# APPENDIX D
# TASK FORCE GUARDIAN DETAILS

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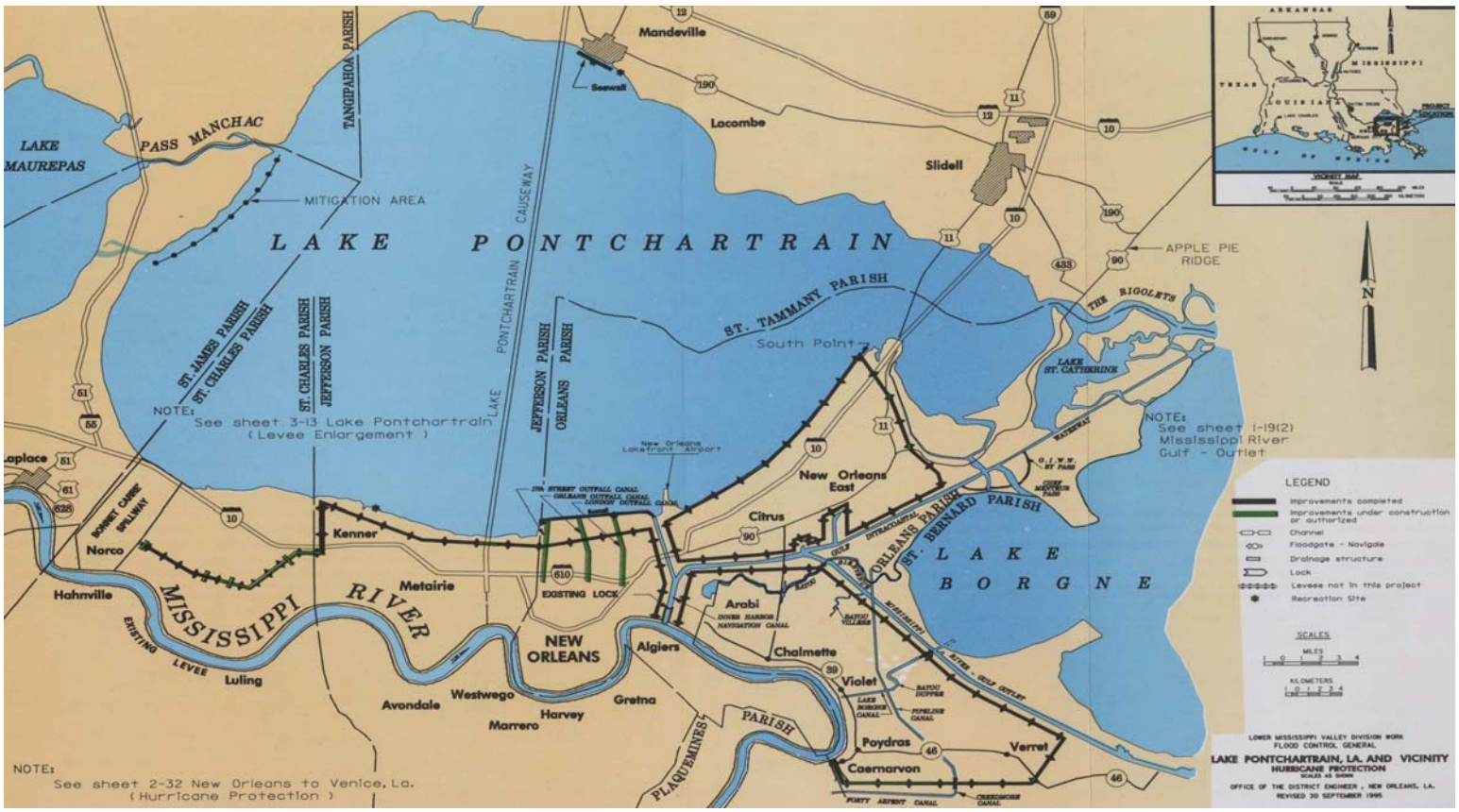
# Lake Pontchartrain, LA and Vicinity Hurricane Protection Project

This flood protection project is located in St. Bernard, Orleans, Jefferson, and St. Charles Parishes in southeast Louisiana, generally in the vicinity of the city of New Orleans, and between the Mississippi River and Lake Pontchartrain (Figure 1). The project was authorized by the Flood Control Act of 1965 and the Water Resources Acts of 1974, 1986, 1990, and 1992.

