge and at least 4.12 feet at the DPS3 gauge, exeeding the SWL in effect at that time.
Gates were not closed.

June 19, 2007: Water reached at least 3.06 feet at the Harrison Avenue gauge.

Gates were not closed.

During time when Safe Water Level was five feet (trigger elevation = 4 feet):

October 22, 2007: Water level reached at least 4.75 feet at DPS3 gauge, 4.26 feet at Harrison Avenue gauge.
Gates were not closed

April 26, 2008: Water level reached 4.12 feet at DPS3 gauge. It was likely higher at Harrison and Mirabeau gauges, but they were not functioning. The Harrison Ave gauge had stopped working reliably in January, 2008 and the Mirabeau Ave. gauge had gone out in March, 2008. It remains out. This was at a time when the Bonnet Carre Spillway was open, and lake levels were consistently high for weeks.
Gates were not closed.

September 1, 2008 (Hurricane Gustav): Water level reached at least 4.62 feet at Prentiss Avenue gauge.
Gates were closed

September 12, 2008 (Hurricane Ike): Water levels in the lake exceeded 5 feet, gates were closed before the canal levels would have inevitably reached the trigger point

March 27, 2009: Water level reached at least 4.94 feet at the Harrison Avenue gauge, and likely exceeded the Safe Water Level of 5 feet.
Gates were not closed.

The Corps does not have a problem closing the gates on the Harvey and Company canals when their Safe Water Levels are approached, but they seem to not be as scrupulous when it comes to the London Avenue canal. What are the citizens of New Orleans, specifically the citizens living in and around the London Avenue canal, to take from this information, especially in light of the Corps' current proposal to keep this tandem pumping scheme in place after construction of permanent pumping stations at the lakefront?"
<---original email<---

I think I probably know the answer as to why the London Avenue gates were not closed in those other 8 instances, and I believe it probably has to do with time. Can you confirm the following?

Closure of the gates at any of the lakefront interim closure structures is not a quick thing like at the Harvey or Company canals. Media reports have mentioned 50 minutes as a time to close the gates, but that doesn't really tell the whole story. Divers must be brought in to clear the trench into which the needle segments seat. Media reports from this week's drill mentioned that divers had cleaned out those trenches last week, an indication of the time involved in the process when all elements of a response are within the Corps' control. I would imagine that from the moment the decision is made to mobilize divers and operations personnel to the moment the gates are fully closed is a process that takes many, many hours.

The manual for the outfall canals confirms this, since it is geared to response to a storm surge threat from a tropical system. I believe it contains preparatory steps as far out as 5 days ahead of closure. Thus it would appear the Corps anticipates days of warning for a high water event.

One could argue that high water events from nontropical rainfall alone are not that predictable. I tend to agree. However, the sheer number of incidents in which the London Avenue SWL trigger point (let along the SWL itself) has been exceeded without closure of the gates (8) points to a significant gap in the Corps' storm protection planning. There does not seem to be provision for what has happened four times as often as the Corps' planned scenario; that is, it is far more likely for the SWL trigger point to be exceeded by rainfall from non-tropical events than from tropical events. Also, the incident while the Bonnet Carre Spillway was open would seem to have been predictable, since the lake level was already known to be high.

In a few of those 8 events, the Sewerage & Water Board was ordered to turn off pumps. In others, pumps were not turned off. This would appear to be another inconsistency.

Finally, Sewerage & Water Board personnel are not given access to the minute-by-minute canal level gauge data output by the Corps' SCADA system. Considering S&WB personnel are the front-line responders in the pump stations 24 hours a day, this would also appear to be a gap.

In sum it would appear the system in place along the London Avenue canal is not robust enough to respond in a timely fashion to hazards presented by non-tropical high water events. It can take a very long time to close the gates (so long that the water will likely have subsided by the time the gates were closed), and data which would allow for a quicker response is not being made available to the personnel in the best position to make use of it. The only timely solution - turning off the city's drainage pumps until the canal level drops - carries obvious hazards of its own. In addition, it has been inconsistently applied.

The public is being told as part of the permanent pump station review process that this tandem pumping arrangement now in place along the outfall canals will become the norm. If all things remain the same - including the safe water level on the London Avenue canal - there will likely be future incidents when the SWL trigger point and the SWL itself are exceeded and gates will not be closed. If history to date (8 incidents over 30 months) is any guide, the public could expect this sort of thing to occur 160 times over the 50 year lifespan of the permanent pump stations. 160 times. That would appear to be an unacceptable risk without the Corps addressing the matter in some comprehensive fashion.

Now, I understand the new stations will likely have a much more robust design than the current closure structures. There will likely be gates on rollers instead of needles simply riding in the channels of vertical beams, which will allow gate closures while waters are very high. I would imagine the lack of a jetting system for the base of the gates will be addressed, eliminating the need for divers. And I suppose a sturdier sensor system will be put into place along the canals instead of the monitors currently there, where at least 3 level sensors are currently not functioning. Perhaps all those improvements will mitigate against continued incidents such as those described above.

However, those plans are years in the future, and it can rain hard in New Orleans any day. And history does not give confidence that situations such as those that have happened since December, 2006 will go unrepeated. Indeed, it would appear such an incident was narrowly avoided just last week, when a passing subtropical system pushed lake levels over 2 feet for two days but no significant rain fell in New Orleans.

Even accepting the most optimistic estimates for completion of the permanent structures (fall, 2013) would leave New Orleans vulnerable to at least 12 more SWL or SWL trigger exceedances along the London Avenue canal.

Perhaps the new safe water level along the canal will be higher and this will all be moot. Perhaps not. If the London Avenue SWL remains 5 feet, will the Corps make any changes to address what is no longer a theoretical consideration, but a documented fact?

Best regards,

Matt McBride

PEGGY LEWIS, CMC
CLERK OF COUNCIL

1300 Perdido Street • Room 1E09
New Orleans, Louisiana 70112

NEW ORLEANS CITY COUNCIL

May 30, 2009

Mr. Gib Owen
U. S. Army Corps of Engineers
Post Office Box 60267
New Orleans, LA 70160-0267

Dear: Mr. Owen

The New Orleans City Council adopted the attached Resolution (R-09-248) at its meeting of May 21, 2009.

The City Council is calling upon the United States Army Corp of Engineers to adopt a plan that both achieves maximum flood protection from storm surge and rain water, and also leaves the smallest possible environmental footprint in the neighboring human and natural environment.

The Council is requesting that the USACE construct pump station designs using technology and aesthetics (such as low-rise pump technology) and pump station locations (away from the lakefront and farther up the mouths of the canals) which incorporate neighborhood-friendly concepts into the final designs.

The Council is assuming that the maximum flood protection can be achieved at an alternate location, and that the USACE adopt a plan to build the 17th Street Canal pumping station which does not require confiscation and re-development of the land upon which Coconut Beach currently operates.

Thank you for your cooperation in this matter. If you have any questions, please feel free to contact the Clerk of Council's Office at 504-658-1085.

Sincerely Yours,

Lora W. Johnson

Lora W. Johnson
Assistant Clerk of Council

RESOLUTION

NO. R-09- 248

CITY HALL: MAY 21,2009

BY: COUNCILMEMBER MIDURA

SECONDED BY: COUNCILMEMBER FIELKOW

WHEREAS, Hurricanes Katrina and Rita were the greatest natural and manmade disasters in the history of the United States, which affected hundreds of thousands of individuals and their families, and which destroyed billions of dollars worth of city infrastructure and private investment in the City of New Orleans and its neighboring parishes; and

WHEREAS, the federal government, through multiple legislative acts, has authorized the United States Army Corps of Engineers (USACE), to design and construct infrastructure that achieves 100-year level risk reduction and improves the overall hurricane protection for the region immediately, recognizing the need to achieve superior protection in the future; and

WHEREAS, the USACE, Mississippi Valley Division, New Orleans District, is planning to construct new permanent pump stations and closures at or near the mouths of the outfall canals operating in series with the existing Sewerage and Water Board of New Orleans pump stations to prevent storm surges from entering the outfall canals; and

WHEREAS, on the fourth of May, the USACE released its draft Individual Environmental Report for the Permanent Protection System for the Outfall Canals Project on 17th Street, Orleans Avenue, and London Avenue Canals (IER #5), and extended a period of public comment for thirty days from the date of the report's release; and

WHEREAS, the USACE maintains that all possible pump locations and designs contained within the IER #5 achieve the same level of flood protection and risk reduction, but some of the designs have a greater impact on the quality of life in the surrounding, primarily residential, neighborhoods; and

WHEREAS, the IER #5 contains multiple options for each pump station location, but embraces a "design-build" strategy, which creates significant confusion over the public's ability to conceptualize the proposed plan before it is let; and

WHEREAS, the proposed location of the 17th St. Canal pumping station could require the confiscation and re-development of all or part of the land upon which Coconut Beach, a successful business enterprise and quality of life enhancing entity, currently operates, **NOW THEREFORE,**

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF NEW ORLEANS, notwithstanding past resolutions passed by this body in favor of adopting so called Option 2, or 2a, (R-09-147), that within this period of public comment on the IER #5 document, we call upon the USACE to adopt a plan that both achieves maximum flood protection from storm surge and rain water, and also leaves the smallest possible environmental footprint in the neighboring human and natural environments.

BE IT FURTHER RESOLVED that in order to achieve this goal, the USACE construct pump station designs using technology and aesthetics (such as low-rise pump technology) and pump station locations (away from the lakefront and farther up the mouths of the canals) which incorporate neighborhood-friendly concepts into the final designs.

BE IT FURTHER RESOLVED that, assuming that maximum flood protection can be achieved at an alternate location, the USACE adopt a plan to build the 17th Street Canal pumping station which does not require confiscation and re-development of the land upon which Coconut Beach currently operates.

BE IT FURTHER RESOLVED that the Clerk of Council shall forward a certified copy of this resolution to Gib Owen of the U.S. Army Corps of Engineers, the New Orleans delegation to the Louisiana Legislature, the Louisiana Delegations to the United States Congress and C. Ray Nagin, the Mayor of the City of New Orleans.

THE FOREGOING RESOLUTION WAS READ IN FULL, THE ROLL WAS CALLED ON THE ADOPTION THEREOF AND RESULTED AS FOLLOWS:

YEAS: **Carter, Clarkson, Fielkow, Head, Midura, Willard-Lewis - 6**

NAYS: **0**

ABSENT: **Hedge-Morrell - 1**

AND THE RESOLUTION WAS ADOPTED.

THE FOREGOING IS CERTIFIED
TO BE A TRUE AND CORRECT COPY

Peggy Lewis, CMC
CLERK OF COUNCIL

6-1-09

To Whom it may Concern:

I am writing in response to IER #5.

Thank you for sending me the requested hard copy. It certainly is filled with all sorts of technical and intricate detail(s). It is obvious that you are "listening" to us; I'm not sure it is having any effect.

My concerns are as follows:

Since the London Ave Canal permanent pump station will be placed near its current ICS (which is also fairly far away from the mouth of the canal), I see no reason why the Orleans Ave Canal permanent pump station, AT THE LEAST, cannot be placed near its current ICS.
My rationale is this: the current proposed permanent location (for Orleans) is the closest to the Lakefront of all three proposed sites for the permanent stations. This will require a breakfront according to IER 5. At the latest Corps meeting held at St. Dominic's (5/20), a Corps representative said that this breakfront may or may not be needed and, in fact, will probably not be needed. This is an important issue and needs clarification.

Placing the Orleans Ave permanent pump station so close to the Lakefront will permanently and, in my opinion, irreversibly destroy the Lakefront. As usual, safety is the paramount issue. But safety will not be compromised if the permanent pump station is moved just a little bit south of the proposed permanent site. It is so stated in IER 5. However, the Corps has stated different positions on this matter - as a resident of Lake Vista I have had the opportunity to hear Corps representatives say contradictory things in regards to placement. At a special meeting held for Lake Vista residents only, it was stated that the further away from the mouth of the canal, the greater the risk of failure. As a follow-up clarification, Col Beady said that this was not so - any proposed option (including site D) would be equally as safe. In fact, if the best location is at the mouth of the canal, then why is the London station being placed so far south? Discrepancies exist and clarification has not been made.

Consideration for a graduated marsh/wetland area along the lakefront has been proposed for Jefferson Parish and could be easily incorporated for Orleans parish (study done by LSU). This would mitigate storm surge and would be visually acceptable in contrast to a concrete structure plopped down in lake waters.

Discrepant statements have been made as to the longevity of each ICS. We have been told, at various times, that the current ICS's have a life span of more than 50 years. Now we are being told that they need to be replaced within 5 years or New Orleans will be at risk. Mr Accardo (at the 5/20 meeting) stated that work needed to be commenced "now" or safety would be compromised. Doing something for "doing something" is not an acceptable option. I would rather rely on the current ICS and have a good, long-term and acceptable solution agreed upon rather than build something just to say it had been built within a certain period of time.

Even in your own report (page 41) you specifically state that conversion of the current ICS at Orleans is an environmentally preferred alternative.

Working in tandem with the current Sewerage & Water Board pumps will certainly fulfill your current "authorization and appropriation" mandate but it does not necessarily provide us with the BEST protection.

This leads me to the publicized "Option 2 and Option 2a". I am not an engineer. But I do possess some common sense. The Corps has said, in public (Mr Chris Accardo at the 5/20 meeting), that Option 2 is the best solution. Of course, the response is that the Corps is not authorized or funded to consider Option 2 or Option 2a. Plus, as said at this same meeting, the Corps is prohibited from lobbying Congress.
Telling Congress what is the best engineering solution is NOT the same thing as lobbying. It is simply providing them with technical information that many of them would need as I would bet you that most of them are not engineers. I strongly urge the Corps to simply provide Congress with this basic information. It is up to us, the public, to lobby Congress for support. It is my understanding that both Senators Landrieu & Vitter strongly support Option 2 (and 2a).

The public is being asked to comment on highly technical information and we don't have all the facts. We are being told that the contracts will be of a "design/build" nature but we are supposed to comment on placement without being told what they will look like. I am concerned that the technical specifications will be written so that the only designs that can be considered will fit the Corps's authorized monetary figure. The public cannot have informed input if not provided with information. It is why we ask for consideration of the low-rise concrete volute solution used by the Dutch.

I want to thank the Corps for adhering to federally mandated law that requires the Corps to to hold public meetings. I am positive that these are not the most pleasant events to attend (on both sides). I understand that by suggesting different options the NEPA process will, most likely, start from square one. I am willing to accept this as I continue to reiterate - having the right solution is better than having "a" solution.

Thank you for your attention.

Sincerely,

Susan M Garcia

Susan M Garcia
20 Snipe St
New Orleans, LA
70124

LAKE PONTCHARTRAIN BASIN FOUNDATION
SAVE OUR COAST SAVE OUR LAKE

June 2, 2009

Gib Owen
US Army Corps of Engineers
Planning, Programs, and Project Management Division
EPA Compliance Branch
CEMVN-PM-RS
P.O. Box 60267
New Orleans, LA 70160-0267

VIA EMAIL

RE: Comments on Draft Individual Environmental Report #5: Permanent Protection System for the Outfall Canals Project on 17th Street, Orleans Avenue, and London Avenue Canals

Dear Mr. Owen:

2.2 Proposed action...

Hurricane/Tropical Storm and Flood Protection

Option 1 and Option 2 both propose constructing permanent surge gates at the mouths of the 17th Street, Orleans Avenue, and London Avenue outfall canals. These gates are designed to be closed upon the approach of a hurricane or tropical storm prohibiting storm surges entering the canals from Lake Pontchartrain. Options 1 and 2 provide equivalent degrees of protection (1/100) for hurricane/tropical storm surges.

Option 1 proposes constructing new drainage pumping stations near the mouth of the three outfalls. These new pumping stations would be operated in tandem with the existing New Orleans Sewerage & Water Board (NOS&WB) pump stations when surge gates are closed (during hurricanes and tropical storms). NOS&WB pumps would be used for all other (non tropical) rain events. Option 2 would convert the three outfalls from high-level to low-level canals, eliminate floodwalls, and construct all-purpose drainage pumping stations near the mouth of each canal.

In our opinion, Option 2 is operationally simpler and would provide better long term protection for much of New Orleans and portions of East Jefferson. Currently, $800 million has been appropriated for the project. We recommend that that the project be phased to allow work on the permanent surge gates to commence as soon as possible. Further, we recommend critical features required for future expansion (such as lower sills) be incorporated into the initial phase. Additional work such as deepening canals, elimination of floodwalls, and decommissioning of existing NOS&WB pumping stations should be undertaken as additional funds are secured beyond the $800 million presently available.

3.2.3: Water Quality: We appreciate your discussion of the use of BMPs and SWPPP to reduce the direct impacts to water quality and encourage the COE to enforce strict adherence to these practices by all contractors.

3.2.6: Essential Fish Habitat: As regards the proposed breakwaters associated with the 17th Street and Orleans Avenue Canals, we request the need for these structures be reviewed. These breakwaters will have a direct and indirect impact on essential, estuarine habitat important to numerous fish species.

I appreciate the opportunity to comment on this project.

Sincerely,
Carlton Dufrechou
Executive Director

LAKE TERRACE PROPERTY OWNERS ASSOCIATION
www.laketerrace.net

June 3, 2009

mvnenvironmental@usace.army.mil
Mr. Gibb Owen
United States Army Corps of Engineers
PM-R
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: (IER-5) London Avenue Permanent Pump Station/Closure Structure

Dear Sir or Madam,

I write on behalf of the Lake Terrace Property Owners Association to address the proposed permanent pump station and closure structure at the London Avenue Canal.

I must emphasize at the outset that the Draft IER #5 Report is so vague that it does not provide the public with sufficient specific information upon which to formulate firm conclusions with respect to the impact of the project. Accordingly, we object to it. What the law requires to be a transparent process is, in this instance, most certainly not.

It is essential that, going forward, the Corps of Engineers includes the property owners in the design and construction process, so that we are kept well-informed and have the opportunity to provide input on issues that so directly impact our neighborhood. While we have been told generally that the structure could be as high as 95 feet and span several hundred yards in each direction, thus far, we have been provided no concrete details about features such as shape, orientation, cladding, lighting, fencing, access, trees and other plantings, noise barriers, aesthetics, and other such features that, while not impacting the efficacy of the structure, can serve to lessen the damage to our neighborhood. We request that the Corps take full responsibility for the public acceptance of the design in public meetings, and not rely on a design-build contractor to implement government responsibilities. With that said, we set forth additional concerns below.

