United States Department of the Interior

FISH AND WILDLIFE SERVICE
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June 15, 2009

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

Dear Colonel Lee,

Please reference the Individual Environmental Report 7 New Orleans East Levee, Maxent Canal to Michoud Slip, Orleans Parish, Louisiana (IER 7). That study was conducted in response to Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps of Engineers (Corps) to upgrade some existing hurricane protection projects to provide protection against a 100-year hurricane event. This report contains an analysis of the impacts on fish and wildlife resources that would result from the implementation of 100-year hurricane protection for that area, and provides recommendations to minimize project impacts on those resources.

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

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

This constitutes the report of the Secretary of the Interior as required by Section 2(b) of the

FWCA. This report has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service; their comments have been incorporated into our final report.

DESCRIPTION OF THE STUDY AREA

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

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

FISH AND WILDLIFE RESOURCES

Description of Habitats

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

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

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

Open water in the study area consists of marsh ponds on the protected side of the levee and Lake

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

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

Pontchartrain on the flood side. These ponds support submerged and floating aquatic vegetation such as coontail, fanwort, pondweeds, water primrose, duckweed, and water hyacinth. Outside of the levee, more brackish tolerant submerged aquatic vegetation (SAV), such as widgeon grass, is found in shallow waters (typically less than 3 feet in depth) of Lake Pontchartrain.

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

Fishery/Aquatic Resources

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

Essential Fish Habitat

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

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

Wildlife Resources

Mammals known to occur in the project-area wetlands include mink, raccoon, swamp rabbit, nutria, river otter, and muskrat. Those wetlands also support a variety of birds including herons, egrets, ibises, least bittern, rails, gallinules, olivaceous cormorant, white pelican, pied-billed grebe, black-necked stilt, sandpipers, gulls, and terns. Forested and scrub-shrub habitats within

the study area also provide habitat for many resident passerine birds and essential resting areas for many migratory songbirds including warblers, orioles, thrushes, vireos, tanagers, grosbeaks, buntings, flycatchers, and cuckoos. Wading bird rookeries are known to exist in the southern part of the study area near the LPV 111 reach.

Fresh and intermediate marshes usually receive greater waterfowl utilization than brackish and saline marshes because they generally provide more waterfowl food. Migratory species expected to occur in the project area include gadwall, green-winged teal, blue-winged teal, northern shoveler, mallard, pintail, American widgeon, lesser scaup, ring-necked duck, redhead, and canvasback. Resident species expected to occur in that area include mottled duck and wood duck.

The study area also supports resident hawks and owls including the red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. The red-tailed hawk, northern harrier, and American kestrel are seasonal residents which utilize habitats within the study area.

Amphibians such as the pig frog, bullfrog, leopard frog, cricket frog, and Gulf coast toad are expected to occur in the fresh and intermediate marshes of the project area. Reptiles such as the American alligator, snapping turtle, softshell turtle, red-eared turtle, and diamond backed terrapin are also expected to occur in the study area wetlands.

Endangered and Threatened Species

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

Refuge Land

Several portions of the project area are located within or will require access through the Service's Bayou Sauvage NWR. The National Wildlife Refuge System Improvement Act of 1997 authorized that no new or expanded use of a refuge may be allowed unless it is first determined to be compatible. A compatibility determination is a written determination signed and dated by the Refuge Manager and Regional Refuge Chief, signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. A compatible use is defined as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere

with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. A compatibility determination is only required when the Service has jurisdiction over the use. For example, proposed uses that deal exclusively with air space, navigable waters or overly refuges where another Federal agency has primary jurisdiction over the area, would not be subject to compatibility.

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

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

DESCRIPTION OF SELECTED PLAN

The purpose of the proposed action is to provide the 100-year level of protection for the Greater New Orleans Hurricane and Storm Damage Reduction System (HSDRRS) for New Orleans East. The term "100-year level of protection", refers to a level of protection which reduces the risk of hurricane surge and wave driven flooding that the New Orleans Metropolitan area has a 1 percent chance of experiencing each year. Elevations of the existing floodwalls and levees within three reaches of the LPV project (reaches 109, 110 and 111), a component of the HSDRRS, are below 100-year design elevations and do not meet Corps design criteria. The proposed action is needed to meet the 100-year design elevations and design criteria in these three reaches. The completed HSDRRS would lower the risk of harm to citizens and damage to infrastructure during a storm event.