**Figure 1**
**Lake Pontchartrain, LA and Vicinity Hurricane Protection Project**



## *New Orleans East Bank Plan*
## *Orleans Parish, LA*

The Orleans East Bank portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project is bordered by the Mississippi River to the south, the Orleans/Jefferson Parish line to the west, Lake Ponchartrain to the north, and the Inner Harbor Navigational Canal (IHNC) to the east. This area includes the East Orleans Lakefront levee between the IHNC on the east and 17th Street Canal on the west. Within this area are the 17th Street Outfall Canal, the London Avenue Outfall Canal, and the Orleans Avenue Canal.

This portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project protects 28,300 acres of urban and industrial lands in the city of New Orleans via a combination of earthen levees and floodwalls. Its levees are constructed with 10-foot crown widths with side slopes of 1V on 3H. Along the Lake Pontchartrain Lakefront, the top elevation of these earthen levees ranges between 13 and 18 ft North American Vertical Datum (NAVD 88)(Figure 2). The project's floodwalls consist of reinforced concrete T-walls and reinforced concrete I-walls constructed on the top of sheetpile and sheet piling without a concrete cap These floodwalls are found on the east side of the 17th Street Canal, both sides of Orleans Avenue Canal and London Avenue Canal, and the west side of the IHNC. Top elevations of the floodwalls vary between 13 and 15 ft NAVD 88.

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**Figure 2**
**Map of the Eastern Half of the Orleans East Bank Portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project**

The Orleans East Bank portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project was damaged by Hurricane Katrina in late August 2005. The flood event produced storm surge levels at the levee along Lake Pontchartrain of approximate +17.0 ft NAVD 88. The height of the existing levees varied, but the levee crowns were generally at an elevation of 17.0 ft NAVD 88. The damage consisted of extensive breaches, scour, and erosion of the levees along the 17th Street Canal, London Avenue Canal, and the IHNC, as well as minor damage to the levees and floodwalls along Lake Pontchartrain (see Tables J-1 and J-2). In addition, there was extensive damage to the floodwalls in these same segments of the hurricane protection system along the Orleans Lakefront and Orleans Avenue Canal.

Structural repairs to the project would consist of restoring the levee to its pre-flood alignment by replacing each damaged section of floodwall and levee embankment to its authorized project height (Figure 2). The repairs would be broken into two major components, Phase I and Phase II Floodwall Repairs. Phase I Floodwall Repairs would consist of temporary hurricane protection at the 17th Street Canal breach and the two London Avenue breaches along their same general alignment. The Phase I Floodwall Repairs would employ steel sheet piling up to an elevation of 14 ft NAVD 88.

Phase II Floodwall Repairs involve construction to the authorized project height, returning the project to its pre-storm height plus overbuild. The Phase II Floodwall Repairs at the three breaches would consist of constructing pile founded reinforced concrete T-wall monoliths on the same alignment as the original I-walls. The 600-foot length of I-wall that rotated on the east side of London Avenue south of the Robert E. Lee Bridge would also be replaced with pile-founded T-wall monoliths. Due to the changed foundation conditions, a T-wall design is a more appropriate application in this area. The 1,400 feet of damaged I-wall floodwall along IHNC West Levee would be replaced with a buttressed I-wall section along the same alignment (also as a result of changed foundation conditions). Overtopping, scour, and erosion along the IHNC West Levee and Lakefront Levee and floodwall would be backfilled with compacted clay material.

According to the tables below, there is a total of approximately 7 acres of damage requiring 7,364 cy of material for repair.