The Lake Terrace subdivision, like the other subdivisions along the New Orleans Lakefront, is characterized by its tranquil setting and park-like atmosphere. Indeed, there are several parks and green spaces integrated into the

neighborhood; and, Lake Terrace has enacted neighborhood building restrictions that serve to maintain the quality of our neighborhood by requiring owners to comply with building and maintenance standards. These features are what, pre-Katrina, drew citizens to invest in the neighborhood, and they are what, post-Katrina, led citizens to return to and reinvest in New Orleans. Our neighborhood is made up of over 400 families that have demonstrated their commitment to our great City. Even today, families in our neighborhood continue to rebuild their homes and lives here.

With respect to the proposed hurricane and flood protection projects, our primary concern is the safety of all New Orleanians. Simply put, we want to make sure that the City never floods again. We also recognize that the proposed permanent pump station and closure structure on London Avenue Canal will have a dramatic and direct impact on the families who live in Lake Terrace. It is fair to say that the structure will forever change the landscape, and has the potential to seriously harm the quality of life here. We understand from our meetings with the Corps of Engineers that every option provides an equivalent factor of safety for our City. Based both on the obligations imposed by NEPA and on our many conversations with the Corps of Engineers, we are confident that if a permanent pump station and closure structure must be constructed on London Avenue Canal, it can be done in a way that accomplishes our primary goal of safety while successfully addressing these fundamental principles:

Wherever the project is located south of Lakeshore Drive, no part of the structure nor access to it should extend west of a line projected from the centerline of the existing Leon C. Simon Bridge to the centerline of the existing Temporary Protection Structure (TPC) and, thence, from the centerline of the existing TPC along a line extending to the centerline of the existing bridge at Lakeshore Drive. We depict this on the attachment to this letter. All ancillary components of the work such as fuel tanks, roads, fencing, offices, radio towers, et cetera, should be sited on the east side of the Canal. We realize that this will require your use of certain property now part of the University of New Orleans campus. The use of that property is appropriate and justified for several reasons:

- UNO is a government entity. Since the structure is a government project, it is certainly preferable to use government-owned land in order to reduce the detrimental impact on private landowners.

- UNO's campus is similar in many respects to a commercial and industrial operation that includes high-rise buildings, power plants, maintenance yards, et cetera. As such, locating ancillary structures on the east-side of the Canal is consistent with the nature and physical characteristics of existing campus facilities.

- Our understanding, based on our many meetings with the Corps of Engineers, is that the areas of UNO's campus that would be affected include, at most, things like parking lots, undeveloped land, and old student housing facilities not currently in use. Common sense dictates that such areas be used before residential areas. We expect UNO to be a cooperative and vibrant partner in the rebuilding effort, and as such we anticipate that, at the end of the day, UNO will do whatever is necessary to help minimize any detrimental impact on Lake Terrace families.

Second, the structure must be located, designed and constructed in a way that minimizes the impact to our neighborhood and quality of life. This includes factors such as:

- the Corps must abide by the Lake Terrace Building Restrictions which prohibits the construction of structures on existing green space within the Lake Terrace subdivision;
- the project specifications should prohibit the use of vibratory hammers and impact hammers, and should require the use of "press-in" pilings. We have experienced damage to the properties in Lake Terrace from noise and vibrations. Should the Corps allow the use of vibratory or impact hammers over our objection, the time of operation should be limited to 6:30 a.m. to 6:30 p.m.;
- should the Corps allow the use of impact or vibratory hammers, then construction specifications should require (a) continual vibration monitoring throughout construction and (b) immediate response by the contractor to reduce excessive vibration and address resulting damage. The results of this monitoring, and the steps to address damage caused by vibration, should be made public;
- the structure must have the smallest footprint possible;
- we urge the Corps to give full consideration to using modern low rise pump systems;
- the Corps must minimize the height of the structure;
- a design that, to the fullest extent possible, complements the existing park setting and adjacent neighborhood aesthetics;
- raising the levee along Pratt Drive, or other comparable effective measures, to limit the sight-line to the structure.
- construction specifications that require coordination and communication throughout construction with the State Division of Administration, Office of Non-Flood Assets, the South Louisiana

Flood Protection Authority – East, and the Lake Terrace Property Owners Association;

- the contractor should not be allowed on residential streets;
- all street damage shall be repaired to like-new conditions;
- the contractor must maintain a cleanup crew with equipment, during every hour the contractor is working, to clean the streets of debris;
- a parking facility for construction workers must be provided outside of the residential neighborhood along with neighborhood security to enforce it and protect homes from intruders;
- incorporating adequate funds for remediation of the area along Pratt Drive to return it to a park-like setting once construction is completed;
- fully compensating landowners along Pratt Drive and other streets whose property values may decline because of the existence of the structure;
- removal of the temporary structure and complete remediation of the parks and green space along Pratt Drive, from Lakeshore Drive to Robert E. Lee Blvd.
- ensuring that the levees and/or floodwalls between the structure and the Lake are fortified, comparable to the work being performed on the levees along the Lakefront.
- the Corps must provide Lake Terrace with monthly updates on the status of work during construction of the structure.
- the Corps and its contractor must appoint and identify a person to whom the neighborhood can present concerns and problems throughout construction.

We reserve the right to amend our comments during the design process to the extent that we are allowed to participate. We urge you to take these considerations into account as you proceed. We are available at your convenience to discuss these issues. Thank you.

Sincerely,

Lambert J. Hassinger, Jr.

Lambert J. Hassinger, Jr.
President

LJH,Jr

-----Original Message-----
From: ebludwig@aol.com [mailto:ebludwig@aol.com]
Sent: Wednesday, June 03, 2009 9:52 PM
To: MVN Environmental
Subject: Please accept this IER-5 Comment

To Whom It May Concern:
Please accept this IER-5 Comment from a CONCERNED Citizen of New Orleans, LA We do not want option 1! We need the BEST and SAFEST plan for the 17th Street Canal:
Option 2, the deepening and armoring of the 17th Street Canal, and Option 2a, Pump to the River.

ALL THOSE IN FAVOR OF OPTION 2 AND OPTION 2A:
Jefferson Parish Council
Senator Mary Landrieu
New Orleans City Council
Senator David Vitter
Regional Planning Commission
Congressman Steve Scalise
New Orleans Sewerage and Water Board
Council President Jacquelyn Clarkson
The Jefferson Chamber
Council V.P. Arnie Fielkow
SE Louisiana Flood Protection Authority
Parish President Aaron Broussard
Coastal Protection and Restoration Authority Council President Tom Capella Jefferson Business Council Councilwoman Cynthia Lee-Sheng Tom Jackson, P.E.
Councilman John Young

even the U.S. Army Corps of Engineers says:
"Option 2 is generally more technically advantageous …. over Option 1 because it would give greater reliability and further reduces the risk of flooding." Report to Congress in response to Section 4303 of Public Law 110-28

NEIGHBORHOODS DRAINED BY THE 17TH ST. CANAL:
Audubon Triangle
Beverly Knoll
Broadmoor
Carrollton Riverbend
Central Carrollton
Claiborne University
Cottam Park
Country Club Gardens
Fontainbleau
Hollygrove
Lakeview
Maple Area

0A
Metairie Club Estates
Metairie Club Gardens
Metairieville
N.W. Carrollton
Oak Street
Oakridge Park
Old Jefferson
Palm-Aire
Palmer Park
Savannah Ridge
South Beverly Knoll
Suburban Terrace

We want Option 2 Option 2-A PUMP TO THE RIVER.
We do not want to flood again. Option 1 is a flawed plan that will leave the people of New Orleans vulnerable. The Corps needs to learn from it's past mistakes and make the best choice, not the cheapest.
thank you,
Lisa Ludwig
570 Woodvine Avenue
Metairie,La 70005
504-495-1597

-----Original Message-----
From: Patricia Fullmer [mailto:pfullmer@bellsouth.net]
Sent: Wednesday, June 03, 2009 6:13 PM
To: MVN Environmental
Subject: IER-5 Orleans Avenue Permanent Pump Station/Closure Structure

Patricia Fullmer
11 N. Lark Street
New Orleans, LA 70124
June 3, 2009

mvnenvironmental@usace.army.mil
Mr. Gibb Owen
United States Army Corps of Engineers
PM-R
U. S. Army Corps of Engineers
P. O. Box 60267
New Orleans, LA 70160-0267

REF: IER-5 Orleans Avenue Permanent Pump Station/Closure Structure

Dear Sir or Madam:

The law requires the process to be transparent and this process has not been transparent.

It is unclear if we need pump stations at the mouths of the Orleans and London Avenue outflow canals.

This elaborate report of yours has made a reckless decision to place the proposed pump station for the Orleans Canal along Lakeshore Drive rather than back in the canal near the temporary pump station or past Robert E. Lee Blvd. Both locations provide safer placement for the pump. The location south of Robert E. Lee would affect fewer residents and promote a better quality of life for the lakefront neighborhoods, all New Orleanians and visitors that enjoy the recreation along Lakeshore Drive.

You obviously don't trust your ability to protect the City of New Orleans given the fact that you have entered into a $90 million one year contract with a California company and a joint venture group to assist you in the New Orleans area with among other things, pump stations. Why would you partner with a group from another region in our country instead of the Dutch? The Dutch know more about water management than anyone on the planet.

The Corps reached its level of incompetence years ago but has not learned from its mistakes. You continue to do business as usual and keep a closed mind on modern, safer ways to manage water. The Corps needs to rethink how to protect us.

Yours truly,
Patricia Fullmer

-----Original Message-----
From: JOHN M DAVIS JR [mailto:djohnmjr@bellsouth.net]
Sent: Wednesday, June 03, 2009 5:02 PM
To: MVN Environmental
Subject: IER5 Document and meeting Comments

I attended the IER5 meeting on May 20, 2009. You changed the format and required comments be in the form of a written question. Because of this, I don't think I had the opportunity to bring forth my opinions. If I had spoken later in the meeting, after you lost total control of the meeting, I would have been able to express my opinions. You should revert to the original format for future meetings.

In the meeting, someone asked why the Orleans Canal pump was at the lakefront, requiring a breakwater in the lake, while the London Avenue Canal pump was back from the lakefront, requiring no breakwater. The answer was that the rationale was fully explained in the IER5 document. I assert that the rationale is NOT clearly explained.

A preliminary assertion is that the pump does not have to be at the lakefront to be safe. The Corps has repeatedly said that any of the proposed pump locations will meet the safety requirements. I have letters from both Col. Jeff Bedey and Col. Al Lee which make this same assertion. And, in IER5, the London Ave pump is not at the lakefront and is considered safe.

I think that the site you have selected for the Orleans Canal pump, Site B, is the very worst place a pump for this canal could be placed. (Only Site A would be more destructive, and you have ruled that site out.) The pump site is an industrial complex. The pump will be in the canal, 300 feet from Lakeshore Drive. It will be 150 feet on a side. The height of the pump is unknown but if the 'rumor mill' is correct, the low-rise pump technology will not be used and the pump could be tall. Up to 21 acres of green space, primarily on the west side of the canal, will be used for a generator building, a fuel storage tank farm complex, parkinag, general staging and storage. Some of the green space taken will likely be across the street from homes in Lakeshore. Other of the green space taken will likely be on Lakeshore Drive. A 700 foot long, 15 1/2 foot high breakwater will be built in the lake.

Given that Lakeshore Drive is heavily traveled, and many people come to the lakefront to fish or just enjoy the lake, and many people come to the lakefront to enjoy the green space, and that the neighborhoods on eigher side fo the complex will be negatively impacted, and that visitors to the City are reqularly given tours of athe lakefront, this site will negatively affect the maximum number of people.

Site C, the site of the current temporary pump, is away from the lakefront. It could be used as the site for the permanent pump. The canal walls from the temporary pump site to the lakefront have been brought up to current standards. But, this site is between two neighborhoods and, while affect on people would be less than Site B, the negative affect would be significant.

Site D is south of Robert E. Lee Boulevard. At this site, the west side of the canal is Lakeview; homes there would be affected, and the higher the pump, the greater the negative effect.

However, the east side of the canal is uninhabited City Park property. It is currently a stand of cypress trees. It is not used for recreation except to store some sculls. Almost all construction would be on the City Park property. With this site, no breakwater in the lake would be required. Traffic around this site is less than that on Lakeshore Drive.

Overall, the negtative impact on people as the result of using this site would be far less than if the the pump were put on the lakefront.

If Site D were used, the canal walls from Robert E Lee Blvd. to the temporary pump site would have to be brought up to the 100 year standard. These canal walls are earthen levees now (same as on the lakefront) and could be 'enhanced.'

Finally, tahe IER5 document states that using Site B, on the lakefront, will cost more than using either Site C or Site D.

While I don't advocate just looking for the least cost solution, if you can have flood protection, and if you can minimize cost, and if you can negatively affect the least number of people, it makes sense to use Site D.

If you continue to recommend Site B, I ask that you document the SPECIFIC REASONS why you would choose the site that does the maximum damage to people and costs the most.

Thank you.

John M Davis Jr
President, Lake Vista Property Owners Association
504-282-1137 Home
504-352-5038 Cell
jmdavisjr@bellsouth.net

WE ARE AGAINST ANY PUMP PROPOSAL THAT WOULD ELIMINATE TWO TONY'S RESTAURANT FROM WHERE IT CURRENTLY EXISTS WHICH IS 105 HAMMOND HIGHWAY METAIRIE LA 70005

NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
Bret Maxwell	423 S. Clark St 70119
A. McFadden	205 Fairway Dr. 70124
Dennis Ross	423 S. Clark St 70119
Louis Nichols	7828 Breakwater Dr #36 N.O. La. 70124
Janet D. Burtet	3225 Ursulines Ave. NOLA. 70119
[illegible]	2500 N. Diaz St. N.O. LA 70002
Terry Ann Richard	3909 Delgrey Dr Met 70002
Sandy-Ann Drummond	3809 North Met 70002
[illegible]	25 Crone St NOLA 70124
[illegible] A McDonald	4616 Lindstrom Drive Metairie La
Margo Stamoulis	4817 St. Mary St. Met. LA 70006
[illegible]	" " " " " "
Brad Casey	6239 Gen. Diaz St. N.O. La. 70124
Dorien Mahoney	1301 Cherokee Met 70005
Courtney Murphy	6423 Bellaire Dr New Orleans 70124
Mr & Mrs J. D. Hamm	1505 Helios, Met.
Gemelle Linzy	5662 Marcia Ave NOLA 70124
Keith Casella	256 20th Street. N.O. 70124
Emily Degan	1161 Robert E. Lee Blvd NOLA 70124
Nancy Degan	1161 Robert E. Lee, NOLA 70124
Sydney W. Degan Jr	1057 Leon Diaz La. 70124
Krystal Dubroc	1109 Trudeau Dr. Metairie LA 70003
Karen Lucy	74611 Drummond Head Dr N Drummond Head MS

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NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
Jenny Johnston Jenny Johnston	JJohnston512@yahoo.com
Rose Anne Allen Rose Anne Allen	8903 Buena Pl #3B7 Windermere Fl
Alice Marie Tucker Alice Marie Tucker	6075 Waterloo Ave PSJ FL 32927
Kenneth Tucker Kenneth Tucker	6075 Waterloo Ave PSJ FL 32927
Ryan Breyer Ryan Breyer	6075 Waterloo Ave PSJ FL 32927
Donald Cady Sr	120 Roosevelt Ave, Mass. PK NY 11758
Barbara Ustica	120 Roosevelt Ave. Mass Pk NY 11758
John Castellucco	3945 Cypress Sq. Metairie LA 70001
Cindy Cocke	2432 1/2 Jefferson Ave NOLA 70115
Krystal Dubroc	1109 Trudeau Dr. Met LA 7000
Tom Wagner	10724 Hillbrook Ave BR 70810
Alaina Crosby	6342 Kuebel Dr. 70126
Kery Biagas	6342 Kuebel Dr 70126
Katherine Scott	5918 St. Claude Ave 70117
Kayesha Crosby	5916 St. Claude Ave 70117
Shawn Thermanklg.	7857 Sail St. 70128
Steve Wagner	55 Tappan St #1 Kearny NJ 07032
Steven A. Mager	55 Tappan St. Kearny NJ 07032
Robert T. Wagner	8736 Ashbury Dr. Hudson, FL 34667
Arthur + June Mager	165 Forest St. Kearny NJ 07032
Dennis Rose	3534 Bonnet St. 70117
Francis P. Landry	4635 Lakewood Dr Met. La 70002

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NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
JUDY TERUALON	4850 READ BLVD N.O. LA. 70127
ELODIE SCHAEFFER	2913 PARIS AVE N.O.
Elan Cvars	318 Lake Marina, N.O. LA
Gwen Dickens	528 Bayou Rd. St Bernard La 700
Michael G Totten	3917 BRIANT DR MARRERO LA 70072
Lydia Nettenville	739 Agate St, New Orleans
Diana Nettenville	7309 Agate St
Irina McAllister	2721 Burgundy St. NOLA 7011
Elizabeth Dawson	347 Vincent Ave. Metairie, LA 70005
Susan S. Dawson	347 Vincent Ave. Metairie, LA 70005
Tracey Couret	1712 High ave Met LA 70001
MIKE COURET	1712 HIGH AVE MET LA 7000
Rev Victor Celia, OP	St. Dominic Priory 775 Harrison NOLA 70124
LAURIE McNeese	28540 Hwy 424 Franklinton, LA 70438
CHARLES FARANGA	6077 Neal St Lacombe La
GEORGE GONZALES	1345 CHACKASAW AVE METAIRIE LA. 70005
Krystal Dulroy	1109 Trudeau Dr Metairie LA 7000
KEITH NEIDLINGER	1440 ROSE GARDEN DR MET, LA 7000
Brandi Roth	1440 Rose Garden Dr. Met, 70005
Joal Ruebel	532 Crystal St. N.O. LA. 70124
Omer F. Ruebel, JR	532 Crystal St. N.O. LA 70124
Charles A. Ruebel	532 Crystal St. N.O. LA 70124