Various alternative alignments and structures (*i.e.*, floodwalls and levees) were evaluated for

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

The LPV 108 reach is approximately 6.3 miles long (Figures 1and 2). The authorized level of flood protection ranges from +17.5 feet North American Vertical Datum 1988 (NAVD 88) in the western portion of LPV 108 to +18.5 feet NAVD 88 in the eastern portion. This height provides the 100-year level of flood protection; therefore no further levee work is required to achieve NFIP certification for this reach.

Riprap foreshore protection along Lake Pontchartrain would be raised to reduce erosion and wave impact on the LPV 108 levee. Approximately 121,000 cubic yards of riprap would be required to raise levee foreshore protection to an elevation that would not settle below a net grade of approximately +14 feet NAVD 88 in 10 years. It is anticipated that riprap would be transported to the Lake Pontchartrain shoreline by barge and placed from equipment stationed on barges in the lake and from trucks and equipment accessing the foreshore protection from the shoreline. The placement of foreshore protection would permanently fill approximately 7.2 acres of Lake Pontchartrain. While included as part of the project, this work is actually maintenance of the previously constructed erosion protection. To provide barge access, channels would be dredged in Lake Pontchartrain perpendicular and parallel to the shoreline. It is proposed that five offshore to inshore access channels perpendicular to the Lake Pontchartrain shoreline and four lateral channels parallel to the shoreline would be constructed to allow the tug boat and barge to approach the construction area (Figure 2). Perpendicular and parallel channel dimensions would be approximately 10 feet deep, 100 feet wide at the channel bottom with a 2:1 slope on both sides of the channel. Perpendicular channels would range from 764 to 1,126 feet long and parallel channels would be 2,000 feet long. The dredging operation would excavate approximately 243,000 cubic yards of material. Dredged material (tailings) would be placed within a 178-foot wide area located on one side of and parallel to the dredged channel. The width of the channel and dredged material placement area would create a 400-foot wide footprint, which includes the 140-foot wide channel (top width; 100-foot wide bottom width), the 178-foot wide dredged material stock pile, and the space between the stock pile and channel. Assuming these dimensions, the channel and excavated sediments are expected to directly impact approximately 118.1 acres of lake bed. After construction dredged material for the access channels would be used to backfill the dredged channels.

The LPV 109 reach includes the use of stability berms, high strength geotextile and prefabricated vertical (PV) drains (*i.e.*, wick drains) for levee construction. A stability berm with a width of 120 feet would be constructed on the protected side from South Point to US Highway 90 (US 90), and a stability berm with a width of 175 feet on the protected side would be constructed from US 90 to LPV 110. Two to three layers of high strength geotextile would be used, and the levee fill placed in five lifts between South Point and US 90 and in six lifts between US 90 and LPV 110. PV drains would be used to promote horizontal drainage in subsurface clay soils.