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**Table J-1**

**Orleans East Bank Lakefront - Summary of Damages**

| | Location (GPS Coordinates) | | | | | | Dimensions (feet) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ID # | Degrees N | ' | " | Degrees W | ' | " | Length | Width | Depth | Cu-yd to fill | Description |
| L 46 | 90 | 05 | 17.3 | 30 | 01 | 39.3 | 20 | 10 | 2 | 15 | Eroded levee under I-wall |
| L 50 | 90 | 05 | 10.4 | 30 | 01 | 36.1 | 10 | 20 | 1 | 7 | Scour |
| L 51 | 90 | 05 | 7.9 | 30 | 01 | 35.6 | 20 | 3 | 1 | 2 | Scour |
| L 52 | 90 | 05 | 7.5 | 30 | 01 | 35.5 | 10 | 3 | 1 | 1 | Scour |
| L 59 | 90 | 04 | 59.1 | 30 | 01 | 33.6 | 20 | 20 | 3 | 44 | Scour under bridge |
| L 60 | 90 | 04 | 59.0 | 30 | 01 | 34.1 | 20 | 20 | 1.5 | 22 | Scour under bridge |
| L 67 | 90 | 04 | 55.4 | 30 | 01 | 31.1 | | | | | Floodwall damage |
| L 72 | 90 | 04 | 55.3 | 30 | 01 | 33.7 | 30 | 20 | 2 | 44 | Scour under bridge |
| L 73 | 90 | 04 | 55.4 | 30 | 01 | 34.6 | 30 | 20 | 3 | 67 | Scour under bridge |
| L 83 | 90 | 03 | 52.6 | 30 | 01 | 57.2 | 6 | 4 | 2 | 2 | Erosion |
| L 88 | 90 | 03 | 49.5 | 30 | 01 | 57.3 | 30 | 15 | 0.5 | 8 | Shallow erosion |
| L 90 | 90 | 03 | 43.6 | 30 | 01 | 57.3 | | | | | Floodwall damage |
| L 104 | 90 | 03 | 28.9 | 30 | 01 | 56.8 | 30 | 15 | 0.5 | 8 | Degraded fill material at base of wall |
| L 119 | 90 | 02 | 15.9 | 30 | 01 | 52.1 | 10 | 2 | 2 | 1 | Scour |
| L 120 | 90 | 02 | 15.4 | 30 | 01 | 52.2 | 10 | 2 | 2 | 1 | Scour |
| L 124 | 90 | 02 | 19.2 | 30 | 01 | 53.8 | 20 | 6 | 2 | 9 | Scour |