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NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
KAREN McFERON	ANewHope2000@MSN.COM
Yvette L. deBLANC	228 COUNTRY CLUB Dr. 70012
FRANCIS X. DE BLANC, JR	"
D. COCO	1437 Pauger
RAGAN KIMBRELL	1437 PAUGER ST. 70116
Krystal Dabry	1400 Seminole Ave 70005 Metairie
Natalie Crist	300 LaSalle Ct. 70018 NOLA
Dayna Pembo	526 Choctaw Dr. Abita Sp, LA 70420
Tony Pembo	526 Choctaw Dr Abita Sp LA 70420
Lisa Knapp	315 Crystal NOLA 70124
CYNDI ST RUNTINE	6540 Center St. NO, LA 70124
Tom Harris	134 Anchorage [illegible] LA 70124
Rachel Bailey	1100 N. Wilson [illegible] LA 70003
Damon Adams	3412 Lake Trail Dr. Met, LA 7000
Michael Mullet	3201 [illegible]
[illegible] Schaff	5109 Pitcairnhale ST 70006
Jason Milam	jaymanco@cox.net
Charlie Pabst	CAPS@EARTHLINK.net
Carl Guidry	4205 Arizona Kenner LA
Carolyn M. Erath	2719 Fourne Fort Chalmette LA 70043
Kelly Juneau	7101 Schwest St. Met LA 700
Brenda Stamm	6210 Cotton St. NO, LA 70124

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NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
RANDALL LARGE Randall Large	671 ROSA AVE. MET
Susan Peck	4764 Perelli Dr. NO La
Alice Delaney	4764 Perelli Dr NO La
Yvonne Bay	2732 Whitney Pl. #207 Met 70002
Sharon Gundy	2609 Alistha 70003
REGINA BERGMAN	ARABIA, LA 30062
Rose Mogabgab	N.O. LA 70124
Krystal Dubroc	1109 Trudeau Dr. 70003 Metairie
JOY TERUALON	4850 READ BLVD 70127
Bob Maxwell	423 S. Clark
Kenneth Kimble	49 S. LARK ST. N.O. LA 70129
DAL[illegible]	166 COUNTRY CLUB NO LA 70124
PAM GENDUSA	214 W. Robert E. Lee Blvd. NOLA 70124
[illegible] Swaney	1128 Aurora Ave Met 70005
Sarah Marlow	SKARI01@TIGERS.LSU.edu
Melissa Rocher	MROCHER05@yahoo.com
Jaymee Robin	4120 Jasper St. Met. 70002
Shirley Maxley	4120 Jasper St. Met 70005
Pat Montegut	437 Aurora Ave. Met 05
John [illegible]	157 7th [illegible] Ave Metairie
Casey O'Neal	6726 Marshall Foch St.
D.A.N. Pollard	4534 Redbird NO 70127

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NAME (PRINT & SIGN)	ADDRESS AND/OR EMAIL
Kim Dubroc	KDubroc@cox.net
D. J. NOLAN	darrennolan31@hotmail.com
[redacted]	[redacted]
Darlene Pagani	2512 Mississippi Ave 70003
Vincent Cardinale	bretmaxwell85@yahoo.com
Denise Avellina	watersolja@hotmail.com
Jean Anderson	JeanAnderson2@cox.net
Lois Landry	500 Olive Ave Harvey, LA 70058
John Dufrene	2326 Bucaneer, Marrero, La. 70056

schedules, and

WHEREAS, This report did not contain an Independent Risk and Reliability Analysis, and

WHEREAS, The cost estimate for Option 1 does not address the removal of the Katrina damaged and weakened floodwalls and the existing pump stations are left to pump to the new permanent pump stations at high discharge levels that can exceed the safe water elevations in the canals, and

WHEREAS, The citizens of Jefferson Parish remain at risk to catastrophic flooding should these weakened and damaged flood walls fail. and

WHEREAS, The Corps is proceeding with the procurement of a design and construction contract for Option 1 without seeking further input from Jefferson Parish or other stakeholders; and

WHEREAS, On March 10, 2009 the Honorable C. Ray Nagin, Mayor of the City of New Orleans, met with Major General Merdith Temple, Deputy Commanding General for Civil and Emergency Operation, and stated that Sewerage and Water Board and the City of New Orleans considers Option 1 to be technically flawed and fraught with long term risk to the safety of the citizens and businesses of Orleans Parish and other stakeholders and therefore was an unacceptable solution for the construction of the three permanent pump stations; and

WHEREAS, General Temple committed to Mayor Nagin that the Corps would conduct an Independent Peer Review of the Options 1, 2 & 2a; and

WHEREAS, On March 12, 2009, Mayor Nagin met with Secretary John Paul Woodley, Jr., Assistant Secretary of the Army for Civil Works and restated the Board and City's position with regard to proceeding with Option 1; and

WHEREAS, Secretary Woodley stated that the Corps had constructed the temporary interim pump stations at the lakefront on the 17th Street, Orleans Avenue and London Avenue canals to have a sufficient life span so as not to bring undue pressure on the stakeholders while a solution for the permanent pump stations was being sought and that an Independent Peer Review involving the stakeholders, as pledged by General Temple.

NOW, THEREFORE, BE IT RESOLVED, by the Jefferson Parish Council of Jefferson Parish, Louisiana, the governing authority of said Parish:

SECTION 1. That the Council does hereby request that the Assistant Secretary of the Army for Civil Works, acting through the Chief of Engineers, immediately suspend all procurement actions which would otherwise lead to the design and construction of the three permanent pump stations under Option 1 until: (a) the Jefferson Parish Council has the opportunity to provide additional technical input and to understand the engineering basis underlying each of the options considered; (b) the Corps has undertaken and completed an Independent Peer review of all relevant reports and engineering data and analyses related to the three project options conducted generally in accordance with Section 2034 of Public Law 110-114; and (c) the risk and reliability analyses for all three options has been completed in cooperation with local stakeholders

SECTION 2. That the Council does hereby request the Governor of the State of Louisiana, the Honorable Bobby Jindal, to officially withhold the State's support for implementation of Option 1 under the terms of the Project Partnering Agreement existing between the State and the Department of the Army for the Lake Pontchartrain and Vicinity Hurricane Protection Project until the action specified in SECTION 1 have been satisfactorily completed, and that the Governor immediately notify the Assistant Secretary of the Army for Civil Works of this decision.

SECTION 3. That the Council does hereby request the Southeast Louisiana Flood Control Authority – East to withhold its support for the implementation of Option 1 pending satisfactory completion of actions specified in SECTION 1.

SECTION 4. That this resolution be sent to: President Barrak Obama; the Honorable John Paul Woodley, Jr., Governor Bobby Jindal, Senators Landrieu and Vitter,

Representatives Scalise, Melancon, and Cao, Colonel Alvin B. Lee (District Engineer, New Orleans District); Brigadier General Michael J. Walsh (Commander, Mississippi Valley Division erm Vicksburg, MS); Lt. General Robert L. Van Antwerp, (Commander and Chief of Engineers, HQ USACE, Washington, DC), Mr. Garret Graves (Governor's Executive Assistant for Coastal Activities and Chairman, Louisiana Coastal Protection and Restoration Authority) and the Southeast Louisiana Flood Control Authority - East.

The foregoing resolution having been submitted to a vote, the vote thereon was as follows:

YEAS: 6 NAYS: None ABSENT: (1) Lee

The resolution was declared to be adopted on this the 18th day of March, 2009.

THE FOREGOING IS CERTIFIED
TO BE A TRUE & CORRECT COPY

Eula A. Lopez

EULA A. LOPEZ
PARISH CLERK
JEFFERSON PARISH COUNCIL

Phone message received

1. Text Message “Save Coconut Beach” (225-315-5749) May 13 10:28:45 2009
2. Please save coconut beach, we love it (504-416-4325) May 13 10:55:57 2009
3. Please save coconut beach (5043773634) May 13 10:55:57 2009
4. Cory Buck, 100% support of not taking Coconut Beach, reconsider all other available options, please do not take the beach. (5048277691) May 13 11:23:13 2009
5. Scott, played at coconut beach since the storm, wants to keep it alive (5047237918) May 13 11:23:13 2009
6. Please save coconut beach, thank you (5049208808) May 13 11:37:09 2009
7. Can you please save coconut beach (5044961157) May 13 11:37:09 2009
8. Please save coconut beach (5043398275) May 13 11:37:09 2009
9. Please save coconut beach (5047153758) May 13 11:37:09 2009
10. Please save coconut beach, thank you (5042019076) May 13 11:37:09 2009
11. Please explore other options in order to save coconut beach, thank you (5047237918) May 13 11:37:09 2009
12. Hey, just so you ah don’t take the beach (5044959748) May 13 10:55:57 2009
13. Just called to let you know … coconut beach…thank you. (5049122524) May 13 10:55:57 2009
14. Kelly Nelson, Baton Rouge, called to support coconut beach, can’t have coconut beach closed, it allows all kinds of players to come to New Orleans, thank you. (2256366190) May 13, 2009 5:20 PM
15. Kristen, employee at coconut beach, plays at least 4 nights a week, met friends and important people in her life, without coconut beach would be bored all year, please help us out (5042370890) May 13, 2009 5:06 PM
16. Please save coconut beach (2253155749) May 13, 2009 4:53 PM
17. Please save coconut beach (5048722987) May 13, 2009 4:53 PM
18. John at AT&T, calling to see if there is anyway to work around coconut beach (5045599044) May 13, 2009 3:17 PM
19. Latasha Rowlinson, enjoys visiting concern coconut beach, would like to continue visiting, expresses concern about what is proposed for that area and hopes that you would not do it for the sake of those that live here (5042026729) May 13, 2009 2:36 PM
20. -Allen Villarubia, Small Business Consultant, expressed his interest in coconut beach. (5043382193) May 13, 2009 2:36 PM
21. Elliot Brett, EDG Consulting Engineers, volley ball player at coconut beach, not enough support for coconut beach through electronic means, so invited Gib Owen to coconut beach to hang out (5044550858) May 13, 2009 1:54 PM
22. Jennifer Carter, calling in regards to Coconut Beach, and would like to save coconut beach and would like the Corps in consideration. (5048316987) May 13, 2009 2:23 PM
23. Voice support for coconut beach, it was one of the first businesses back and it would be a great disservice to the city, if the corps makes this another casualty of Katrina, it would do a lot of damage to a lot of people in this good city, thank you. (5044005988) May 13, 2009 2:23 PM

24. Peggy Prescott, Jefferson Parish, coconut beach is very important to me and her family, pulled her son out of drinking at bars, now practices and keeps children out of mischievous things, this facility is important to the area, young adults have nothing else left in this area please do not take away coconut beach (5044664233) May 13, 2009 1:13 PM
25. Save coconut beach (5044322445) May 13, 2009 10:56 AM
26. Save coconut beach (5044164325) May 13, 2009 10:56 AM
27. Lars Vidali, save coconut beach (5043589198) May 13, 2009 10:56 AM
28. -We need to save coconut beach (5044005988) May 13 18:00:50 2009
29. -Matt, express views on coconut beach site, pretty distressed that the corps is going to take away coconut beach, been playing out there 22 years, need corps to consider to leave us a few courts, it is a big asset to the community. (5046170221) May 14 09:33:29 2009
30. -Jason Brandon, if at all possible if another location or part of coconut beach could be saved, there are thousands of families that use that area. It is one of the few facilities that are back in that area. If there is anyway possible to save the facility it would be appreciated. (5049529508) May 14 10:49:00 2009
31. Chris Centennio, Property management for local contractor, called to find out the plan, if there is anyway to get around taking the property, grew up out there, there is no where else in the city that that many people get together for recreation and exercise. Wanted to see if there was any way to only take a small portion and leave place open (5048898358) May 14 10:49:00 2009
32. Seth Mendoza, calling on behalf of coconut beach, played out there since he was a kid, it is an important place in New Orleans, asking sincerely if there is any possible way to not have coconut beach mickey retif sports complex confiscated. (5042361859) May 14 11:58:55 2009
33. Please save coconut beach (5044959748) May 14 12:54:34 2009
34. Coconut beach fan, best place in the south, really want to do anything we can to keep this place open. (5048277691) May 14 12:54:34 2009
35. Marvin Destin, really appreciate keeping coconut beach the way it is right now, lots of memories, all for protecting the city, but really want to keep coconut beach open. (5044870246) May 14 13:51:00 2009
36. Greg Shexnayder, called to support coconut beach, have a new plan, reconsider, look at all the options not just take the land (5047383774) May 14 21:08:47 2009
37. Dillon, please don’t shut coconut beach down. (8177977467) May 14 22:35:41 2009
38. Craig Gambino, having a tournament out at coconut beach, and invited Gib Owen to attend, if we don’t have a social life and what makes us tick going, it won’t matter if we build levees around it, come on out and see what we have to offer. (5043056575) May 15 16:44:55 2009
39. Dillon Brown, out here at coconut beach having a blast, don’t shut it down, because then I will go back to doing drugs and banging hookers. (8177977467) May 18 22:37:22 2009
40. -Andrew, called to let know how coconut beach is important, it is a home away from home. (5048284949) May 18 14:35:21 2009

41. Justin Rush, save the beach, I love it, friends love it, if there is anyway not to take all of coconut beach, that would be awesome (5049208781) May 19, 2009 1:56 PM
42. Kitty Roush, been going out to coconut beach since 27, now 55, son plays out there, went to junior Olympics, 18 year old son plays out there, it is a great place for people to go, exercise, no drugs, people can socialize out there, please don't take coconut beach, the city really needs it, she is an advocate for coconut beach. (5044647968) May 19, 2009 1:56 PM

Coconut Beach email messages can be downloaded from
http://www.nolaenvironmental.gov/nola_public_data/projects/usace_levee/docs/original/IER5CoconutBeachComments.pdf

APPENDIX C: MEMBERS OF INTERAGENCY ENVIRONMENTAL TEAM

Member	Agency Affiliation
Kyle Balkum	Louisiana Dept. of Wildlife and Fisheries
Catherine Breaux	U.S. Fish and Wildlife Service
David Castellanos	U.S. Fish and Wildlife Service
Frank Cole	Louisiana Department of Natural Resources
John Ettinger	U.S. Environmental Protection Agency
Michelle Fischer	U.S. Geologic Survey
Jeff Harris	Louisiana Department of Natural Resources
Richard Hartman	NOAA National Marine Fisheries Service
Christina Hunnicutt	U.S. Geologic Survey
Barbara Keeler	U.S. Environmental Protection Agency
Kirk Kilgen	Louisiana Department of Natural Resources
Tim Killeen	Louisiana Department of Natural Resources
Brian Lezina	Louisiana Department of Wildlife and Fisheries
Brian Marcks	Louisiana Department of Natural Resources
Ismail Merhi	LA Coastal Protection and Restoration Authority
David Muth	U.S. National Park Service
Jamie Phillippe	Louisiana Department of Environmental Quality
Manuel Ruiz	Louisiana Department of Wildlife and Fisheries
Reneé Sanders	LA Coastal Protection and Restoration Authority
Angela Trahan	U.S. Fish and Wildlife Service
David Walther	U.S. Fish and Wildlife Service
Patrick Williams	NOAA National Marine Fisheries Service

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APPENDIX D: INTERAGENCY AND TRIBAL GOVERNMENT CORRESPONDENCE

United States Department of the Interior

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

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

Dear Colonel Bedey,

Please reference the November 7, 2007, letter, and November 11, 2007, electronic mail from Laura Lee Wilkinson requesting our review of the U.S. Army Corps of Engineers' (Corps) proposed 100 Year Hurricane Protection Projects for Individual Environmental Reports (IER) 5-11 in Orleans, Jefferson, and St. Bernard Parishes and concurrence with determinations on effects to Federally Listed Species. That project would involve improvements to levees, floodwalls, floodgates, and construction of new barriers, closure structures, navigable gates and/or permanent pump stations in the New Orleans East Bank, New Orleans East and Chalmette Loop sub basins. These improvements are necessary to provide 100-year level flood protection for the New Orleans Metropolitan area. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Sincerely,

James F. Boggs
Acting Field Supervisor
Louisiana Field Office

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

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

October 1, 2008

Planning, Programs, and
Project Management Division
Environmental Planning
and Compliance Branch
Attn: CEMVN-PM-RN

No known historic properties wil be affected by this undertaking. This effect determination could change should new information come to our attention.

Scott Hutcheson 11-10-08
Scott Hutcheson Date
State Historic Preservation Officer

Mr. Scott Hutcheson
State Historic Preservation Officer
Office of Cultural Development
Department of Culture, Recreation, and Tourism
P.O. Box 44247
Baton Rouge, Louisiana 70804

RE: Request to Continue Consultation Under Section 106 of the National Historic Preservation Act for the Lake Ponchartrain and Vicinity Hurricane Protection Project, Orleans East Bank Outfall Canals, Individual Environmental Report #5, Jefferson and Orleans Parishes, Louisiana.

Dear Mr. Hutcheson:

The U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District (CEMVN), is amending the Area of Potential Effects (APE) for the project area currently being studied under Individual Environmental Report #5, Lake Ponchartrain and Vicinity Hurricane Protection Project, Orleans East Bank Outfall Canals, Individual Environmental Report #5, Jefferson and Orleans Parishes, Louisiana. This amendment shifts the Orleans Avenue Canal APE to the north and slightly extends the London Avenue Canal APE north to Lakeshore Drive. No changes are proposed to the 17th Street Canal APE.

In our letter to your office dated February 22, 2008, the District provided project documentation in support of a "no historic properties affected" finding for the three original project APE's located at Orleans Avenue, London Avenue, and 17th Street Canals. Your office concurred with our opinion in a letter dated March 17, 2008. Copies of these letters are attached herein.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), the District, in consultation with the State Historic Preservation Officer (SHPO) and Indian Tribes, will determine if the amended areas of potential effects (APE) established for the Orleans Avenue Canal and The London Avenue Canal contains historic properties.

RECEIVED
OCT 2 2008
DIV. OF ARCHAEOLOGY

The amended Orleans Canal APE, as proposed, is approximately 30 acres in size and has been shifted to the north where it now partially extends into Lake Pontchartrain. The amended APE for the London Avenue has been slightly extended north approximately 140 feet and is now adjacent to south side of Lakeshore Drive. Maps showing the boundaries of the amended APE's are attached herein.