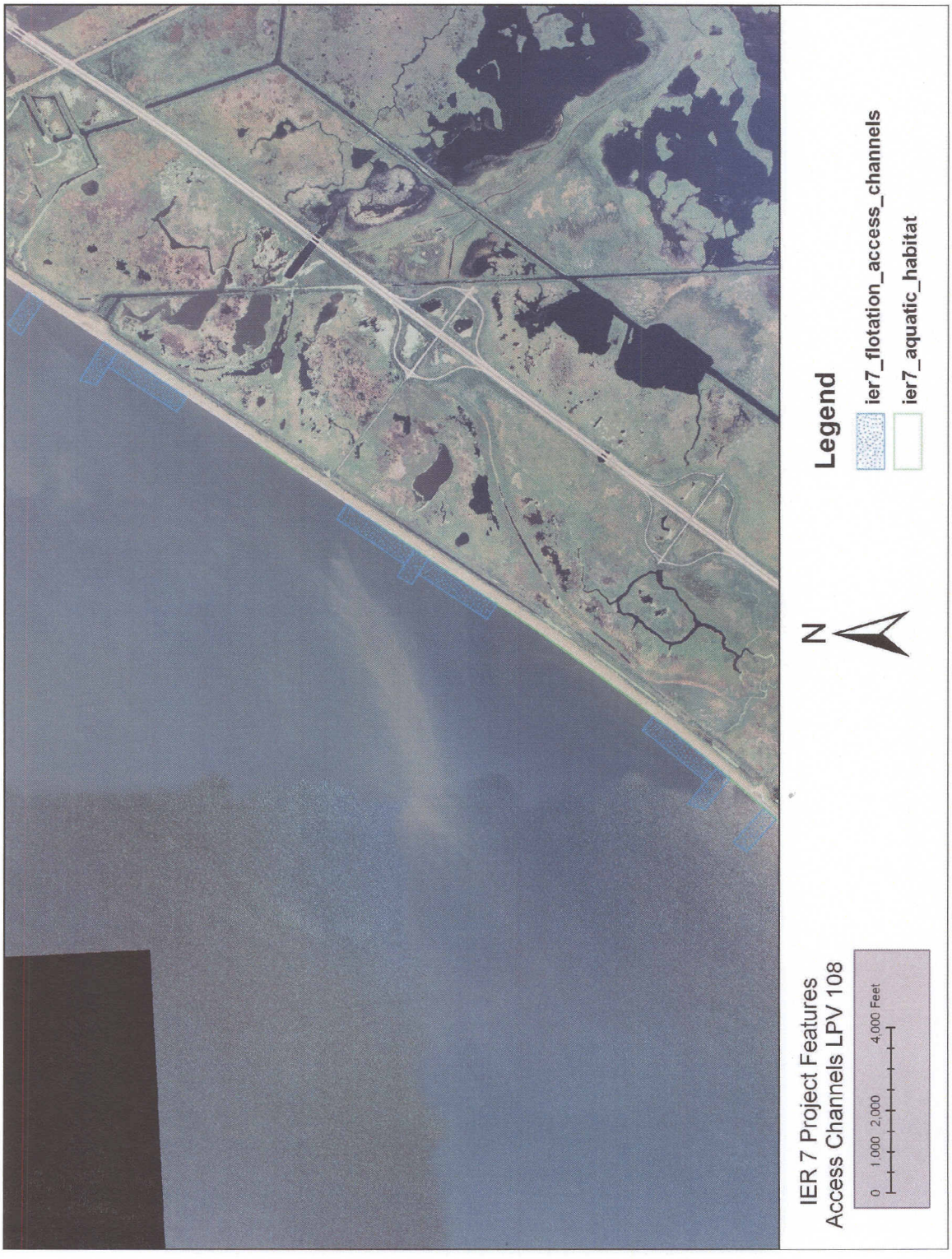

Figure 2. IER 7 – LPV 108 access channels.

Additionally, seepage analysis would be performed during levee design, and if additional seepage control measures are warranted, a cement-bentonite (CB) slurry wall would be constructed beneath the levee. The levee would be raised to an elevation that would vary with distance from Lake Pontchartrain and would not settle below a net grade of between +17.0 feet NAVD 88 (from South Point to US 90) and +22.0 feet NAVD 88 (from US 90 to CSX Railroad) in 10 years. Flood side levee slopes would be 1:4 (vertical:horizontal) from South Point to US 90 and 1:5 (vertical:horizontal) from US 90 to LPV 110. Protected side levee slopes would be 1:4 (vertical:horizontal). The levee would be vegetated along both slopes along its entire length following construction. Levee reconstruction would impact two pump stations and four drainage control structures that provide water level management for Bayou Sauvage NWR. These structures would be redesigned and constructed to accommodate the new levee heights and footprints.

The expanded levee and stability berm footprint would require the acquisition of ROW. The majority of the additional ROW needed for construction is located in Bayou Sauvage NWR. Additionally, a haul route for construction equipment access would be improved along an existing Service-owned road between the LPV 109 levee and US 90.

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

The existing I-10 roadway that crosses the HSDRRS levee is a six-lane, controlled access, divided interstate highway with shoulders that are supported on an elevated embankment. I-10 passes over the levee via an earthen ramp. The proposed I-10 crossing includes raising the existing levee structure and highway earthen ramp to the 100-year level of risk reduction, with a minimum net elevation of +19.0 feet NAVD 88. There would be sufficient overbuild in the crossing to accommodate natural compaction and subsidence in order to maintain the 100-year level of risk reduction for 10 years. The ramp construction includes a temporary traffic control plan that provides a minimum of three traffic lanes in each direction continuously through the duration of the project construction. The construction of the ramp would occur within existing Louisiana Department of Transportation and Development (DOTD) ROW.