**Table J-2**

**Inner Harbor Navigation Canal - West Levee**

**Summary of Damages**

| | | | GPS Coordinates | | | | | | Scour Dimensions (Feet) | | | | | Condition of Floodwall | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DSR ID # | Type of Structure | | Degrees (N) | ' | " | Degrees (W) | ' | " | Length | Depth | Width | Cu-yd to fill | Scour Damage Class | Type | Description |
| Lock to Florida Avenue (West side) | | | | | | | | | | | | | | | |
| W-1 | Levee with I-wall (capped) | Start/End | 29 | 57 | 59.3 | 90 | 1 | 37.2 | 20 | | | | II | I-Wall | Scour adjacent to wall |
| W-2 | Gates W2, W3 (T-wall monoliths) | Start | 29 | 58 | 65.3 | 90 | 1 | 37.5 | 500 | 3 | 15 | 833 | I | T-Wall | Scour adjacent to wall |
| | | End | 29 | 58 | 8.9 | 90 | 1 | 36.1 | | | | | | | |
| W-3 | Gates W4, W5 (T-wall monoliths) | Start | 29 | 58 | 8.9 | 90 | 1 | 36.1 | 700 | 3 | 15 | 1,167 | I | Gate monolith | Scour adjacent to wall |
| | | End | 29 | 58 | 13.6 | 90 | 1 | 36.2 | | | | | | | |
| W-4 | Wall btwn Gates W5, W6 (T-wall monoliths | Start | 29 | 58 | 13.6 | 90 | 1 | 36.2 | 1,460 | 3 | 15 | 2,433 | I | Gate monolith | Scour adjacent to wall |
| | | End | 29 | 58 | 27.9 | 90 | 1 | 31.8 | | | | | | | |
| W-5 | Wall between Gate W6 and Namasco Bldg | Start | 29 | 58 | 27.9 | 90 | 1 | 31.8 | 1,330 | 3 | 5 | 739 | I | Gate monoliths, T-wall, | Scour adjacent to wall |
| | to Gate W13 (T-wall, I-wall monoliths) | End | 29 | 58 | 38.6 | 90 | 1 | 34.8 | | | | | | I-wall | |
| W-6 | Wall btwn Gate W14 and Gate W15 (T-wal | Start | 29 | 58 | 40.7 | 90 | 1 | 33.8 | 300 | 2 | 5 | 111 | I | Gate monoliths, I-wall | Scour adjacent to wall |
| | and I-wall monoliths) | End | 29 | 58 | 43.4 | 90 | 1 | 33.1 | | | | | | | |
| W-7 | Gate W17 | Start/End | 29 | 58 | 48.6 | 90 | 1 | 32.7 | 30 | 1 | 3 | 3 | I | Gate monoliths | Scour adjacent to wall |
| W-8 | Gate W18 to Gate W19 | Start | 29 | 58 | 48.6 | 90 | 1 | 32.3 | 600 | 2 | 5 | 222 | I | I-wall | Scour adjacent to wall |
| | | End | 29 | 58 | 49.0 | 90 | 1 | 31.2 | | | | | | | |
| W-9 | Gate W19 to Gate W20 | Start | 29 | 58 | 49.0 | 90 | 1 | 31.2 | 200 | 4 | 5 | 148 | I | I-wall | Scour adjacent to wall |
| | | End | 29 | 58 | 50.7 | 90 | 1 | 25.4 | | | | | | | |
| W-10 | Gate W20 to GateW22 (adjacent to PS#19 | Start | 29 | 58 | 50.7 | 90 | 1 | 25.4 | 200 | 2 | 5 | 74 | I | I-wall | Scour adjacent to wall |
| | | End | 29 | 58 | 53.0 | 90 | 1 | 22.8 | | | | | | | |
| | | | | | | | | | | | | | | | |
| Florida Avenue to Hwy 90 (West side) | | | | | | | | | | | | | | | |
| W-11 | Gate W23 | Start/End | 29 | 58 | 56.2 | 90 | 1 | 27.9 | 30 | 4 | 15 | 67 | II | T-wall | Scour adjacent to wall |
| W-12 | Gate W2 to W3 | Start | 29 | 58 | 56.5 | 90 | 1 | 22.5 | 300 | 3 | 5 | 167 | I | I-wall | Scour adjacent to wall |
| | | End | 29 | 59 | 4.0 | 90 | 1 | 19.9 | | | | | | | |
| W-13 | Levee | Start | 29 | 59 | 4.7 | 90 | 1 | 23.4 | 150 | Scour repaired | | | II | | Scour repaired w/ aggregate |
| | | End | 29 | 59 | 4.8 | 90 | 1 | 25 | | | | | | | |
| W-14 | Gate W25B to Gate W26 | Start | 29 | 59 | 4.7 | 90 | 1 | 23.4 | 800 | Scour repaired | | | III | | Scour around gate W25B and |
| | | End | 29 | 59 | 8.0 | 90 | 1 | 38.2 | | | | | | | on P/S of Gate W26 |
| W-15 | Gate W26 to Gate W28 | Start | 29 | 59 | 8.0 | 90 | 1 | 38.2 | 500 | 5 | 10 | 926 | I | I-wall | Some scour backfilled by RR |
| | | End | 29 | 59 | 14.3 | 90 | 1 | 36.7 | | | | | | | |
| W-16 | Levee with I-wall (capped) | Start | 29 | 59 | 18.7 | 90 | 1 | 37 | 200 | Breach repaired | | | III | I-wall | I-wall rotated, breached, |
| | | End | 30 | 0 | 9.0 | 90 | 1 | 45.9 | | | | | | | and scoured |
| W-17 | Gate W29 | Start | 30 | 0 | 10.1 | 90 | 1 | 42.1 | 240 | 2 | 6 | 107 | I | I-wall | Scour adjacent to wall |
| | | End | 30 | 0 | 12.3 | 90 | 1 | 41 | | | | | | | |
| W-18 | Levee with I-wall (capped) | Start | 30 | 0 | 18.7 | 90 | 1 | 38.1 | 90 | 2 | 3 | 20 | I | I-wall | Scour adjacent to wall |
| | | End | 30 | 0 | 19.6 | 90 | 1 | 38.3 | | | | | | | |
| W-19 | Gate W32 to Gate W34 | Start | 30 | 0 | 20.7 | 90 | 1 | 38.6 | 220 | 1 | 2 | 16 | I | I-wall | Scour adjacent to wall |
| | | End | 30 | 0 | 26.1 | 90 | 1 | 40.4 | | | | | | | |

## *New Orleans East Area Plan*
## *Orleans Parish, LA*

The New Orleans East portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project is located in Orleans Parish, east of downtown New Orleans, and is bordered by Lake Pontchartrain, the Inner Harbor Navigation Canal (IHNC), and the Gulf Intracoastal Waterway (GIWW). This portion protects 44,700 acres of residential, urban, commercial, and industrial lands. Its levees are constructed with 10-foot crown widths with 1V on 3H side slopes and range in elevation from 13.8 - 19 ft NAVD 88. There are also floodwall segments along the line of protection that consist of sheetpile walls or concrete I-walls at approximately the same elevation  Numerous road and railroad closure structures occur at various locations throughout the line of protection.