Proposed activities in the APE's include the construction of a new permanent pump station and gates at or near the mouth of each of the outfall canals operating in series with the existing Sewerage and Water Board of New Orleans (SWBNO) pump stations (PS). Under normal conditions, the gates would remain open and bypass flow through the new pump station. During those events where the combination of storm surge from Lake Pontchartrain and flow from the existing SWBNO pump stations could create a condition where the safe water elevation in the canals is exceeded, the gates would be closed and the new pump stations operated. The existing SWBNO PS #3, #4, #6, and #7 would remain in service and operate concurrently or in series with the new pump stations and the outfall canals would continue to convey stormwater from the SWBNO pump stations to the new pump stations. The proposed action leaves in place the floodwalls that flank the outfall canals, and these floodwalls would remain an integral part of the city's internal flood protection system. The floodwalls on the protected side of the new pump stations would be maintained in their current condition and would not be reconstructed.

In a recent cultural resources investigation conducted by R. Christopher Goodwin & Associates, Inc, researchers utilized background research, previous cultural resource investigation review, soil and topographic analyses, field reconnaissance data, and remote sensing survey data to assess historic structures, identify high potential areas for archaeological resources, and locate remote sensing targets exhibiting cultural resources characteristics in the IER #5 study area (Heller et al. 2008). This study evaluated the amended APE locations. No terrestrial or submerged cultural resources were identified in the amended Orleans Avenue Canal or London Avenue Canal APE's.

Based on a review of the information summarized above, it is our view that the proposed project activities in the amended APE's will not impact any significant cultural resources. However, in the event that cultural resources are encountered during construction activities, work will be halted and your office will be contacted for further consultation. Any resources encountered will be recorded and documented, and state archaeological site forms will be provided.

Please review the enclosed project documentation and provide this office with your opinion regarding our "no historic properties affected" finding within 30 days of receipt of this letter. If you have any questions and/or concerns, please contact Mr. Michael Swanda at (504) 862-2036.

Sincerely,

For Elizabeth Wiggins
Chief, Environmental Planning
and Compliance Branch

Enclosures

CF: Klima, Advisory Council on Historic Preservation
Rivet, Louisiana State Historic Preservation Office
Varnado, Louisiana State Historic Preservation Office

References Cited

Heller, Nathanael, Troy J. Nowak, Kathryn A. Ryberg, Katy Coyle, Lindsay Hannah, and Ginny Jones.

2008 *Management Summary: Phase I Cultural Resources Survey and Archeological Inventory of the Lake Pontchartrain and Vicinity Project, Individual Environmental Report Area 5 (IER #5), Jefferson and Orleans Parishes, Louisiana.* Prepared by R. Christopher Goodwin & Associates, Inc., New Orleans. On file, New Orleans District Corps of Engineers.

Seminole Nation of Oklahoma

Historic Preservation Office

Department of the Army
New Orleans District
Corps of Engineers
P. O. Box 60267
New Orleans, Louisiana 70160-0267

10-06-08

Dear Ms. Elizabeth Wiggins:

We concur with No Historic Properties regarding the following project:

Re: Request to Continue Consultation Under Section 106 of the National Historic Preservation Act for the Lake Pontchartrain and Vicinity Hurricane Protection Project, Orleans East Bank Outfall Canals, Individual Environmental Report #5, Jefferson and Orleans Parishes, Louisiana.

At this time, we have no interest in this site. However, we would like to reserve the right to participate in future consultation if discoveries are made or resources are impacted that are of significance to the Seminole Nation of Oklahoma.

If you have any further questions, please do not hesitate to contact my office.

Sincerely,

Jennifer Johnson, M.Ed

Tribal Historic Preservation Officer

P.O. Box 1498 Wewoka, OK 74884 405.257.7271

TRIBAL HISTORIC
PRESERVATION OFFICE
SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
HC-61, BOX 21A
CLEWISTON, FL 33440
(863) 983-6549

TRIBAL OFFICERS:
MITCHELL CYPRESS
CHAIRMAN
MOSES OSCEOLA
VICE CHAIRMAN
PRISCILLA D. SAYEN
SECRETARY
MICHAEL D. TIGER
TREASURER

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

Michael Swanda
Planning, Programs, and
Project Management Division
Environmental Planning and
Compliance Branch
Attn: CEMVN-PM-RN

Saturday, October 11, 2008

Subject: IER #5 Revisions

Dear Mr. Swanda,

The Tribal Historic Preservation Office of the Seminole Tribe of Florida (STOF-THPO) has received your email correspondence concerning the aforementioned project. The STOF-THPO concurs with your findings of "no historic properties affected." However, the STOF-THPO would like to be informed should any archaeological and/or historic resources be discovered inadvertently during the construction process. We thank you for the opportunity to review the information that has been sent to date regarding this project.

We look forward to working with you in the future.

Sincerely,

FOR

Direct routine inquiries to:

Willard Steele,
Tribal Historic Preservation Officer

Dawn Hutchins,
Compliance Review Supervisor

Ah- Tah- Thi- Ki Museum, HC-61, Box 21-A, Clewiston, Florida 33440
Phone (863) 902-1113 ♦ Fax (863) 902-1117

Swanda, Michael L MVN

From: Robert Cast [rcast@caddonation.org]
Sent: Friday, October 17, 2008 8:12 AM
To: Swanda, Michael L MVN
Subject: RE: IER #5 - October 1, 2008 Caddo Nation of Oklahoma Request to Continue Consultation

Mr. Swanda~ we concur with the "No historic properties affected" finding.

Robert Cast
Tribal Historic Preservation Officer/Director
Caddo Nation
P. O. Box 487
Binger, Oklahoma 73009
Phone: 405-656-2901 or 2344, ext. 245
Fax: 405-656-2386
Email: rcast@caddonation.org

From: Swanda, Michael L MVN [mailto:Michael.L.Swanda@usace.army.mil]
Sent: Wednesday, October 01, 2008 2:24 PM
To: preservation@caddonation-nsn.gov
Subject: IER #5 - October 1, 2008 Caddo Nation of Oklahoma Request to Continue Consultation

Dear Mr. Cast,

The U.S. Army Corps of Engineers, New Orleans District (the Corps), is amending the Area of Potential Effects (APE) for the project area currently being studied under the Lake Pontchartrain and Vicinity, Orleans East Bank Outfall Canals project as part of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System. Information relating to this proposed project amendment will appear in the Individual Environmental Report #5, a National Environmental Policy Act document.

Based on a review of recent cultural resources investigations previously submitted to you on February 22, 2008 as part of the original study, the Corps has found that the proposed amendments to the Orleans Avenue Canal and London Avenue Canal APE's will have no impact on historic properties. A copy of our letter to Chairperson Parker and project documentation is attached herein. If you wish to respond, please review these attachments and provide our office with your opinion regarding our "no historic properties affected" finding within 30 days of receipt of this email. If you have any questions or require additional information, please contact me at (504) 862-2036.

Thank you.

Michael Swanda
Archaeologist
U.S. Army Corps of Engineers, New Orleans District
(504) 862-2036

<<IER5 proposed action_082508 (2).doc>> <<IER #5 - February 22, 2008 Caddo Nation of Oklahoma Request to Continue Consultation.pdf>> <<IER #5 - October 1, 2008 Caddo Nation of Oklahoma Request to Continue Consultation.pdf>>

BOBBY JINDAL
GOVERNOR

SCOTT A. ANGELLE
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL RESTORATION AND MANAGEMENT

November 17, 2008

Elizabeth Wiggins
Chief, Environmental Planning and Compliance Branch
U. S. Army Corps of Engineers, New Orleans District
P. O. Box 60267
New Orleans, Louisiana 70160-0267

RE: **C20080112,** Coastal Zone Consistency Modification
U. S. Army Corps of Engineers, New Orleans District
Direct Federal Action
IER #5, Permanent Protection System for Outfall Canals along Lake Pontchartrain, modification for a breakwater and revised location of Orleans and London Avenue Canals, **Orleans and Jefferson Parishes, Louisiana**

Dear Ms. Wiggins:

The above referenced project modification has been reviewed for consistency with the approved Louisiana Coastal Resource Program (LCRP) as required by Section 307 of the Coastal Zone Management Act of 1972, as amended. The modification, as proposed in the application, is consistent with the LCRP. If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7939.

Sincerely yours,

Jim Rives
Administrator

JR/JDH/bgm

cc: Dave Butler, LDWF
Laura Lee Wilkinson, COE-NOD
Wynecta Fisher, Orleans Parish
Marnie Winter, Jefferson Parish
Tim Killeen, CMD FC
Ismail Mehri, LACPRA

BOBBY JINDAL
GOVERNOR

HAROLD LEGGETT, PH.D.
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

JAN 26 2009

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

Attention: Laura Lee Wilkinson

RE: Water Quality Certification (WQC 081110-01/AI 161807/CER 20080001)
Individual Environmental Report #5 (IER #5)
Jefferson & Orleans Parishes

Dear Ms. Wilkinson:

The Department has reviewed your application to install and maintain three permanent pump stations for improvements to the hurricane protection levee system, on the 17th Street, Orleans Avenue and London Avenue Canals at Lake Pontchartrain in New Orleans, Louisiana.

The requirements for Water Quality Certification have been met in accordance with LAC 33:IX.1507.A-E. Based on the information provided in your application, we have determined that the placement of the fill material will not violate the water quality standards of Louisiana provided for under LAC 33:IX.Chapter 11. Therefore, the Department has issued a Water Quality Certification.

Sincerely,

Thomas F. Harris
Administrator
Waste Permits Division

TFH/jjp

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
(727) 824-5312, FAX (727) 824-5309
http://sero.nmfs.noaa.gov

APR 17 2009

F/SER32:CH

Mrs. Elizabeth Wiggins, Chief
Environmental Planning and Compliance Branch
New Orleans District Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mrs. Wiggins:

The enclosed document constitutes the National Marine Fisheries Service's (NMFS) biological opinion based on our review of the proposed actions stated in the New Orleans District of the U.S. Army Corps of Engineers' (NOCOE) letter dated September 23, 2008. The proposed action is to install two breakwaters to provide 100-year-level storm protection for the city of New Orleans and Jefferson Parish, Louisiana. The proposed action is evaluated in the context of the overall comprehensive Greater New Orleans Hurricane and Storm Reduction System. This biological opinion analyzes project effects on Gulf sturgeon critical habitat in accordance with section 7 of the ESA, as well as determines whether the continued incremental consultation on the individual IER complies with 50 CFR 402.14(k). NMFS initiated formal consultation on November 14, 2008, in accordance with section 7 of the Endangered Species Act (ESA) of 1973 as amended.

It is NMFS' biological opinion that this project is not likely to destroy or adversely modify Gulf sturgeon critical habitat, individually or as part of the overall comprehensive Greater New Orleans Hurricane and Storm Reduction System. Conservation recommendations have been provided to avoid adverse effects of this and similar actions on Gulf sturgeon and its critical habitat. Further, based on available information to date, we conclude that consultations on the IER projects under the Alternative Arrangements comply with all the provisions contained in 50 CFR § 402.14(k) for consultations on incremental actions.

We look forward to further cooperation with you on other NOCOE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions, please contact Ms. Calusa Horn at (727) 824-5312 or by e-mail at Calusa.Horn@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.f.1 LA
Ref: F/SER/2008/08000

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: U.S. Army Corps of Engineers, New Orleans District

Activity: Installation of two breakwaters in Lake Pontchartrain providing 100-year-level storm protection for the City of New Orleans and Jefferson Parish (Consultation Number F/SER/2008/08000)

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Approved by:

Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: APR 17 2009

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Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA: if the subject species is cited in 50 CFR 222.23(a) or 227.4 the federal agency shall contact NMFS, otherwise the federal agency shall contact USFWS (50 CFR 402.01).

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or species critical habitat, or after NMFS issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures) to reduce the effect of take, and recommends conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized, and thus there are no reasonable and prudent measures, only reasonable and prudent alternatives that must avoid destruction and adverse modification.

This document represents NMFS' opinion based on our review of impacts associated with the installation of two breakwaters for shoreline protection at the 17th Street canal pump station and at the New Orleans Avenue pump station along Lake Pontchartrain. The proposed action is evaluated in the context of the overall comprehensive Greater New Orleans Hurricane and Storm Reduction System. This opinion analyzes project effects on Gulf sturgeon and Gulf sturgeon critical habitat in accordance with section 7 of the ESA, as well as determines whether the continued incremental consultation on the individual IER complies with 50 CFR 402.14(k).

This opinion is based on project information provided by the New Orleans District Corps of Engineers (NOCOE) and other sources of information including published literature, and summary reports provided by the NOCOE.

BIOLOGICAL OPINION

1 CONSULTATION HISTORY

NMFS received a request from the NOCOE on October 1, 2008, for ESA section 7 consultation on the project. The NOCOE requested NMFS' concurrence with their determination that the proposed action was not likely to adversely affect Gulf sturgeon and their critical habitat. NMFS requested additional information via e-mail on November 7, 2008, and received the NOCOE response on November 14, 2008. NMFS was unable to concur with the NOCOE's effects determination, and later concluded instead that the proposed action was likely to adversely affect

Gulf sturgeon and/or its designated critical habitat. Formal consultation was initiated by NMFS on November 14, 2008.

Though NMFS has previously completed consultation on five COE-proposed hurricane protection projects, we have only recently recognized that those projects as well as the project evaluated in IER 5 are components of the COE's comprehensive plan to upgrade existing structures in the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, which was authorized and funded under Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery (2006). The 17 projects included in the proposed comprehensive plan will upgrade the existing hurricane protection system, damaged and weakened by Hurricanes Katrina and Rita in 2005, to reduce the threats to communities and infrastructure from 100-year level storms. On March 13, 2007, the COE implemented Alternative Arrangements under the provisions of the Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (NEPA; 40 CFR § 1506.11) to expedite complete environmental analysis for the proposed comprehensive plan. The Alternative Arrangements allow decisions on individual components of the overall proposed action so that the process can be completed more quickly than under the traditional NEPA process. The COE deemed the Alternative Arrangements necessary to reduce the risk of flooding and to restore public confidence in the hurricane protection system so that economic recovery of the area could proceed. When sufficient information is available from each of the IERs analyzing the proposed individual projects making up the comprehensive plan, the COE will produce a draft Comprehensive Environmental Document (CED). The CED will incorporate the IERs by reference and address the work completed, as well as the remaining work to be completed, on a system-wide scale and include a final mitigation plan. The COE has committed to NMFS that if individual and/or cumulative effects to listed species or designated critical habitat not previously addressed in IERs that have undergone consultation, are subsequently identified in the CED, the COE will reinitiate consultation with NMFS.

The Endangered Species Act has been interpreted by courts, including the Supreme Court of the United States, as requiring comprehensive consultation on the entire scope of a proposed project or plan. Incremental consultation on separate stages or phases of a project is allowable only where the project is implemented under statutes that authorize staged decision-making, including staged environmental reviews and the potential for modification or cancellation of subsequent stages.

The regulations implementing the ESA include provisions at 50 CFR § 402.14(k) for consulting on projects in incremental steps that are based on the caselaw discussed above. Section 402.14(k) provides that:

> Incremental steps. When the action is authorized by a statute that allows the agency to take incremental steps toward the completion of the action, the Service shall, if requested by the Federal agency, issue a biological opinion on the incremental step being considered, including its views on the entire action. Upon the issuance of such a biological opinion, the Federal agency may proceed with or authorize the incremental steps of the action if:
> (1) The biological opinion does not conclude that the incremental step would violate section 7(a)(2);

(2) The Federal agency continues consultation with respect to the entire action and obtains biological opinions, as required, for each incremental step;
(3) The Federal agency fulfills its continuing obligation to obtain sufficient data upon which to base the final biological opinion on the entire action;
(4) The incremental step does not violate section 7(d) of the Act concerning irreversible or irretrievable commitment of resources; and
(5) There is a reasonable likelihood that the entire action will not violate section 7(a)(2) of the Act.

In accordance with these provisions, the consultation on each incremental step must be in the context of the entire action (i.e., the effects of all previous steps should be considered in the evaluation of the effects of the current step). NMFS has previously completed consultations on IERs 2, 3, 6, 7, and 11. Therefore, this consultation will consider the effects of those projects in the evaluation of the effects of the currently proposed actions, IER 5 on listed species and critical habitat under NMFS purview.

Description of the Proposed Action and Action Area

1.1 Proposed Action

Current Proposed Project

The proposed action for IER 5 includes the installation of two breakwaters providing a 100-year-level storm protection for Jefferson Parish and the city of New Orleans through the upgrade of its hurricane protection system. Installation includes the placement of a 104- by 600-ft breakwater in front of the 17th Street canal pump station and a 116- by 700-ft breakwater at the Orleans Avenue canal pump station. Construction will occur from land. Breakwaters will be constructed out of rock and concrete, and materials will be placed by crane where pumping station outfall canals meet Lake Pontchartrain. No dredging is required and there is no submerged aquatic vegetation in the project area. Construction will result in the permanent loss of 3.3 acres of designated critical habitat for Gulf sturgeon. NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions dated March 23, 2006, will be implemented by the NOCOE or its contractors. The project will take up to 18 months to complete.

Previously Authorized IER Projects

Section 7 consultation was completed on IER 2 on June 6, 2008. The project consists of replacing existing floodwalls with new T-walls, constructing a breakwater, and dredging a channel for equipment access in the western portion of Lake Pontchartrain in Jefferson and St. Charles Parishes, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. The project is not located in designated Gulf sturgeon critical habitat and has not yet been constructed.