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

The existing CSX Railroad floodgate and associated T-wall at LPV 110 would be raised to an elevation that would not settle below a net grade of approximately +30 feet NAVD 88 in 10 years. The proposed work would include the replacement of the gate monolith and adjacent T-walls and I-walls with T-wall type floodwalls. Because the LPV 110 floodwall would be slightly

offset from the centerline of the adjacent levees, the new T-walls would be constructed to tie into the LPV 109 and LPV 111 levees. The CSX Railroad would remain in service during the floodgate and floodwall construction and no additional ROW would be required.

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

A new reinforced concrete T-wall would be constructed to replace the existing T-wall at Pump Station No. 15. The T-wall contains three 72-inch pipes that discharge into a basin on the flood side of the T-wall. The top of the T-wall fronting Pump Station No. 15 would be +34.0 feet NAVD 88 with the adjacent levee tie-in section raised to +32 feet NAVD 88. The new T-wall would transition into levee on both sides. During T-wall demolition, temporary flood protection would be constructed in the discharge basin adjacent to the GIWW. The three 72-inch pipes would be extended through the temporary flood protection to discharge into the GIWW. The temporary flood protection in the discharge basin would also be used as a cofferdam to dewater the discharge basin during T-wall construction. A temporary bridge for access during levee and T-wall construction would be placed across Maxent Canal just north of Pump Station No. 15.

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

All T-walls would be approximately 2-feet wide supported by an approximately 12- to 17-foot wide and 3-foot high concrete slab connected to H-piles (driven to a depth of approximately 85 feet below the ground surface) and a continuous sheet pile cutoff wall (constructed to depths

ranging from 50 to 60 feet below the ground surface) for further stabilization and seepage protection. It is anticipated that T-walls would be cast-in-place; however, consideration would be given to using precast concrete for T-wall foundations and wall stems.

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

ALTERNATIVES UNDER CONSIDERATION

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

LPV 109 Levee Section

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

Alternative 1: Raise Levee by Placing Stability Berms on Both Sides and Using Pre-fabricated Vertical Drains. Design elevations would be reached by placing levee fill in five stages from South Point to US 90 and in six stages along US 90 to LPV 110. It is anticipated that levee construction would need to be conducted in stages to prevent bearing capacity failure. It is estimated that each stage would need approximately 4 months to substantially complete primary consolidation and associated strength gain in the clay soils. Stability berms would be added to meet slope stability factors of safety requirements. Levee side slopes would be the same as LPV 109 proposed action. PV drains would be utilized in levee construction to achieve strength gain in the underlying soft clay stratum. A stability berm width would be approximately 160 feet on the protected side between South Point and US 90, and a stability berm width of approximately 225 feet on the protected side and 90 feet on the flood side would be required between US 90 and LPV 110. A seepage analysis would be performed during the design phase, and if additional seepage control measures are recommended, a CB slurry wall underneath the levee would be constructed.

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

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

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

LPV 109 I-10 Crossing

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

Alternative 2. Construct Levee and Raise I-10 with a Bridge. A 3,095-foot long, 40-foot high bridge would be constructed over the LPV 109 levee and would meet DOTD's design criteria. Because of the length of this bridge, the existing I-10 bridges located 1,300 feet east of the LPV 109 crossing would also be reconstructed. The bridge would meet Corps design criteria by providing 15 feet of vertical clearance over the proposed LPV 109 levee. The maximum allowable grade of 3 percent would used to minimize the length of the bridges and the amount of reconstruction of the existing bridges.

LPV 109 US 90 and US 11 Crossings

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

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

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

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

LPV 110

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

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

LPV 111

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

Alternative 1. Raise Levee with Prefabricated Vertical Drains and Geotextile. Levees would be constructed utilizing two types of ground improvements, high strength geotextile and the incorporation of PV drains to increase the rate of consolidation. Three to four layers of high

strength geotextile would be used, with the levee fill being placed in five to seven stages to allow for sufficient consolidation of material. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action.

Alternative 2. Raise Levee with Lightweight Fill. Using lightweight fill materials such as geofoam, shredded and baled tires, expanded clay and Elastizell were evaluated. These materials result in small loads being imposed on the levee to raise the elevation to the 100-year risk reduction elevation. The existing levee surface would be partially degraded to create a working platform. Lightweight materials would then be used to raise the levee elevation. Because of the risk of breaches in the levee dislodging lightweight materials, erosion protection would be placed along the slopes of the levee. A new T-wall at Pump Station No. 15 would be constructed as described for the LPV 111 proposed action.