The New Orleans East portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project was damaged by Hurricane Katrina in late August 2005.  The flood event produced storm surge levels that overtopped the existing protection along the Mississippi River Gulf Outlet (MRGO) and Gulf Intracoastal Waterway (GIWW).  Wave action also contributed to the failure.  Major breaching occurred along this stretch of levee, resulting in the levee's erosion and scouring.  In addition, there was damage to the railroad closure structure located in the South Point to GIWW levee segment.  The remainder of the levee protection system received less severe damage, primarily scouring on the land-side of floodwalls, localized scouring of earthen levees, and scouring of the tie-in at each closure structure.

Structural repairs to the project have been broken into three major components.  The first involves reconstruction of the portion of the hurricane protection system along the GIWW/MRGO (approximately 33,000 feet of earthen levee and floodwalls) with the same general alignment as its original construction (Figure 3).  Levee and floodwalls elevations would match authorized heights, returning the project to its previously constructed height. Approximately 700,000 yards of semi-compacted (475,000 cy) and un-compacted (205,000 cy) impervious materials will be needed to rebuild the levee along the MRGO.  The cross section used would be the same used during the most recent levee construction contract along this reach. The second repair would be to replace the I-wall segment at Pump Station 15, which ties it to its adjacent levee segments.  The third repair would be to construct a sheetpile floodwall along the same alignment as the original sheetpile segments.  Approximately 125 acres of turf would need to be established as part of the repairs.

The remaining work to be performed will be awarded as six additional contracts and consists primarily of repairing scoured areas throughout the remainder of the hurricane protection system, including repair of the damaged closure structures.  These repairs would require the placement of approximately 64,860 sf of sheetpiling, 39,000 cy of clay, 54,650 tons of riprap and  15,500 tons of rock.

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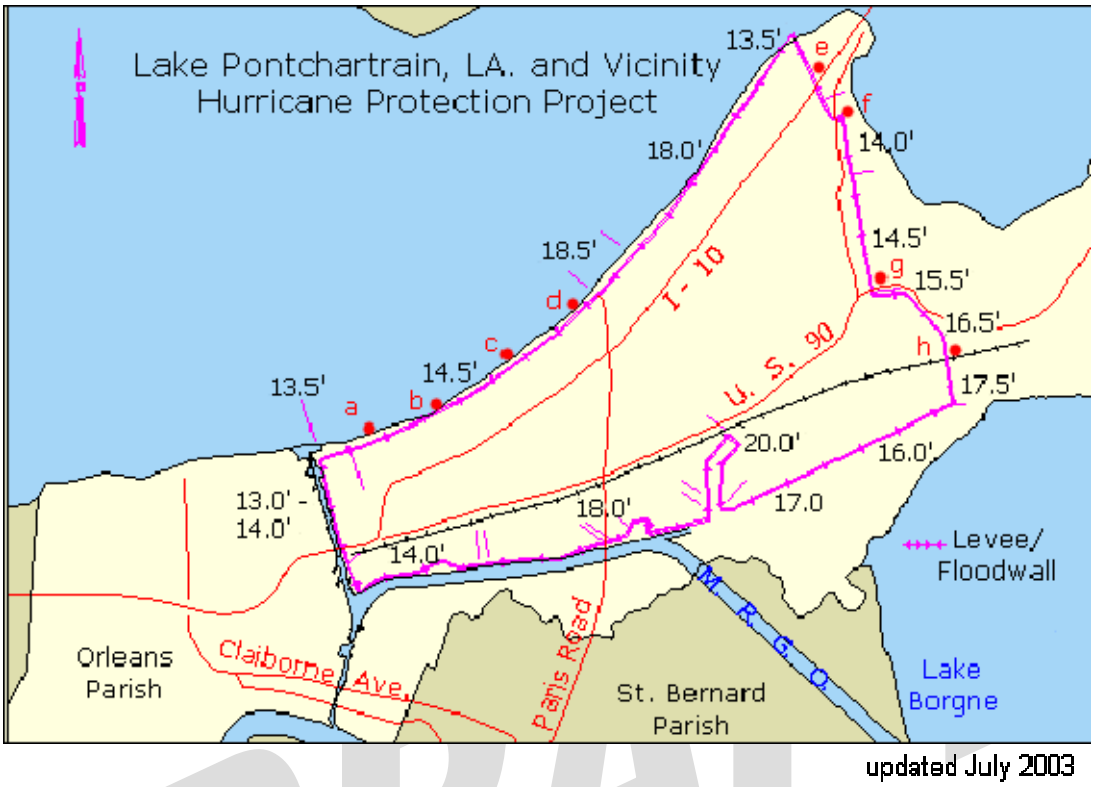
**Figure 3**
**Orleans East Hurricane Protection**