Consultation for IER 3 was completed on May 28, 2008; consultation on modifications to the project was completed on November 6, 2008. The project, as modified, consists of the construction of a cement breakwater, the addition of rock riprap to existing foreshore protection

along the shoreline, and dredging for equipment access in Lake Pontchartrain in Jefferson Parish, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. In addition, NMFS determined that IER 3 was not likely to adversely affect designated Gulf sturgeon critical habitat in Unit 8. Water quality impacts related to dredging and stockpiling of dredged material are expected to be insignificant because they will be temporary and minimized by the use of silt curtains. Potential effects to sediment quality resulting from dredging and stockpiling of dredged material will also be insignificant. While dredging may temporarily uncover a layer of finer-grained sediment, the original material will be placed back in the channel and sediment quality will be returned to pre-project conditions. Prey abundance will be temporarily affected by the dredging of 9 acres of waterbottom and the placement of dredged material on 20 acres of waterbottom. However, the project area encompasses only a small portion of the 403,200 acres of available habitat in Lake Pontchartrain supporting Gulf sturgeon prey items. Stockpiled material will be placed back into the dredged channels upon project completion and returned to pre-project contours. Benthic invertebrates utilized by Gulf sturgeon are expected to recolonize the dredged area rapidly, as they have been found to recolonize within one year when sediment composition and depth remain consistent. The permanent loss of 9 acres of habitat (due to the construction of the breakwater, riprap, and foreshore protection) on prey abundance is also expected to be insignificant. Gulf sturgeon prey are expected to be found in sandy substrate, while the substrate found at the site of the breakwater is mainly hard bottom. Further, Gulf sturgeon are expected to be found in deeper waters (2 to 4 meters) than those at the site of the proposed foreshore protection (less than 1 meter). The project has not yet been constructed.

Consultation on IER 11 was completed on August 12, 2008. The project consists of construction of storm surge protection structures (flood control gates and concrete floodwalls) and dredging for equipment access between the Inner Harbor Navigation Canal and Lake Borgne in Orleans and St. Bernard Parishes, Louisiana. NMFS determined project activities are not likely to adversely affect Gulf sturgeon or listed sea turtles (Kemp's ridley, green, or loggerhead) potentially found in the project area. Although not located in designated Gulf sturgeon critical habitat, the project is hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect hydroperiod, salinity, ability for benthic communities to be established and maintained, water velocity, dissolved oxygen, siltation, or accessibility; therefore, NMFS determined the project was not likely to adversely affect designated Gulf sturgeon critical habitat. This project is currently under construction.

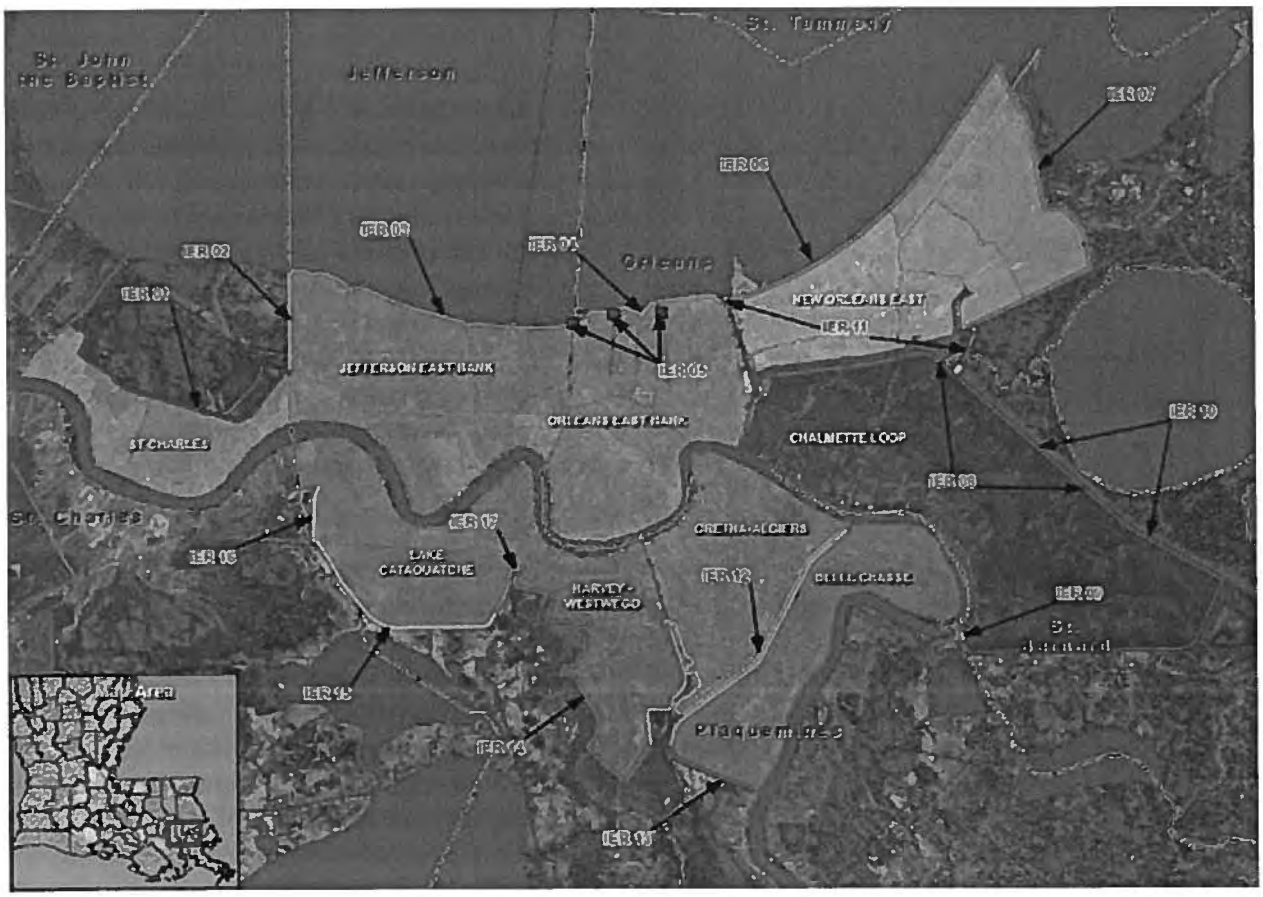
Consultation for IERs 6 and 7 was completed on March 13, 2009. The projects included the placement of rock on the existing foreshore protection to raise its elevation on several sections of the levee system on Lake Pontchartrain near New Orleans, Louisiana. The elevation of 11 miles of existing foreshore protection will be raised to 14 feet NAVD88 by placing additional rock on the structure. To access the foreshore protection for rock placement, a bucket dredge will be used to excavate. Approximately 44 acres of waterbottom will be dredged and 134 acres of waterbottom will be temporarily covered by the stockpiled dredged material, resulting in temporary impacts to 178 acres of benthic habitat through burying and physical disruption of potential prey. Permanent impacts will result from the placement of rock on the existing foreshore protection, which will extend into the water and permanently cover an additional 14 acres of waterbottom. Water depths in the area where the rock will placed are less than 1 meter deep. NMFS determined that the temporary loss of 178 acres of benthic habitat due to dredging

and stockpiling of dredged material, and the permanent loss of 14 acres of habitat due to placement of rock on the existing foreshore protection, proposed in IERs 6 and 7 as having insignificant effects on sea turtles and Gulf sturgeon, and therefore not likely to adversely affect these species or Gulf sturgeon critical habitat. IER 6 and 7 have not yet been constructed; however, NMFS has concluded that sea turtles, and Gulf sturgeon and their designated critical habitat are not likely to be adversely affected.

1.2 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for the proposed activity IER 5 includes the submerged bottom where the pumping station outfall at 17th Street and Orleans Avenue meet Lake Pontchartrain at latitude 30.02927°N, longitude 90.09734°W (NAD83), adjacent to 17th Street and Orleans Avenue, New Orleans, Louisiana. The overall action area for IERs 2, 3, 5, 6, 7, and 11 (Figure 1) is the southern portion of Lake Pontchartrain, bounded by the Lake Pontchartrain Causeway to the west, the southern shoreline of the lake to the south, and the eastern edge of the New Orleans East Lakefront Levee to the east.

Figure 1: Map of Greater New Orleans Hurricane and Storm Reduction System



2 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

2.1 Listed Species that May Occur in the Action Area

The following endangered (E) and threatened (T) sea turtles, fish species, and designated critical habitat under the jurisdiction of NMFS may occur in the action area:

Common Name	Scientific Name	Status
Sea Turtles		
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Green sea turtle	*Chelonia mydas*[1]	E/T
Loggerhead sea turtle	*Caretta caretta*	T
Fishes		
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T

2.2 Species Not Likely to be Adversely Affected

Gulf sturgeon and three listed species of sea turtles may occur within the action area: Kemp's ridley, green, and loggerhead.

According to the NOAA Southeast Fisheries Science Center, there have been no confirmed sea turtle strandings between 1998 and 2002 in the parish adjacent to the action area. Because of the inaccessibility of the action area and the lack of surveyable beaches, the absence of recorded strandings is not indicative of sea turtle distribution in the action area. Additionally, NMFS and the USFWS listed the Gulf sturgeon as a threatened species on September 30, 1991 (56 CFR 49653). The present range of the Gulf sturgeon extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. The Gulf sturgeon is an anadromous fish; adults spawn in freshwater then migrate to feed and grow in estuarine/marine habitats. After spawning in the upper river reaches, both adult and subadult Gulf sturgeon migrate from the estuaries, bays, and the Gulf of Mexico to the coastal rivers in early spring (i.e., March through May) when river water temperatures range from 16° to 23°C (Huff 1975, Carr 1983, Wooley and Crateau 1985, Odenkirk 1989, Clugston et al. 1995, Foster and Clugston 1997, Fox and Hightower 1998, Sulak and Clugston 1999, Fox et al. 2000). Generally, fall downstream migration from the river into the estuary/Gulf of Mexico begins in September (at water temperatures around 23°C) and continues through November (Huff 1975, Wooley and Crateau 1985, Foster and Clugston 1997).

As discussed in a previous section of the document, in accordance with the provisions of the ESA at 50 CFR § 402.14(k), section 7 consultation on each incremental step of a phased/staged action must be in the context of the entire action (i.e., the effects of all previous steps should be considered in the evaluation of the effects of the current step). NMFS has previously completed consultations on IERs 2, 3, 6, 7, and 11. Therefore, this consultation will consider the effects of

[1]Green turtles in U.S. waters are listed as threatened except for Pacific Coast of Mexico and Florida breeding populations which are listed as endangered.

those projects in the evaluation of the effects of the currently proposed action, IER 5, on listed species and critical habitat under NMFS purview.

NMFS has analyzed the routes of potential effects from the proposed projects in IERs 2, 3, 5, 6, 7, and 11 and concluded that listed sea turtles and Gulf sturgeon are not likely to be adversely affected from the suite of activities proposed. The likelihood of sea turtles and Gulf sturgeon being struck during the construction of breakwaters currently proposed in IER 5 is discountable due to these species' mobility. Further, in-water activities will be minimized by constructing the breakwaters using land-based equipment. No dredging is proposed in IER 5. The likelihood of effects to Gulf sturgeon and sea turtles from dredging and the transit and anchoring of equipment and vessels were also determined to be discountable in the consultations on IERs 2, 3, and 11 due to these species' mobility, the type of dredges being used, and/or the lack of species' presence in dredging sites located in marsh or in heavily controlled artificial waterways of low habitat value. The risk of injury to listed species from dredging activities associated with IERs 6 and 7 were determined to be discountable based on the type of dredge being used and the adherence to the May-September dredging window. Gulf sturgeon are not likely to be present during dredging activities because they primarily utilize Lake Pontchartrain for winter foraging and dredging will only occur in the summer. There are no reported takes of sea turtles or Gulf sturgeon by a bucket dredge. Further, the likelihood of sea turtles and Gulf sturgeon being struck by the transit and anchoring of equipment and vessels at the project site is discountable due to these species' mobility.

NMFS considers the permanent loss of 3.3 acres of habitat due to over the construction of the breakwaters on the submerged substrate, as proposed in IER 5, as having insignificant effects on sea turtles and Gulf sturgeon. The project area encompasses only a small portion of the 403,200-acre lake and there is similar habitat in the vicinity such that impacts to foraging success, reproduction, resting, or other activities that might occur in the area are expected to be minor and insignificant. Further, the bottom substrate does not support submerged aquatic vegetation and is likely a poor source of other forage resources for sea turtle species.

We evaluated the potential impacts on listed species from the additive loss of a total of 325.3 acres of habitat (266 temporarily, 59.3 permanently) from implementing IERs 2, 3, 5, 6, 7 and 11. If all impacts occurred in areas utilized by species under NMFS' purview, then only 0.08 percent of the available habitat in Lake Pontchartrain would be temporarily or permanently lost as foraging habitat. There is sufficient available habitat in the vicinity such that impacts to foraging success, reproduction, resting, or other behaviors are expected to be minor and insignificant. However, all but 3.3 acres of the permanent impacts and a portion of the temporary impacts will occur in areas that are not utilized by listed species under NMFS' purview because: (1) they consist of marsh, peat substrate, or hardbottom that do not support prey species or other foraging resources for sturgeon and sea turtles; (2) the sites have high wave energy that interferes with feeding; and/or, (3) they are much shallower (less than 1 meter) than depths preferred by sturgeon and sea turtles. Project activities in IER 11 will not impact habitat in Lake Pontchartrain, but could potentially hinder access by sea turtles and sturgeon to Lake Pontchartrain. However, the structures will remain open at all times with the exception of major storms or hurricanes and many other access points to the lake will remain available to these species.

Because all effects to Gulf sturgeon and listed sea turtles from activities proposed in IERs 2, 3, 5, 6, 7 and 11 are insignificant and/or discountable, the species will not be considered further in this opinion.

2.3 Critical Habitat Likely to be Adversely Affected

Gulf sturgeon critical habitat was jointly designated by NMFS and USFWS on April 18, 2003 (50 CFR 226.214). Critical habitat is defined in section 3(5)(A) of the ESA as (1) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The term "conservation" is defined in section 3(3) of the ESA as the use of all methods and procedures that are necessary to bring any endangered or threatened species to the point at which listing under the ESA is no longer necessary.

Gulf sturgeon critical habitat includes areas within the major river systems, which support the seven currently reproducing subpopulations (USFWS et al. 1995), and associated estuarine and marine habitats. Gulf sturgeon use the rivers for spawning, larval and juvenile feeding, adult resting and staging, and to move between the areas that support these components. Gulf sturgeon use the lower riverine, estuarine, and marine environment during winter months primarily for feeding and, more rarely, for inter-river migrations. Estuaries and bays adjacent to the riverine units provide unobstructed passage of sturgeon from feeding areas to spawning grounds.

Fourteen areas (Units) are designated as Gulf sturgeon critical habitat. The project is located in Unit 8. Critical habitat units encompass a total of 2,783 river kilometers (rkm) and 6,042 km^2 of estuarine and marine habitats, and include portions of the following Gulf of Mexico rivers, tributaries, and estuarine, and marine areas:

Unit 1	Pearl and Bogue Chitto Rivers in Louisiana and Mississippi;
Unit 2	Pascagoula, Leaf, Bowie, Big Black Creek, and Chickasawhay Rivers in Mississippi;
Unit 3	Escambia, Conecuh, and Sepulga Rivers in Alabama and Florida;
Unit 4	Yellow, Blackwater, and Shoal Rivers in Alabama and Florida;
Unit 5	Choctawhatchee and Pea Rivers in Florida and Alabama;
Unit 6	Apalachicola and Brothers Rivers in Florida;
Unit 7	Suwannee and Withlacoochee River in Florida;
Unit 8	Lake Pontchartrain (east of causeway), Lake Catherine, Little Lake, the Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the state waters within the Gulf of Mexico;
Unit 9	Pensacola Bay system in Florida;
Unit 10	Santa Rosa Sound in Florida;
Unit 11	Nearshore Gulf of Mexico in Florida;

Unit 12 Choctawhatchee Bay system in Florida;
Unit 13 Apalachicola Bay system in Gulf and Franklin Counties, Florida, and
Unit 14 Suwannee Sound in Florida.

Critical habitat determinations focus on those physical and biological features (primary constituent elements, i.e., PCEs) that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the PCEs within defined critical habitats. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each PCE.

PCEs identified as essential for the conservation of the Gulf sturgeon consist of:

(1) Abundant food items, such as detritus, aquatic insects, worms, and/or molluscs, within riverine habitats for larval and juvenile life stages; and abundant prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, molluscs and/or crustaceans, within estuarine and marine habitats and substrates for subadult and adult life stages;

(2) Riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay;

(3) Riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, generally, but not always, located in holes below normal riverbed depths, believed necessary for minimizing energy expenditures during fresh water residency and possibly for osmoregulatory functions;

(4) A flow regime (i.e., the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages in the riverine environment, including migration, breeding site selection, courtship, egg fertilization, resting, and staging, and for maintaining spawning sites in suitable condition for egg attachment, egg sheltering, resting, and larval staging;

(5) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;

(6) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

(7) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., an unobstructed river or a dammed river that still allows for passage).

As stated in the final rule designating Gulf sturgeon critical habitat, the following activities, among others, when authorized, funded, or carried out by a federal agency, may destroy or adversely modify critical habitat:

(1) Actions that would appreciably reduce the abundance of riverine prey for larval and juvenile sturgeon, or of estuarine and marine prey for juvenile and adult Gulf sturgeon, within a designated critical habitat unit, such as dredging, dredged material disposal, channelization, in-stream mining; and land uses that cause excessive turbidity or sedimentation;

(2) Actions that would appreciably reduce the suitability of Gulf sturgeon spawning sites for egg deposition and development within a designated critical habitat unit, such as impoundment, hard-bottom removal for navigation channel deepening, dredged material disposal, in-stream mining, and land uses that cause excessive sedimentation;

(3) Actions that would appreciably reduce the suitability of Gulf sturgeon riverine aggregation areas, also referred to as resting, holding, and staging areas, used by adult, subadult, and/or juveniles, believed necessary for minimizing energy expenditures and possibly for osmoregulatory functions, such as dredged material disposal upstream or directly within such areas; and other land uses that cause excessive sedimentation;

(4) Actions that would alter the flow regime (the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) of a riverine critical habitat unit such that it is appreciably impaired for the purposes of Gulf sturgeon migration, resting, staging, breeding site selection, courtship, egg fertilization, egg deposition, and egg development, such as impoundment; water diversion; and dam operations;

(5) Actions that would alter water quality within a designated critical habitat unit, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredging, dredged material disposal, channelization, impoundment, in-stream mining, water diversion, dam operations, land uses that cause excessive turbidity, and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;

(6) Actions that would alter sediment quality within a designated critical habitat unit such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredged material disposal, channelization, impoundment, in-stream mining, land uses that cause excessive sedimentation, and release of chemical or biological pollutants that accumulate in sediments; and

(7) Actions that would obstruct migratory pathways within and between adjacent riverine, estuarine, and marine critical habitat units, such as dams, dredging, point-source-pollutant discharges, and other physical or chemical alterations of channels and passes that restrict Gulf sturgeon movement (68 FR 13399).