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

EVALUATION METHODS FOR SELECTED PLAN AND ALTERNATIVES

The Service used the Habitat Assessment Methodology (HAM) to quantify the impacts to forested habitats. The Fresh-Intermediate, and Brackish Coastal Marsh Models of the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) Wetland Value Assessment (WVA) Methodology was used to quantify the impacts to the marsh habitat. Those habitat assessment models utilized in this evaluation are modified from those developed in the Service's Habitat Evaluation Procedures (HEP). However, both models are community-level evaluations instead of the species-based approach used with HEP. For each habitat type, those models define an assemblage of variables considered important to the suitability of an area to support a diversity of fish and wildlife species (Louisiana Department of Natural Resources 1994; U.S. Fish and Wildlife Service 1980). A Habitat Suitability Index (HIS) is calculated from all of the model variables to represent the overall value of the wetland habitat quality. The product of an HIS value and the acreage of available habitat for a given target year is known as the Habitat Unit (HU), and is the basic unit for measuring project effects on fish and wildlife habitat. HUs are annualized over the project life to determine the Average Annual Habitat Units (AAHUs) available for each habitat type. The change (increase or decrease) in AAHUs for the future with-project scenario, compared to the future without-project conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the fish and wildlife community within that habitat type; a net loss of AAHUs indicates that the project would adversely impact fish and wildlife resources. Further explanation of how impacts/benefits are assessed and an explanation of the assumptions affecting the HSI values for each target year are available for review at Service's Lafayette, Louisiana, field office.

IMPACTS OF SELECTED PLAN AND ALTERNATIVES

The no action alternative was not selected because it would not allow completion of 100 year flood protection; the purpose of the Supplemental 4 authorization. Fish and wildlife resources would not be significantly impacted by selection of the no action alternative for reaches 109-111. However, with the no action alternative, maintenance of rock foreshore protection along LPV 108 would still be conducted. Impacts to SAVs resulting from maintenance of the riprap erosion protection (dredging of access channels, stockpiling of dredged material and riprap in Lake Pontchartrain) for LPV 108 has not be quantified, but surveys prior to and post construction will be undertaken to determine the need for restoration activities.

Prior to levee rebuilding, soil borings will be taken along the LPV 109 reach on the protected and flood sides of the levee. Most of the work will be within the Bayou Sauvage NWR. The purpose of the borings is to characterize the subsurface soils which will underlie part the new levee and berm. The 43 boring sites will experience temporary impacts due to compaction from marsh buggy tracks, discharge of soil during the boring process and removal of dirt from the bore hole. Because most borings will be taken near the existing ROW and efforts have been undertaken to minimize the footprint of this activity, it is estimated by the Corps that only 0.18 acres would be impacted. Post boring surveys of the boring sites should be conducted to ensure the accuracy of impact areas and assess any recovery from impacts. The temporal analysis of the boring impacts would extend from when the borings occur till the time of levee construction which is estimated to be approximately 1 year. Borings are anticipated to result in the loss of 0.05 AAHUS of bottomland hardwood forest and 0.05 AAHUS of marsh.

The LPV 109 and LPV 111 levee reaches will be impacted by the expansion of the levee base onto the surrounding marsh and BLH, eliminating linear strips of these habitats. Levee construction and upgrading would directly impact approximately 182 acres of moderate-quality bottomland hardwood forested wetlands, 100.4 acres of fresh/intermediate marsh, and 70 acres of brackish marsh. Our analyses indicate that project implementation would result in the direct loss of 91.2 AAHUs of bottomland hardwood forested wetlands, and 36.8 AAHUs of fresh/intermediate marsh, and 37.2 AAHUs of brackish marsh.

The selected plan for LPV 111 is a deep soil mixing process which minimizes the levee base width necessary for upgrade to 100 year protection level. Impact acreage of the selected plan for this levee reach is significantly less than for the selected plan for LPV 109. The deep soil mixing alternative was not selected as the proposed plan for LPV 109 resulting in a much larger levee footprint and subsequent greater impacts to habitat. The Service recommends that the IER should contain at least a summary of the plan selection process and the justifications for elimination of alternatives from consideration.