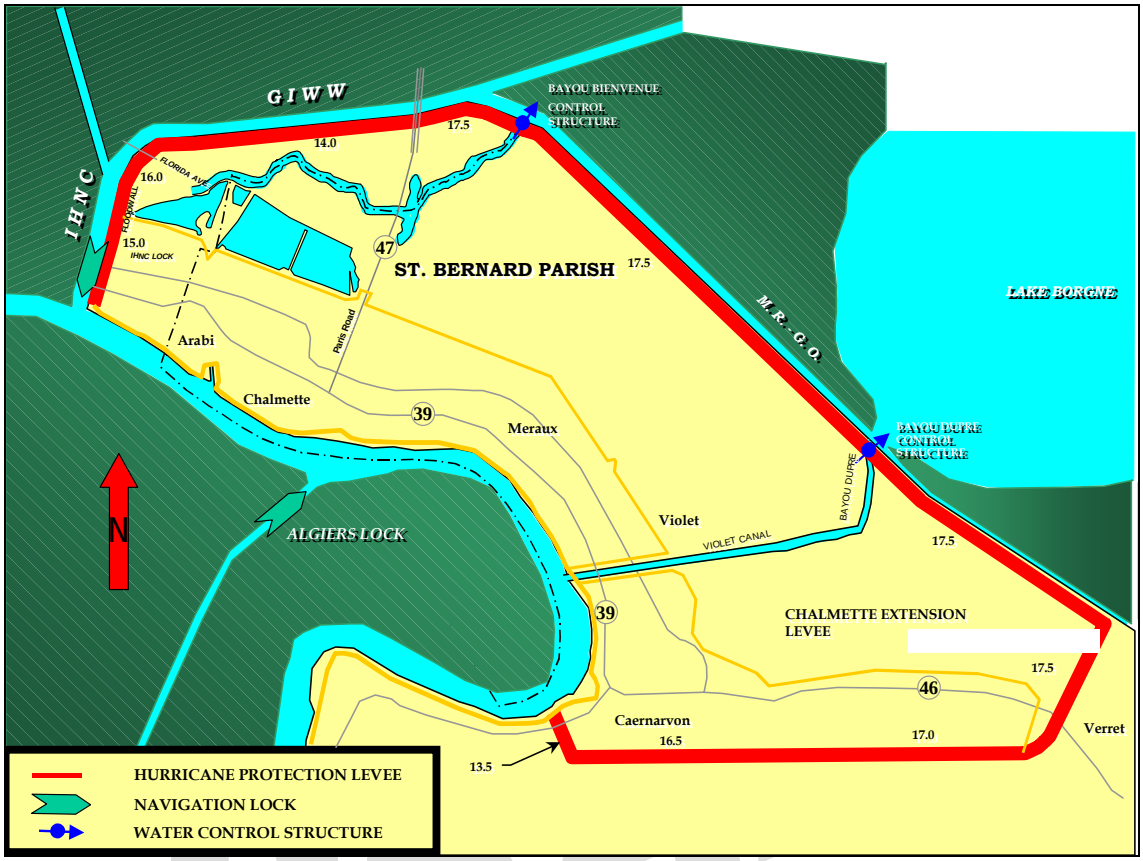



***Chalmette Area Plan***
***St. Bernard and Orleans Parishes, LA***

The Chalmette Area portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project is located in St. Bernard and Orleans parishes, east of downtown New Orleans, and is bordered by the Mississippi River, the IHNC, and the Mississippi River Gulf Outlet (MRGO). The project includes the towns of Violet and Chalmette and protects 75 sq. miles of urban and industrial lands in St. Bernard Parish and a small section of eastern Orleans Parish. Its levees are constructed with 10-foot crown widths with 1V on 3H side slopes and range in height from elevation 13.5 to 17.5 ft NAVD 88 (Figure 4). There are also floodwall segments along the line of protection that consist of sheetpile walls or concrete I-walls at approximately the same elevation. There are two control structures with sector gates that were constructed to allow tidal fluctuations in the marshlands behind the protection project. There are also six road closure structures located where highways or roads pass through the line of protection and one railroad closure. In addition, there is one gravity drainage structure along the southern section of the levee.