The currently proposed project, IER 5, as well as IERs 3, 6, and 7 are located within designated Gulf sturgeon critical habitat Unit 8. Although not located in critical habitat, IER 11 is hydrologically connected to Unit 8 and some project effects could potentially extend into Unit 8. No activities proposed in IER 2 are located in designated critical habitat and project effects will not extend beyond the project site. Therefore, IER 2 will not be considered in the evaluation of the impacts on designated critical habitat. The primary constituent elements (PCEs) essential for the conservation of Gulf sturgeon present in Unit 8 include: abundant prey items; water quality and sediment quality necessary for normal behavior, growth, and viability of all life stages; and, safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats. Of these PCEs, NMFS believes water quality, sediment quality, and prey abundance may be affected.

The actions proposed in IER 5 will directly impact the benthos by the placement of rock and concrete rubble which will permanently remove (cover) 3.3 acres of designated Gulf sturgeon critical habitat consisting of 50 percent or less sandy substrate. Substrate modification can impact prey availability and abundance; therefore, the project has the potential to impact Gulf sturgeon prey availability/abundance. Analyses of these potential impacts are presented in the Effects of the Action (Section 4). The individual consultations on project activities in IERs 2, 3, 6, 7, and 11 determined that the projects were not likely to adversely affect designated critical habitat in Unit 8, Lake Pontchartrain. However, in order to comply with 50 CFR 402.14(k), the additive effects of IERs 2, 3, 5, 6, 7, and 11 will be considered in Section 4, as well.

3 ENVIRONMENTAL BASELINE

This section identifies the effects of past and ongoing human and natural factors leading to the current status of Gulf sturgeon designated critical habitat within the action area. The environmental baseline is a "snapshot" of the action area at a specified point in time and includes state, tribal, local, and private actions already affecting the critical habitat that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the action area that may benefit the species and its critical habitat.

3.1 Status of Critical Habitat Within the Action Area

Of the fourteen Units designated as Gulf sturgeon critical habitat, Unit 8 will be affected by the proposed project. Unit 8 encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne, including Heron Bay, and the Mississippi Sound. Critical habitat follows the shorelines around the perimeters of each included lake. The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois Pass. The northern boundary of the Mississippi Sound is the shoreline of the mainland between Heron Bay Point, Mississippi and Point aux Pins, Alabama. Critical habitat excludes St. Louis Bay, north of the railroad bridge across its mouth; Biloxi Bay, north of the U.S. Highway 90 bridge; and Back Bay of Biloxi. The southern boundary follows along the broken shoreline of Lake Borgne created by low swamp islands from Malheureux Point to Isle au Pitre. From the northeast point of Isle au

Pitre, the boundary continues in a straight north-northeast line to the point one nautical mile (nmi) seaward of the western most extremity of Cat Island (30°13'N, 89°10'W). The southern boundary continues 1 nmi offshore of the barrier islands and offshore of the 72 COLREGS lines at barrier island passes (defined at 33 CFR 80.815 c)), (d) and (e)) to the eastern boundary. Between Cat Island and Ship Island there is no 72 COLREGS line. NMFS has therefore defined that section of the unit southern boundary as 1 nmi offshore of a straight line drawn from the southern tip of Cat Island to the western tip of Ship Island. The eastern boundary is the line of longitude 88°18.8'W from its intersection with the shore (Point aux Pins) to its intersection with the southern boundary. The lateral extent of Unit 8 is the MHW line on each shoreline of the included water bodies or the entrance to rivers, bayous, and creeks. Pascagoula Channel, a major shipping channel, as identified on standard navigation charts and marked by buoys, is excluded.

Unit 8 provides juvenile, subadult and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations; fish are consistently located both inshore and around/between the barrier islands (i.e., Cat, Ship, Horn, and Petit Bois) within this unit (Reynolds 1993, Ross et al. 2001, and Rogillio et al. 2002). Gulf sturgeon have also been documented within 1 nmi off the barrier islands of Mississippi Sound. Substrate in this unit range from sand to silt, all of which contain known Gulf sturgeon prey items, including lancelets (Menzel 1971, Abele and Kim 1986, American Fisheries Society 1989, Heise et al.1999, Ross et al. 2001, and Rogillio et al.2002).

3.2 Factors Affecting Critical Habitat within the Action Area

The April 2003 joint designation of Gulf sturgeon critical habitat by NMFS and USFWS will benefit the species, primarily through the ESA section 7 consultation process. When critical habitat is designated, other federal agencies are required to consult with NMFS on actions they carry out, fund, or authorize, to ensure that their actions will not destroy or adversely modify critical habitat. In this way, a critical habitat designation will protect physical and biological features that are necessary for the conservation of the species. Designation of critical habitat may also enhance awareness within federal agencies and the general public of the importance of Gulf sturgeon habitat and the need for special management considerations. Numerous nationwide COE permits exist for wetland mitigation throughout Mississippi Sound. Furthermore, federal Essential Fish Habitat (EFH) consultation requirements pursuant to the Magnuson-Stevens Fishery Management and Conservation Act minimize and mitigate for losses of wetlands and preserve valuable Gulf sturgeon habitat.

3.2.1 Federal Actions

Federal agencies that consult on potential impacts to Gulf sturgeon critical habitat include the COE, the Department of Defense (DOD), the Environmental Protection Agency (EPA), the Federal Energy Regulatory Commission (FERC), and the Nuclear Regulatory Commission (NRC). Dredging and dredged material disposal and military activities, including training exercises and ordnance detonation, have the potential to impact designated critical habitat. In 2003, NMFS completed a regional biological opinion on hopper dredging in the Gulf of Mexico that includes maintenance dredging in Gulf sturgeon critical habitat Units 8-14 and concluded that when existing navigation channels within designated critical habitat are dredged to only their current depth (i.e., maintenance-dredged), without improvements (e.g., deepening or widening),

the project will not destroy or adversely modify Gulf sturgeon critical habitat. While numerous formal consultations have been conducted on potential impacts to the species, NMFS has conducted 42 formal consultations on potential impacts to Gulf sturgeon critical habitat since the April 18, 2003, final rule designating Gulf sturgeon critical habitat.

Of the formal consultations conducted by NMFS on impacts to designated Gulf sturgeon critical habitat 22 of the 42 have been for projects within Unit 8. Meanwhile, USFWS has yet to conduct a formal consultation to ascertain potential project impacts on designated Gulf sturgeon critical habitat (D. Walther, USFWS, pers. comm., April 2008). The previous formal consultations conducted by NMFS concluded that those proposed actions would not result in the destruction or adverse modification of critical habitat. Numerous informal consultations with the DOD, COE, EPA, FERC, and NRC analyzing potential impacts to designated critical habitat have been conducted.

Federally-regulated stormwater and industrial discharges and chemically-treated discharges from sewage treatment systems may impact Gulf sturgeon critical habitat. NMFS continues to consult with EPA to minimize the effects of these activities on both listed species and designated critical habitat. In addition, other federally-permitted construction activities, such as beach restoration, have the potential to impact Gulf sturgeon critical habitat.

Actions impacting wetlands abutting Gulf sturgeon critical habitat throughout Mississippi Sound are regulated, managed, and mitigated via numerous COE nationwide permits. Furthermore, federal EFH consultation requirements pursuant to the Magnuson-Stevens Fishery Management and Conservation Act minimize and mitigate for losses of wetlands and preserve valuable Gulf sturgeon habitat.

3.2.2 State or Private Actions

A number of activities that may indirectly affect Gulf sturgeon critical habitat include discharges from wastewater systems, dredging, ocean pumping and disposal, and aquaculture facilities. The impacts from these activities are difficult to measure. However, where possible, conservation actions through the ESA section 7 process, ESA section 10 permitting, and state permitting programs are being implemented to monitor or study impacts from these sources.

Increasing coastal development and ongoing beach erosion will result in increased demands by coastal communities, especially beach resort towns, for periodic privately-funded or federally-sponsored beach renourishment projects. These activities may affect Gulf sturgeon critical habitat by burying nearshore habitats that serve as foraging areas.

3.2.3 Conservation and Recovery Actions Shaping the Environmental Baseline

Federal EFH consultation requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act minimize and mitigate for losses of wetlands, and preserve valuable foraging and developmental habitat for Gulf sturgeon.

4 EFFECTS OF THE ACTION ON GULF STURGEON CRITICAL HABITAT

Of the seven possible PCEs that define Gulf sturgeon critical habitat, Gulf sturgeon critical habitat Unit 8 contains four PCEs, three of which may be adversely affected by the proposed project. The three PCEs that are in Gulf sturgeon critical habitat Unit 8 analyzed below and described in detail in Section 3.2, are the following: (1) water quality; (2) sediment quality; and (3) prey abundance.

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

4.1.1 Water Quality

Water quality impacts associated with IER 5 were considered individually and as a part of the overall comprehensive Greater New Orleans Hurricane and Storm Damage Risk Reduction System. Turbidity caused by sediment disturbance during breakwater placement is expected to be temporary and minimal, with suspended particles settling out within a short time frame and no measurable effects on water quality. No changes in temperature, salinity, pH, hardness, oxygen content, and other chemical characteristics necessary for normal growth, behavior, and viability of all life stages are expected. During the previous consultations on IERs 3, 6, and 7, impacts on the water quality PCE from dredging and stockpiling of dredged material were determined to be insignificant because they will be temporary and minimized by the use of silt curtains. Because of the use of silt curtains for activities proposed in IERs 3, 6, and 7, turbidity will not extend beyond the immediate project areas. Although not located in designated Gulf sturgeon critical habitat, project activities in IER 11 are hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect hydroperiod, salinity, water velocity, or dissolved oxygen. Therefore, there will be no additive effects on water quality from those projects in combination with IER 5. NMFS does not expect measurable impacts to Gulf sturgeon critical habitat as a result of water quality impacts related to IERs 3, 5, 6, 7, and 11.

4.1.2 Sediment Quality

Project activities associated with IER 5 will permanently impact approximately 3.3 acres of submerged bottom. The proposed action will directly impact sediment quality of the benthos by the placement of concrete debris onto the submerged bottom. However, all material placed at the site will be inert and free of contaminants. Sediment quality impacts associated with IER 5 were also considered as part of the overall comprehensive Greater New Orleans Hurricane and Storm Damage Risk Reduction System. Potential effects to the sediment quality PCE resulting from dredging and stockpiling of dredged material proposed in IERs 3, 6, and 7 were determined to be insignificant. While dredging may temporarily uncover a layer of finer-grained sediment, the original material will be placed back in the channels and sediment quality will be returned to pre-project conditions. Further, the placement of inert, non-toxic rock in these projects will not affect water quality or sediment quality. Although not located in designated Gulf sturgeon critical habitat, project activities in IER 11 are hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect water velocity and siltation. Because sediment quality will be returned to pre-project conditions for IERs 3, 6, and 7, and IER 11 is not expected to affect sediment quality

in Unit 8, there will be no additive effects on sediment quality for those projects in combination with IER 5.

The construction of the breakwaters for IER 5 will permanently alter the bottom, making those 3.3 acres unavailable as potential foraging habitat, impacting the availability and abundance of prey. Potential project impacts relative to Gulf sturgeon prey are presented in the next section.

4.1.3 Prey Abundance

Gulf sturgeon food items is the last PCE evaluated in this opinion. The final rule designating Gulf sturgeon critical habitat states that the abundance of prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, mollusks, and/or crustaceans within estuarine and marine habitats and substrates for subadult and adult life stages, are essential for the conservation of the species. In other opinions, NMFS has considered and analyzed the following seven factors to determine direct and indirect effects of projects impacting Gulf sturgeon prey abundance essential to the conservation of the Gulf sturgeon:

1) Gulf sturgeon subpopulations using the affected critical habitat;
2) Mean generation time;
3) Foraging behavior;
4) Prey items;
5) Benthic community structure;
6) Potential Gulf sturgeon prey in the action area; and
7) Recovery of benthic biota.

Whether individual factors are relevant to a particular action and analyzed within an opinion is highly site and project-specific. NMFS determines and assesses relevant factors in order to predict the persistence and resilience of the prey resource with regard to density of but current and recovering Gulf sturgeon populations. That is, numerous variables depicting Gulf sturgeon prey are utilized to determine the likelihood of appropriate and abundant prey in the unit following the project to ensure that the action is not likely to result in the destruction or adverse modification of the PCE. All will be considered in this opinion.

Gulf sturgeon sub-populations using affected critical habitat
Overall, Gulf sturgeon critical habitat Unit 8 provides juvenile, subadult, and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl Rivers; the project area is located approximately 38 mi west of the Pearl River and 95 mi west of the Pascagoula River. Population estimates are 292 fish in the Pearl River (Morrow et al. 1998) and approximately 200 fish in the Pascagoula River (Heise et al. 2002). Ross et al. (2001a, 2001b) have investigated the movement of 19 fish exiting the nearby Pascagoula River and concluded that the fish locate in or near the barrier island (Cat, Ship, Horn, and Petit Bois Islands) passes (Ross et al. 2001a) in the clean sand substrates (c.f. the inshore mud substrata). Rogillio et al. (2001) tracked 25 fish from the Pearl River and all fish relocated (n=7) were also found near the barrier islands; after three months of systematic survey, no fish were located nearshore, or in Lakes Pontchartrain or Borgne. Incidental capture of a sturgeon tagged in the Pearl River near Breton Island, Louisiana, supports the concept that Gulf sturgeon utilize barrier island sites in the winter (Rogillio et al. 2001). Preference for sandy habitat is supported by studies in other areas

that have correlated Gulf sturgeon presence to sandy substrate (Fox et al. 2002, Parauka et al. in press).

Mean Generation Time

Mean generation time (mean period elapsing between the birth of the parents and the birth of the offspring) is a useful tool to estimate the period of time for a population to increase in size. While mean generation time is unknown for the Gulf sturgeon, it has been calculated for the shortnose sturgeon (*A. brevirostrum*), a congener, to be between 10 and 30 years (NMFS 1998). A self-sustaining Gulf sturgeon population has been defined as one where the average rate of natural recruitment is at least equal to the average mortality rate in a 12-year period; 12 years is the approximate age at maturity for a female Gulf sturgeon (USFWS et al. 1995). Mean generation time is evaluated respective to the proposed action as it provides an estimated time frame to expect an increase in population size. Given current measures to protect individuals, subpopulations, and habitat, NMFS is hopeful that the number of Gulf sturgeon will increase as many threats have been reduced with the protection afforded via section 7 of the ESA.

Foraging Method

Gulf sturgeon possess a highly protrusible mouth that extends downward to vacuum up sediments containing their prey (i.e., infaunal macroinvertebrates). This suction feeding requires an expandable mouth cavity and a relatively narrow mouth through which to funnel water and food items (Westneat 2001). Success of suction feeding relies on the ability of the predator's mouth to protrude into the proximity of prey (Westneat 2001); the suction tube of the sturgeon's mouth must be able to maintain contact with the benthos their prey inhabit. Findeis (1997) described sturgeon as exhibiting evolutionary traits adapted for cruising the benthos in search of prey. Notably, their caudal fin morphology has presumably been adapted for benthic cruising; the hypochordal lobe is often reduced to allow sweeping of the tail while close to the substrate (Findeis 1997).

Research supports that Gulf sturgeon are typically found foraging in depths greater than 1 meter. Lower energy areas, where water depth is greater than 1 to 2 meters, would likely assist foraging success given their feeding biology and the dissipation of wave energy. The protrusible mouth of these suction feeders must make contact with the benthos in order to vacuum prey out of the sediments while benthic cruising. The slightly deeper depths (2 to 4 meters) the sturgeon seem to prefer would have less wave energy at the substrate compared to the shallower swash zone. Downward cycloidal movement of waves dissipates energy through the water column (i.e., wave energy is exponentially dissipated with depth). A sturgeon attempting to forage in a high-energy, shallow-water environment (i.e., the swash zone) would likely be challenged to retain position and maintain contact with the benthos. Therefore, Gulf sturgeon foraging success would likely be greater in the slightly deeper, lower energy areas compared to the high-energy swash zone.

As benthic cruisers, sturgeon forage extensively in an area, presumably until preferred prey is depleted/reduced, relocate, and resume foraging. Tracking observations by Sulak and Clugston (1999), Fox et al. (2002), and Edwards et al. (2003) support that individual Gulf sturgeon move over an area until they encounter suitable prey type and density, at which time they forage for extended periods of time. Individual Gulf sturgeon often remain in localized areas (less than 1 square kilometer) for extended periods of time (greater than two weeks) and then move rapidly to another area where localized movements occurred again (Fox et al. 2002). While the exact

amount of benthic area required to sustain Gulf sturgeon health and growth is unknown (and likely dependent on fish size and reproductive status), Gulf sturgeon have been known to travel long distances (greater than 161 kilometers) during their winter feeding period. This supports the likelihood that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location as many other nearby sandy areas exist.

Prey items

Ontogenetic changes in Gulf sturgeon diet and foraging area have been documented. Young-of-the-year forage in freshwater on aquatic invertebrates and detritus (Mason and Clugston 1993, Sulak and Clugston 1999); juveniles forage throughout the river on aquatic insects (e.g., mayflies and caddisflies), worms (oligochaete), and bivalves (Huff 1975; Mason and Clugston 1993); adults forage sparingly in freshwater and depend almost entirely on estuarine and marine prey for their growth (Gu et al. 2001). Both adult and subadult Gulf sturgeon are known to lose up to 30 percent of their total body weight while in freshwater, and subsequently compensate the loss during winter feeding in marine areas (Carr 1983, Wooley and Crateau 1985, Clugston et al. 1995, Morrow et al. 1998, Heise et al. 1999, Sulak and Clugston 1999, Ross et al. 2000). Therefore, once Gulf sturgeon leave the river after having spent at least six months in the river fasting, it is presumed that they immediately begin feeding. Upon exiting the rivers, Gulf sturgeon concentrate around the mouths of their natal rivers in lakes and bays. These areas are very important for the Gulf sturgeon as they offer the first foraging opportunity for the Gulf sturgeon exiting the rivers.