FISH AND WILDLIFE CONSERVATION MEASURES

Clearing and grubbing should be limited to only what is necessary at the time of construction. If bald eagle nesting locations and wading bird colonies are found in the project area before or during construction, adverse impacts may be avoided by timing of construction and further consultation with the Service. SAVs may be directly impacted by dredging of access channels and indirectly by turdidity increases resulting for erosion of disposed access channel material stockpiled in Lake Pontchartrain. Prior to construction and following backfilling of the access channels the Corp should conduct a survey for SAVs in Lake Pontchartrain from the western end of IER 6 eastward to 6,000 feet west of Paris Road. Surveys should be taken at 1,000 feet intervals along the shoreline out to the 3 foot depth contour with samples taken every 20 feet. SAV should be replanted, if needed, to minimize project impacts. The need to replant would be determined in coordination with the Service, NMFS, and other interested natural resource agencies.

COMPENSATORY MITIGATION MEASURES

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include:

(a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

The Service supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value of forested wetlands for fish and wildlife and the relative scarcity of that habitat type, those wetlands are usually designated as Resource Category 2 habitats, the mitigation goal for which is no net loss of in-kind habitat value. The degraded bottomland hardwood forest and wetland scrub-shrub that would be impacted is placed in Resource Category 3 due to its reduced value to wildlife. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value. Project impacts will be minimized to some extent by hauling in material for the levee. Because the "no action" alternative was not selected, avoiding the project impacts altogether is not feasible. Therefore, remaining project impacts should be mitigated via compensatory replacement of the habitat values lost.

To replace the project-related loss of moderate-quality forested wetland habitat, fresh/intermediate marsh, and brackish marsh, on the protected and flood sides of the existing levee system, the Corps and the local sponsor should develop and fund mitigation actions that would produce the equivalent of 165 AAHUs, within the Bayou Sauvage NWR (Table 1). The Service would be involved in evaluating the adequacy of mitigation at any site.

Table 1. Project impact acres and AAHUs lost.

	BLH		**Fresh/Int. Marsh**		**Brackish Marsh**		**Total**
	Acres	**AAHUs**	**Acres**	**AAHUs**	**Acres**	**AAHUs**	**(Acres/AAHUs)**
Flood	30.0	11.9	0	0	70.0	37.2	100 / 49.1
Protected	151.7	79.3	100.4	36.8	0	0	252.1 / 116.1
Total	181.7	91.2	100.4	36.8	70.0	37.2	**352.1 / 165.2**

SERVICE POSITION AND RECOMMENDATIONS

Construction of the flood protection levee would result in the loss of approximately 182 acres of bottomland hardwood wetlands, 100 acres of fresh/intermediate marsh, and 70 acres of brackish marsh for a loss of 91.2, 36.8, and 37.2 AAHUs respectively. The Service does not object to providing improved hurricane protection to the greater New Orleans area provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Service, LDWF, NMFS, and other resource agencies shall be provided an opportunity to review and submit recommendations on the draft plans and specifications for all levee work addressed in this report.

2. Access channels should be refilled up to the prior lakebed elevation after project construction, especially the channel sections in water depths of 3 feet or less. Post-construction surveys (e.g., centerline surveys) should be taken to ensure access channels have been adequately backfilled. That information should be provided to the natural resource agencies for review. In areas shallower than 3 feet, where pre-existing elevations have not been successfully restored, the Corps should ensure those elevations are restored by additional measures

3. The Corps should avoid impacts to Bayou Sauvage NWR, when feasible. The Corps should continue to coordination with Refuge personnel during planning and compatibility determination processes. A Special-Use Permit should be obtained prior to any entrance onto the refuge. Coordination should continue until construction is complete and prior to any subsequent maintenance. Points of contacts for that refuge are Kenneth Litzenberger, Project Leader for the Service's Southeast National Wildlife Refuges and Jack Bohannan (985) 822-2000, Refuge

Manager for the Bayou Sauvage NWR. The Corps should not sign the Decision Record until a Compatibility Determination is complete.

4. Mitigation for impacts to the Bayou Sauvage NWR should occur on Bayou Sauvage NWR property. Mitigation planning should include refuge staff. The Corps and local sponsor shall obtain 165.2 AAHUs (as apportioned in Table 1) to compensate for the unavoidable, project-related loss of forested and emergent wetlands.

5. The Service, LDWF, NMFS and other natural resource agencies should be consulted regarding the adequacy of any proposed mitigation.

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

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

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

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

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

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

cc: FWS, Southeast Refuge Complex, Lacombe, LA
EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Baton Rouge, LA
OCPR, Baton Rouge, LA

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