The Chalmette Area portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project was damaged by Hurricane Katrina in late August 2005. The flood event produced storm surge levels at the levee along the MRGO at approximately elevation 19.0 NGVD (El.19.0). Numerous breaches, scour, and severe erosion occurred along this stretch of levee as a result of overtopping. In addition, there was damage to the two control structures located in the levee segment along the MRGO.

**Figure 4**
**Chalmette Area Plan**



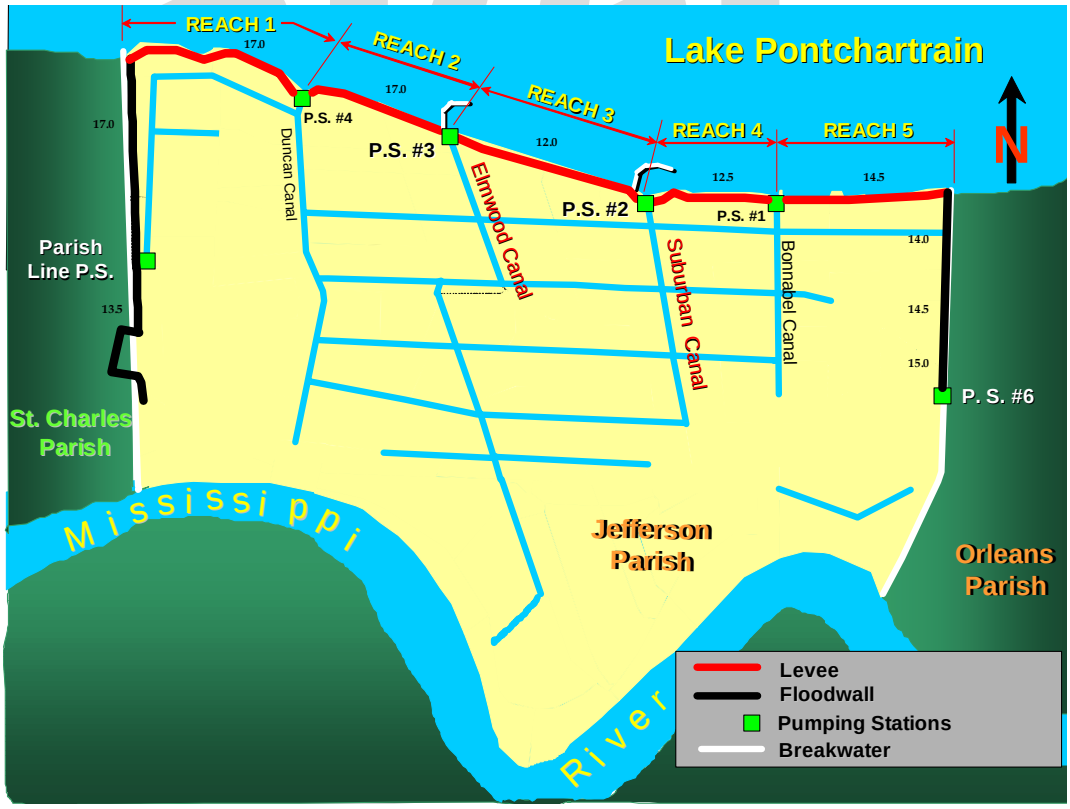

The repairs will consist of six major components. The first is to reconstruct the hurricane protection levee along the MRGO with the same general alignment and design as the original construction. Approximately 1.6 million cubic yards of impervious materials will be needed to construct the levee. The elevations of the levee will match the authorized project height (generally 17.5 ft NAVD 88), returning the project to its previous lift height plus overbuild. The sheetpile floodwall sections will be replaced with levee embankment. The cross section used will be that used during the most recent levee construction contract along this reach. The second component will be to repair the two control structures including the I-wall floodwalls that tie these control structures into its adjacent levee segments. The third component will be to replace the damaged and failed floodwalls along the IHNC with new T-Walls. The fourth component will be to repair the foundation by backfilling each of the four road closure structures that were overtopped. The fifth component will be to repair the Creedmore Drainage Structure by clearing the debris in the gatewell and replacing the sluice gate hoists and stems. The sixth component would be to repair the minor scour on the crown and backside of the levee running from Verret to Caernarvon. Minor scour repair is also needed adjacent to the railroad closure structure and the sheetpile floodwall, and one of the floodgate's pedestals and screw jack also needs repair. Other miscellaneous work includes removing marsh grass debris and re-establishing turf on damaged sections of the levee.