Few studies have been conducted on the food habits of Gulf sturgeon; their threatened status limits sampling efforts and gastric lavaging has only recently become successful (anal lavaging is being investigated). Gulf sturgeon have been described as opportunistic and indiscriminate benthivores; their guts generally contain benthic marine invertebrates including amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, molluscs, and crustaceans (Huff 1975, Mason and Clugston 1993, Carr et al. 1996, Fox et al. 2000, Fox et al. 2002). During the early fall and winter, immediately following downstream migration, Gulf sturgeon are most often located in nearshore (depth less than 20 ft) sandy areas that support burrowing macroinvertebrates, where the fish are presumably foraging (Craft et al. 2001, Ross et al. 2001a, Fox et al. 2002, Parauka et al. in press). Generally, Gulf sturgeon prey are burrowing species (e.g., annelids, polychaetes, oligochaetes, amphipods, isopods, and lancelets) that feed on detritus and/or suspended particles, and inhabit sandy substrate.

Benthic Community Structure

In most areas, community structure of the benthos is unknown. Without a comprehensive benthic survey, availability of Gulf sturgeon prey remains undeterminable. While the absolute biomass of benthic meio- and macrofauna is not totally dependent upon sediment grain size, community structure and faunal size directly correlate to benthic substrate (Parsons et al. 1984). If sediment type is not changed as a result of dredging, recolonization can be expected with the same species returning to the disturbed area (Stickney 1984). NOCOE reported that boring logs of depth-integrated composites indicate that the sediments of the proposed dredging areas are relatively homogenous through the action depth and consist primarily of poorly sorted sandy mud or very fine mud (i.e., clay).

Mud is defined, per the Wentworth scale, as a combination of silt (materials between 1/16 and 1/256 mm diameter) and clay (materials <1/256 mm diameter). Because sediments which differ in grain size differ in numerous properties of significance for organisms, sediment type is the most important physical feature that determines benthic community structure; similar sediment types at the same depths around the world contain similar communities (a.k.a. "parallel bottom communities"). Food availability is related to sediment particle size for many deposit-feeding species. Sediment porosity (water content) and interstitial space are critical for small organisms living within the sediment – the maximum diameter of interstitial amphipods capable of burrowing and inhabiting various grades of substrate corresponded to calculated diameters of space between sediment particles (Morgan 1970), and amphipods have been found to prefer substrate which permitted free movement through voids. Water exchange supplies dissolved nutrients through the sediment grains, and gases and large particles of detritus are readily trapped in spaces between sediment grains. Sediment in muddy-sand areas is more compacted, provides less porosity and fewer interstitial spaces, and thereby provides appropriate habitat for organisms such as polychaetes, bivalves, and gastropods. Conversely, sandy substrate has more porosity and interstitial spaces and provides appropriate habitat for soft-bodied organisms such as amphipods and isopods. Generally, meio- and macrofaunal species found in sand habitats are soft-bodied and move through interstitial spaces; fauna in muddy sediments are usually stockier (heavier-bodied) species (McIntyre 1969). Muddy-substrate meio- and macrofauna live near the sediment surface (often in the upper centimeter) and may inhabit anaerobic areas, while sandy-substrate meiofauna can often be found in abundance to depths greater than 10 cm. Therefore, many burrowing species that are deposit feeders prefer sandy substrates.

Potential Gulf sturgeon prey in action area

NMFS is not aware of any research or surveys to describe benthic composition in or nearby the proposed project area. However, data are available from estuarine/marine habitats throughout the geographic range of Gulf sturgeon that have been assessed for benthic composition. Research in Choctawhatchee Bay (Fox and Hightower 1998, Fox et al. 2002, Parauka et al. in press) indicates that Gulf sturgeon show a preference for sandy shoreline habitats with the majority of fish being located in areas lacking seagrass. Craft et al. (2001) found that Gulf sturgeon in Pensacola Bay prefer shallow shoals with unvegetated, fine to medium-grain sand habitats such as sandbars and subtidal energy zones resulting in sediment sorting and a preponderance of sand supporting a variety of prey items. Habitats used nearby the Mississippi Sound barrier islands tend to have a clean sand substrate and all benthic samples from the area contained lancelets (Ross et al. 2001a). Other nearshore Gulf of Mexico locations where Gulf sturgeon are often located (via telemetry and tag returns) consist of unconsolidated, fine-medium grain sand habitats, including natural inlets and passes that are known to support Gulf sturgeon prey items (Menzel 1971, Abele and Kim 1986, AFS 1989). It has been concluded that Gulf sturgeon are foraging in these sandy areas where they are repeatedly located, as this habitat supports their prey (see preceding section "Prey items" for specifics).

The placement of concrete rubble onto 3.3 acres of substrate consisting of 50 percent sand or less is not expected to meaningfully reduce the availability of prey items in the action area as the muddy-sand substrate is not the preferred forage habitat of Gulf sturgeon; the project areas' substrate is less functional than sand for predominant Gulf sturgeon prey items. Therefore, impacts to prey abundance for Gulf sturgeon in Unit 8 are not expected to reduce the critical habitat's ability to support Gulf sturgeon conservation.

Recovery of Benthic Biota
Rate and success of benthic recovery resulting from removal of materials during maintenance dredging and the accompanying temporary storage of dredged material is a function of sediment texture, depth, time of year, and habitat type. The materials that will be removed (dredged) and temporarily stored adjacent to the dredged areas from the project area are homogenous with those that will remain in the channel and storage areas and, therefore, no alteration of habitat composition is occurring. The area will remain a shallow-water neritic zone that can support sublittoral benthic biota. Therefore, because similar habitat, in terms of both sediment composition and depth, will be present pre- and post-dredging and storage, NMFS concludes that the benthic biota in the project areas will have the ability to recover and recolonize.

Summary of effects on Gulf sturgeon prey abundance
Gulf sturgeon from both the Pearl and Pascagoula Rivers are known to forage in Unit 8. Telemetry data indicates that fish from both river systems utilize the passes between the offshore barrier islands for winter feeding. The project area is approximately 38 mi from the nearest river mouth where Gulf sturgeon forage immediately after exiting the rivers. Substrate nearby the barrier islands is predominantly sand, and every benthic sample taken from that area contained lancelets (Ross et al. 2001a). The muddy-sand substrate at the project area is an appropriate environment for hard-bodied organisms such as polychaetes, bivalves, and molluscs. However, Gulf sturgeon prey are generally burrowing species (e.g., annelids, polychaetes, and oligochaetes, amphipods, isopods, and lancelets) that feed on detritus and/or suspended particles, and are known to inhabit sandy substrate. While some Gulf sturgeon prey items are found in muddy-sand (e.g., polychaetes), predominant (in terms of frequency and biomass) prey items are classified as burrowing species that inhabit sandy substrate (e.g., lancelets, amphipods, isopods) due to the texture and function of the benthos. Furthermore, Gulf sturgeon presence has been correlated to areas of sandy substrate. While the placement of concrete rubble will permanently remove 3.3 acres of muddy-sand substrate, IER 5 is not expected to reduce the critical habitat's ability to support Gulf sturgeon conservation as the substrate in the project area is less functional than sand for predominant Gulf sturgeon prey items. Additionally, given that sturgeon forage opportunistically while benthic cruising, they can easily locate prey and fulfill nutritional requirements in areas adjacent to those impacted. When available prey is reduced locally as a result of project activities, it is likely that the sturgeon will quickly relocate to other areas for foraging. Therefore, NMFS concludes that the proposed permanent removal of 3.3 acres of muddy-sand benthos associated with IER 5 is not expected to reduce the critical habitat's ability to support Gulf sturgeon conservation.

Impacts to prey abundance associated with IER 5 were also considered as part of the overall comprehensive Greater New Orleans Hurricane and Storm Damage Risk Reduction System. The total temporary loss of 207 acres of Gulf sturgeon critical habitat from activities in IERs 3, 6, and 7 was determined to be insignificant. Those temporary losses represent only a small portion (0.05 percent) of the available habitat in Lake Pontchartrain supporting Gulf sturgeon prey items. Further, stockpiled material will be placed back into the dredged channels upon project completion and returned to pre-project contours. Benthic invertebrates utilized by Gulf sturgeon are expected to recolonize the dredged area rapidly, as they have been found to recolonize within one year when sediment composition and depth remain consistent. The permanent loss of 23 acres of habitat resulting from the conversion of waterbottoms to hard foreshore protection

structures associated with IERs 3, 6, and 7 was also determined to have insignificant impacts on prey abundance. Water depths at the project sites are less than 1 meter and these areas experience high wave energy. Gulf sturgeon are suction feeders; due to their feeding morphology, they are usually found at deeper depths (2 to 4 meters), where lower wave energy at the substrate, compared to the shallower swash zone, interferes less with feeding. Further, the bottom substrate at the project site for IER 3 is hardbottom and likely does not support Gulf sturgeon prey items, which are typically found in sandy substrates. Although not located in designated Gulf sturgeon critical habitat, project activities in IER 11 are hydrologically connected to designated critical habitat in Unit 8. Based on modeling reports and analyses provided by the COE, the project will not significantly affect the ability for benthic communities to be established and maintained. Of the 26.3 acres of permanent impacts proposed in IERs 3, 5, 6, and 7, only 3.3 acres (all associated with IER 5) are in areas where prey items are available to Gulf sturgeon (because of bottom substrate and water depth). While temporary losses of prey abundance associated with IERs 3, 6, and 7 will occur, those areas represent only 0.05 percent of habitat supporting prey in Lake Pontchartrain and are expected to fully recover. Therefore, there will be no additive effects on prey abundance for those projects in combination with IER 5.

4.2 Summary of the Effects of the Action

Unit 8 of Gulf sturgeon critical habitat encompasses a total of 881,421 acres. Previous federal actions have converted 114.1 acres of submerged critical habitat to reef habitat or upland (NMFS SERO unpublished data, 2009). Cyclic changes in shorelines due to erosion and storm events, coupled with natural modification and movement of superficial substrates due to runoff and storm events, are not easily quantified and are not included in calculations. The amount of area impacted by the action is approximately 3.3 acres, which constitutes less than 0.00037 percent of the total area within the unit. The total area (including both temporary and permanent losses) impacted by the IERs reviewed to date as part of the overall comprehensive Greater New Orleans Hurricane and Storm Damage Risk Reduction System is 233.3 acres and constitutes 0.026 percent of the total area within the unit. NMFS analyzed the project's effects on Gulf sturgeon critical habitat PCEs. Prey abundance will be adversely affected by the project but not to the extent that would reduce the critical habitat's ability to support Gulf sturgeon conservation.

5 CUMULATIVE EFFECTS

ESA section 7 regulations require NMFS to consider cumulative effects in formulating their biological opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this opinion.

Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the present levels of intensity in the near future.

Throughout the coastal Gulf of Mexico, the loss of numerous acres of wetlands is occurring due to natural subsidence and erosion, as well as reduced sediment input from the Mississippi River.

Impacts caused by residential, commercial, and agricultural developments appear to be the primary causes of wetland loss in Texas.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water, will continue to affect water quality in the Gulf of Mexico. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still legal, concluded that up to 60 percent of the pelagic tars sampled did not originate from northern Gulf of Mexico coast.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States due to the large number of waste discharge point sources. A limited number of Gulf sturgeon (n=12) have been analyzed for pesticides and heavy metals (Bateman and Brim 1994). Results demonstrated that each individual fish had concentrations of arsenic, mercury, DDT metabolites, toxaphene, polycyclic aromatic hydrocarbons, and aliphatic hydrocarbons high enough to warrant concern (USFWS et al. 1995). Specific sources were not identified.

Hurricane Katrina, a Category 5 hurricane of the 2005 Atlantic hurricane season, resulted in a storm surge greater than historical maximums. The combination of a storm surge of up to 30 feet, wave action, and high winds resulted in massive destruction of buildings and roads in the affected areas. In the Gulf of Mexico, 108 off-shore oil platforms were destroyed and 53 suffered significant damage. The Federal Emergency Management Agency found in its most recent study that 350,000 structures have been built within 500 feet of U.S. coasts with 13 percent of those structures located on the Gulf coast and 50 percent of these structures located on the Atlantic coast, (FEMA 2000). The study warned that coastal erosion could wipe out one in four of them by 2060. Although recovery and reconstruction efforts will last several years, there is an urgent need for technical information to enable safer, sustainable redevelopment in areas affected by hurricanes. An environmental factor in the extent of damage caused by Katrina has been the destruction of wetlands in the affected regions, which traditionally have a mitigating effect on hurricane damage, acting as a "sponge" to slow floodwaters. Environmental impacts from hurricanes are not well understood, but are likely to get attention and research. Coastal impacts of future hurricanes may be lessened as a result of lessons learned from Katrina.

Because many activities that affect marine habitat involve some degree of federal authorization (e.g., through MMS or COE), NMFS expects ESA section 7 will apply to most major, future actions that may affect designated Gulf sturgeon critical habitat.

Future IER Projects

Based on information provided by the COE, consultations on two remaining IERs must be completed with NMFS. Varying levels of information are available regarding the remaining IER projects. A brief summary of each remaining IER, with the key available details, are presented here in order to make a determination that the continued incremental consultation on each IER complies with 50 CFR § 402.14(k).

The COE will submit a single request for consultation on a supplement to IER 3 and IER 11 Tier 2. The IER 3 supplemental activities include the construction of bypass/detour lanes coming off the Lake Pontchartrain Causeway into New Orleans to reroute traffic around the other constructed components of IER 3. The project will occur in Gulf sturgeon critical habitat Unit 8. Temporary impacts from dredging for equipment access and the stockpiling of dredged material are expected to be similar to, or less than, the temporary impacts to 29 acres of habitat currently proposed in IER 3. Permanent impacts will result from the driving of piles into waterbottoms for the detour lanes. It is unknown how much designated critical habitat will be affected by these activities, however other similar projects in Gulf sturgeon critical habitat have been found to affect a relatively small footprint and sturgeon can continue to forage underneath the pile-supported structure once construction is completed. IER 11 Tier 2 is not located in Gulf sturgeon critical habitat. However, components of the project involve placing flood control structures and shallowing waterbottoms with fill material in areas traversed by sturgeon and sea turtles. The COE will place coffer dams around the area during the majority of the construction period to exclude listed species from the site and to prevent sediments and other materials from flowing into Lake Pontchartrain. Further, the majority of construction will occur between May and September when Gulf sturgeon are not expected to be in the area. However, some components of the project may occur when the coffer dams are not in place and outside the May to September time-frame. Therefore, NMFS will have to evaluate expected impacts from IER 11 Tier 2 to listed species when all the necessary information becomes available. However, based on the short duration of the construction impacts, the low likelihood of interactions between construction activities and listed species, and the lack of operational impacts to listed species, any impacts associated with the project would not reasonably be expected to result in jeopardy. This conclusion must be verified through the completion of consultation on the project.

Analysis of Compliance with 50 CFR § 402.14(k)

As discussed above, NMFS has determined that the incremental step of implementing IER 5 will not violate section 7(a)(2) of the ESA, as required in 50 CFR 402.12(k)(1). As required by 50 CFR 402.14(k) paragraphs (2) and (3), the COE will consult with NMFS on all future IERs that may affect species or critical habitat under NMFS' purview, and through ongoing information collection, will reinitiate consultation if new or unanticipated effects of previous action become apparent. Further, COE will complete a comprehensive environmental review of the effects of the entire hurricane protection plan as soon as sufficient information is available about each of the IERs.

Though specific project details for the remaining IERs are still in development, based on information currently available analyzed above, there is a reasonable likelihood that the COE's comprehensive plan to upgrade the Greater New Orleans Hurricane and Storm Damage Risk Reduction System will not violate section 7(a)(2) of the ESA by jeopardizing the continued existence of a listed species or destroying or adversely modifying designated critical habitat. 50 CFR 402.14(k)(5). Paragraph (4) of 50 CFR 402.14(k) requires that each incremental step of a comprehensive action does not violate section 7(d) of the ESA concerning irreversible or irretrievable commitment of resources. Therefore, the actions consulted on and authorized in IERs 2, 3, 5, 6, 7, and 11 cannot foreclose the implementation of reasonable and prudent alternatives (RPAs), that may be necessary to address effects from the remaining consultations on IERs 3 supplemental, and 11 Tier 2, or the additive effects of successively implemented

projects. None of the impacts from the IERs, either individually or comprehensively, are expected to rise to the level of jeopardy to a listed species or destruction or adverse modification of designated critical. However, if information provided by the COE in the future suggests that jeopardy or adverse modification are likely, then potential RPAs (e.g., fully adhering to dredging/construction windows, modifications to structure design and placement) are still available to the action agency. Therefore, based on available information to date, we conclude that consultations on the IER projects under the Alternative Arrangements comply with all the provisions contained in 50 CFR § 402.14(k) for consultations on incremental actions.

6 CONCLUSION

After reviewing the current status of Gulf sturgeon critical habitat in Unit 8, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the placement of concrete and rock breakwaters will not reduce the critical habitat's ability to support the Gulf sturgeon conservation. Further, after reviewing the effects of IER 5 in conjunction with the effects associated with the other IER projects evaluated to date as part of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, we conclude that there are no additive effects of the overall project that rise above the level of effects considered for each of the individual component projects. Therefore, NMFS concludes that the action, as proposed, is not likely to destroy or adversely modify designated Gulf sturgeon critical habitat. Also, based on available information to date, we conclude that consultations on the IER projects under the Alternative Arrangements comply with all the provisions contained in 50 CFR § 402.14(k) for consultations on incremental actions.

7 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species and no take is being authorized.

8 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species to help implement recovery plans or to develop information. NMFS believes that NOCOE should implement the following conservation recommendation.

1. Gather data describing community structure of the benthos in and nearby the project area that would help determine local Gulf sturgeon prey availability and thereby assist in future assessments of impacts to designated critical habitat.

NMFS requests notification if the conservation measure is implemented. This will assist us to evaluate future project effects on Gulf sturgeon or designated Gulf sturgeon habitat.

9 REINITIATION OF CONSULTATION

This concludes formal consultation on the actions outlined in the initiation request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

May 12, 2009 F/SER46/RH:jk
225/389-0508

Mr. Gib Owen
Environmental Planning and Compliance Branch
Planning, Programs, and Management Division
New Orleans District, U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Owen:

NOAA's National Marine Fisheries Service (NMFS) has received the draft **Individual Environmental Report (IER) #5** transmitted by a letter from Ms. Joan Exnicios dated May 4, 2009. The draft IER evaluates and quantifies the impacts associated with constructing permanent pump stations and closures at or near the mouths of the 17th Street, Orleans Avenue, and London Avenue Canals in Jefferson and Orleans Parishes, Louisiana.

NMFS has reviewed the draft IER and finds that the disclosure and assessment of impacts associated with the construction of these pump stations and canal closures are quite comprehensively addressed. As such, we have no comments to provide on the draft IER #5.

We appreciate the opportunity to review and comment on the draft IER.

Sincerely,

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette
EPA, Dallas
LA DNR, Consistency
F/SER46, Swafford
Files

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

May 12, 2009 F/SER46/RH:jk
225/389-0508

Mr. Gib Owen
Environmental Planning and Compliance Branch
Planning, Programs, and Management Division
New Orleans District, U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Owen:

NOAA's National Marine Fisheries Service (NMFS) has received the May 4, 2009, Clean Water Act, Section 404 Public Notice titled "**Permanent Protection for the Outfall Canals Project on 17th Street, Orleans Avenue, and London Avenue Canals, Jefferson and Orleans Parishes, Louisiana.**" The public notice describes plans of the New Orleans District to construct new permanent pump stations and closures at or near the mouths of the outfall canals. Breakwaters are proposed for installation in Lake Pontchartrain adjacent to the 17th Street and Orleans Avenue pump stations to help protect them from erosion. The proposed work is necessary to provide storm surge risk reduction to developed areas of New Orleans in the vicinity of Lake Pontchartrain.

NMFS has reviewed the work described in the Public Notice and does not believe it constitutes a significant adverse impact to essential fish habitat or associated marine fishery resources. As such, we have no recommended revisions to the work proposed in the Public Notice and do not object to project implementation.

We appreciate the opportunity to review and comment on this Public Notice.

Sincerely,

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette
EPA, Dallas
LA DNR, Consistency
F/SER46, Swafford
Files

United States Department of the Interior

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

May 20, 2009

Colonel Alvin B. Lee
District Engineer
U.S. Army Corps of Engineers
Planning, Programs, and Project Management Division
Environmental Compliance Branch, CEMVN-PM-RS
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

The U.S. Fish and Wildlife Service (Service) has reviewed the draft Individual Environmental Report 5 (IER5) titled "Permanent Protection System for the Outfall Canals Project on 17th Street, Orleans Avenue and London Avenue Canals, Lake Pontchartrain and Vicinity, Jefferson and Orleans Parishes, Louisiana." That study was conducted in response to Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps of Engineers (Corps) to upgrade some existing hurricane protection projects to provide protection against a 100-year hurricane event. The Service submits the following comments in accordance with provisions of the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The IER is well written and provides a good description of fish and wildlife resources in the project area and project impacts on those resources. Wetlands in the project area provide important habitat for several Federal trust species including wading birds, neotropical migrants, and resident and migratory waterfowl, however, the Service agrees there would be no impacts that would require compensatory mitigation.

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The Service does not object to the measures proposed thus far for the IER5 Hurricane Protection Project. Thank you for the opportunity to provide comments on the draft IER 5. If you have any questions regarding our comments, please contact Catherine Breaux at (504) 862-2689.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

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

Choctaw Nation of Oklahoma

P.O. Box 1210 • Durant, OK 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Gary Batton
Assistant Chief

May 26, 2009

Joan Exnicios
Dept of the Army
New Orleans District, Corps of Engineers
PO Box 60267
New Orleans, Louisiana 70160-0267

Dear Joan Exnicios:

We have reviewed the following proposed project (s) as to its effect regarding religious and/or cultural significance to historic properties that may be affected by an undertaking of the projects area of potential effect.

Project Description: Environmental Report #5 Permanent Protection System for the Outfall Canals Project on 17th Street

Comments: After further review of the above-mentioned project (s), The Choctaw Nation Tribal Historic Office concurs with the finding of no effect on cultural resources. Please feel free to contact our office @ 1-800-522-6170 ext. 2137 with any questions you may have.

Sincerely,

Terry D. Cole
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma

By: _____
Ian Thompson PhD, RPA
NAGPRA Specialist/Tribal Archaeologist
Choctaw Nation of Oklahoma

IAT:vr

From: Diane Hewitt
To: Owen, Gib A MVN
Sent: Thu May 28 14:32:04 2009
Subject: DEQ SOV:90513/1160 USACE IER #5

May 28, 2009

Gib Owen, USACE
CEMVN-PM-RS
P.O. Box 60267
New Orleans, LA 70160-0267
gib.a.owen@usace.army.mil <mailto:gib.a.owen@usace.army.mil>

RE:
90513/1160 USACE IER #5
Notice of Availability
Jefferson and Orleans Parishes

Dear Mr. Owen:

The Department of Environmental Quality, Office of Environmental Assessment and Office of Environmental Services received your request for comments on the above referenced project. Please take the appropriate steps to obtain and/or update all necessary approvals and environmental permits regarding this proposed project.

Construction activities may impact areas with impacts from previous commercial and/or industrial activities. Care should be taken to address any soils or structures impacted by hazardous constituents in accordance with current environmental rules and regulations.

There were no objections based on the limited information submitted to us. However, the following comments have been included. Should you encounter a problem during the implementation of this project, please make the appropriate notification to this Department.

The Office of Environmental Services/Permits Division recommends that you investigate the following requirements that may influence your proposed project:

* If your project results in a discharge to waters of the state, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary.
* If the project results in a discharge of wastewater to an existing wastewater treatment system, that wastewater treatment system may need to modify their LPDES permit before accepting the additional wastewater.
* LDEQ has stormwater general permits for construction areas equal to or greater than one acre. It is recommended that you contact Melissa Conti at (225) 219-3078 to determine if your proposed improvements require one of these permits.
* All precautions should be observed to control nonpoint source pollution from construction activities.

* If any of the proposed work is located in wetlands or other areas subject to the jurisdiction of the U.S. Army Corps of Engineers, you should contact the Corps to inquire about the possible necessity for permits. If a Corps permit is required, part of the application process may involve a Water Quality Certification from LDEQ.
* All precautions should be observed to protect the groundwater of the region.
* Please be advised that water softeners generate waste waters that may require special limitations depending on local water quality considerations. Therefore if your water system improvements include water softeners, you are advised to contact DEQ, Water Permits to determine if special water quality based limitations will be necessary
* Any renovation or remodeling must comply with LAC 33:III.Chapter 28.Lead-Based Paint Activities, LAC 33:III.Chapter 27.Asbestos-Containing Materials in Schools and State Buildings (includes all training and accreditation) and LAC 33:III.5151.Emission Standard for Asbestos for any renovations or demolitions.

Currently, Jefferson and Orleans Parishes are classified as an attainment parishes with the National Ambient Air Quality Standards for all criteria air pollutants.

Please forward all future requests to Ms. Diane Hewitt, LDEQ/Performance Management/ P.O. Box 4301, Baton Rouge, LA 70821-4301 and we will expedite it as quickly as possible.

If you have any questions, please contact me at (225)219-4079 or by email at diane.hewitt@la.gov <mailto:diane.hewitt@la.gov> . Permitting questions should be directed to the Office of Environmental Services at 225-219-3181.

Sincerely,

Diane Hewitt
LDEQ/Community and Industry Relations
Business and Community Outreach Division Office of the Secretary P.O. Box 4301 (602 N. 5th Street) Baton Rouge, LA 70821-4301
Phone: 225-219-4079
Fx: 225-325-8208
Email: diane.hewitt@la.gov

United States Department of the Interior

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

June 6, 2009

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

Dear Colonel Lee

Please reference the Individual Environmental Report (IER) Lake Pontchartrain and Vicinity (LPV), Outfall Canal Closure Structures, 17th Street Canal, Orleans Avenue Canal and London Avenue Canal, Orleans and Jefferson Parish, Louisiana (IER5). That study was conducted in response to Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps of Engineers (Corps) to upgrade some existing hurricane protection projects to provide protection against a 100-year hurricane event. This report contains an analysis of the impacts on fish and wildlife resources that would result from the implementation of 100-year hurricane protection for that area, and provides recommendations to minimize and/or mitigate project impacts on those resources.

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

This final report incorporates and supplements our FWCA Reports that addressed impacts and mitigation features for the WBV of New Orleans (dated November 10, 1986, August 22, 1994, November 15, 1996, and June 20, 2005) and the LPV (dated July 25, 1984 and January 17, 1992) Hurricane Protection projects and the November 26, 2007 Draft Programmatic FWCA Report that addresses the hurricane protection improvements authorized in Supplemental 4. This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

TAKE PRIDE IN AMERICA

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

Open-water habitat within the project area consists of the 17th Street Canal, the Orleans Avenue Canal, the London Avenue Canal and the southern portion of Lake Pontchartrain. These canals are man made features created for control of storm water run-off. The network of these structures illustrates the highly manipulated hydrology of the project area. Historically Lake Pontchartrain supported submerged and floating aquatic vegetation though none appear to be present in the project area. The canals in the project area do not support significant fishery resources but currently are open to Lake Pontchartrain. Lake Pontchartrain supports brackish water sport fishes include red drum, black drum, spotted seatrout, Gulf menhaden, white shrimp, brown shrimp, and blue crab. In the future fisheries of the area are expected to remain relatively stable.

DESCRIPTION OF SELECTED PLAN

The proposed plan for IER 5 consists of construction of new permanent pump stations near the mouths of the outfall canals. The existing Sewerage and Water Board (S&WB) drainage pump stations which directly feed the canals would remain in service and operate concurrently or in series with the new pump stations, and the outfall canal would continue to convey stormwater from the existing S&WB pump stations to the new pump stations. This alternative leaves in place the floodwalls that flank the outfall canals, and these floodwalls would remain an integral part of the city's internal flood protection system.

Preliminary screening of alternatives eliminated several alternatives based on their not meeting the goals of engineering effectiveness, economic efficiency, environmental and social acceptability, and meeting the purpose and need of the project. These include the non-structural alternatives including flood proofing or elevating all residential and commercial properties and public acquisition of properties in areas subject to flooding; the Lake Pontchartrain barrier plan that would reduce storm surge in Lake Pontchartrain by cutting off the lake from influence of storm surges generated in the Gulf of Mexico; Canal closure by having either one-directional flow gates or manual gates without pumps; pressurized conduits to replace the outfall canal system; utilization of grade variation for pump station sitting; one central pump station in Lake Pontchartrain; and three pump stations in Lake Pontchartrain. Several additional project features which could be used in conjunction with the proposed action were also eliminated, including city park/bayou St. John retention/detention; polders to divide the interior drainage into sub-basins to localize any flooding within individual polders; interconnected laterals that provide laterals between the three outfall canals that allow drainage from one canal to be diverted to another canal in the event of problems at one of the pump stations; and consolidation of canals.

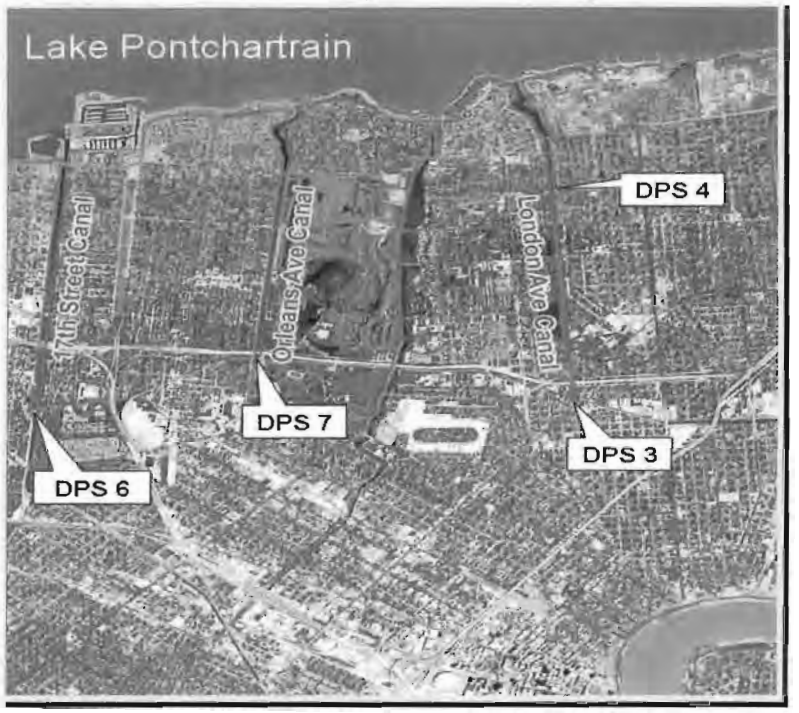
In addition to the proposed action, the alternatives carried forward in a detailed impacts analysis included: the no-action plan; parallel protection using concrete-lined canals or improved parallel protection; converting the temporary pump stations to a permanent system; permanent pump stations and closures at the mouths of the outfall canals where the existing S&WB pump stations would be taken out of commission. Additional project features such as diverting water from London Avenue

This report has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service; their comments have been incorporated into our final report.

DESCRIPTION OF THE STUDY AREA

The IER5 project area in Orleans Parish including the three canals that run inland from Lake Pontchartrain (figure 1). The canals include the 17th Street Canal, the Orleans Avenue Canal, and the London Avenue Canal. Currently in these canals exists interim pump stations with I-walls and earthen levee along the length of the canals.

Figure 1. Individual Environmental Report (IER) Lake Pontchartrain and Vicinity (LPV), Outfall Canal Closure Structures, 17th Street Canal, Orleans Avenue Canal and London Avenue Canal, Orleans and Jefferson Parish, Louisiana (IER5).



FISH AND WILDLIFE RESOURCES

The Service provided a draft programmatic FWCA Report for the LPV project on November 26, 2007. The Service also provided a letter, dated August 7, 2006, addressing threatened and endangered species for the coastal parishes of the New Orleans District. Those reports contain a thorough discussion of the significant fish and wildlife resources (including those habitats) and threatened and endangered species and their critical habitat that occur within the study area. For brevity, those discussions are incorporated by reference herein.

Habitat types specifically for IER 5 include open water and developed areas. Due to urban development and a forced-drainage system with the levee system, the hydrology of the area has been altered. The forced-drainage system has been in operation for many years, and subsidence is

Canal to Industrial Canal; pumping to the Mississippi River; and construction of additional drainage pump stations, were investigated in the impacts analysis because they could provide additional efficiency; however, because they alone could not meet the purpose and need they were not identified as individual alternatives.

PROJECT IMPACTS

The proposed project sites have been located in areas that minimize impacts to wetlands. Open-water habitat in the three canals of the project area will be enclosed within the hurricane protection projects. These canals may become stagnant except when pumps are operating to remove rain water. The open water habitat in Lake Pontchartrain at the mouths of the canals will be impacted by the pump station structures. Those habitats will no longer support significant fish and wildlife use.

There will be no other habitat impacted as a result of the proposed project. As with the future without project, fish and wildlife and their habitats, in the future with project scenario, are expected to remain relatively stable with some decline from development, subsidence, and erosion.

Threatened and Endangered Species

Three threatened or endangered species of concern to this project area include the brown pelicans (*Pelecanus occidentalis*), the West Indian manatees (*Trichechus manatus*) and the Gulf sturgeon (*Acipenser oxyrhynchus desotoi*).

Federally listed as an endangered species, brown pelicans are currently known to nest in Louisiana but not within the project area. Brown pelicans feed within Lake Pontchartrain and other shallow estuarine waters, using sand spits, sand bars, and some man-made structures (e.g., pilings) as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance.

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

The following are conditions that would be used to avoid impacts to manatee. All contract personnel associated with the project shall be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be

observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels shall operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

The Gulf sturgeon, federally listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwannee River, Florida. In Louisiana, Gulf sturgeon have been reported at Rigolets Pass, rivers and lakes of the Lake Pontchartrain basin, and adjacent estuarine areas. On March 19, 2003, the Service and the National Marine Fisheries Service (NMFS) published a final rule in the Federal Register (Volume 68, No. 53) designating critical habitat for the Gulf sturgeon in Louisiana, Mississippi, Alabama, and Florida. Portions of the Pearl and Bogue Chitto Rivers, Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, and Lake Borgne within Louisiana were included in that designation.

In that critical habitat designation, responsibility for consultation with specific Federal agencies was also identified for the Service and for the NMFS. For estuarine and marine waters in Louisiana, the NMFS is responsible for consultations regarding impacts to the sturgeon and its critical habitat with all Federal agencies, except the Department of Transportation, the Environmental Protection Agency, the U.S. Coast Guard, and the Federal Emergency Management Agency, which consult with the Service. Therefore, please contact Dr. Stephania Bolden (727/824-5312) in St. Petersburg, Florida, for information concerning that species and its critical habitat. Should the proposed project directly or indirectly affect the Gulf sturgeon or its critical habitat in Louisiana, further consultation with this office will be necessary.

If project construction has not been initiated within 1 year, follow-up consultation should be accomplished prior to making expenditures for construction. If the scope or location of the proposed work is changed, both threatened and endangered species and FWCA consultation should be reinitiated as soon as such changes are made.

FISH AND WILDLIFE CONSERVATION MEASURES

Coastal marshes are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). Because of the Services' close coordination with the

Corps on this project, and because the project is not expected to have any adverse impacts to wetlands, the Service has no conservation measures to offer at this time.

SERVICE POSITION AND RECOMMENDATIONS

There will be no fish and wildlife resources impacted as a result of the proposed project. The Service does not object to the construction of the proposed project provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Service shall be provided an opportunity to review and submit recommendations on the draft plans and specifications for all work addressed in this report.

2. Any proposed change in the proposed project features, locations or plans shall be coordinated in advance with the Service, NMFS, LDWF, and LDNR.

3. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their habitat.

4. Avoid adverse impacts to manatee and Gulf sturgeon

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD/CRD), Baton Rouge, LA