## *East Jefferson Bank*
## *Jefferson Parish, LA*

The East Jefferson portion of the Lake Pontchartrain, LA and Vicinity Hurricane Protection Project includes the area from the south shore of Lake Pontchartrain to the east bank of the Mississippi River between the St. Charles and Orleans Parish lines. It protects 28,300 acres of urban and industrial lands in Jefferson Parish. Its levee is constructed with a 10-foot crown width with side slopes of 1V on 3H. The top elevation of the earthen levees along the Lake Pontchartrain Lakefront ranges between 13 and 16 ft NAVD 88 (Figure 5). Its floodwalls were designed to provide lines of protection on the west side of the 17th Street Canal, the east side of the Kenner Return Levee Canal, and the south side of Lake Pontchartrain. These floodwalls consist of reinforced concrete T-walls and reinforced concrete I-walls and sheet piling without a concrete cap. Top elevations of the floodwalls vary between 14 and 15 ft NAVD 88.

The East Jefferson Bank Lakefront Hurricane Protection sustained damage by Hurricane Katrina in late August 2005. The flood event produced storm surge levels at the Lake Pontchartrain levee of ranging from 13.0 to 14.0 ft NAVD 88. Minor damages occurred along the Lakefront levees and floodwalls, the Kenner Return Levee, and the west side of the 17th Street Canal floodwall. The recommended plan is to rebuild the levees, floodwalls, and control structures to their authorized project grade.

**Figure 5**
**East Jefferson Bank Plan**



The repairs along the west side of the 17th Street Outfall Canal, that forms the eastern boundary of Jefferson Parish, will consist mainly of repairing foreshore protection, I-walls and bulkheads. The riprap at the base of the I-walls and the crushed stone adjacent to floodwalls will be replaced.

The bulk of the damage to the East Jefferson Parish Lakefront Levee is scour at the base of the floodwalls and displacement of lakeside stone protection from erosion. Stone protection and damaged concrete slope paving found in these areas will be replaced. Also, the base of floodwalls will be backfilled to prevent further scouring.

The Kenner Return Levee (including flood protection at Louis Armstrong airport) extends along the east side of the West Return Canal and forms the western boundary of Jefferson Parish in the city of Kenner. Flood protection along this reach consists of T-walls and I-walls. The bulk of the damage in this reach consists primarily of the settlement and rotation of a 1,600 ft reach of the floodwall. Its repair will initially consist of the installation of a temporary sheetpile wall that will then be used as part of the temporary retaining structure during construction of the permanent T-wall.

## *New Orleans to Venice, LA Hurricane Protection Project*

The New Orleans to Venice, LA Hurricane Protection Project (NOV) straddles the Mississippi River in Plaquemines Parish, Louisiana between approximate river miles 10 and 59. The NOV's West Bank extends 37 miles from St. Jude to Venice (Figure 6). Its back levees are divided into 4 reaches: Reaches A, B-1 (including a marine floodgate at Empire), B-2, and St. Jude to City Price. The NOV's West Bank reach also includes 34 miles of enlarged West Bank Mississippi River Levees. On the East Bank, the project extends from Phoenix to Bohemia and consists of 16 miles of enlarged back levees (Reach C). In total, the NOV protects approximately 15,600 acres of land, 75 percent of the population, and 75 percent of the improved lands in the project area.

**West Bank Features**

St. Jude to City Price - 3 miles of enlarged back levees from St. Jude to City Price (between approximate river miles 47.1 and 43.9 Above Head of Passes (AHP)).

Reach A - 13 miles of enlarged back levees from City Price to Tropical Bend and two 54" flap-gated culverts (between approximate river miles 43.9 and 30.7 AHP).

**Reach B-1** - 12 miles of enlarged back levees from Tropical Bend to Fort Jackson (between approximate river miles 30.7 and 20.5 AHP) and a marine floodgate at Empire.

Reach B-2 - 9 miles of enlarged back levees from Fort Jackson to Venice (between approximate river miles 20.5 and 10.4 AHP).

**West Bank River Levee (WBRL)** - 34 miles of enlarged West Bank Mississippi River levees from City Price to Venice (between Mississippi River miles 44 to 10 AHP) (Note: the lock at Empire is a State of Louisiana facility).

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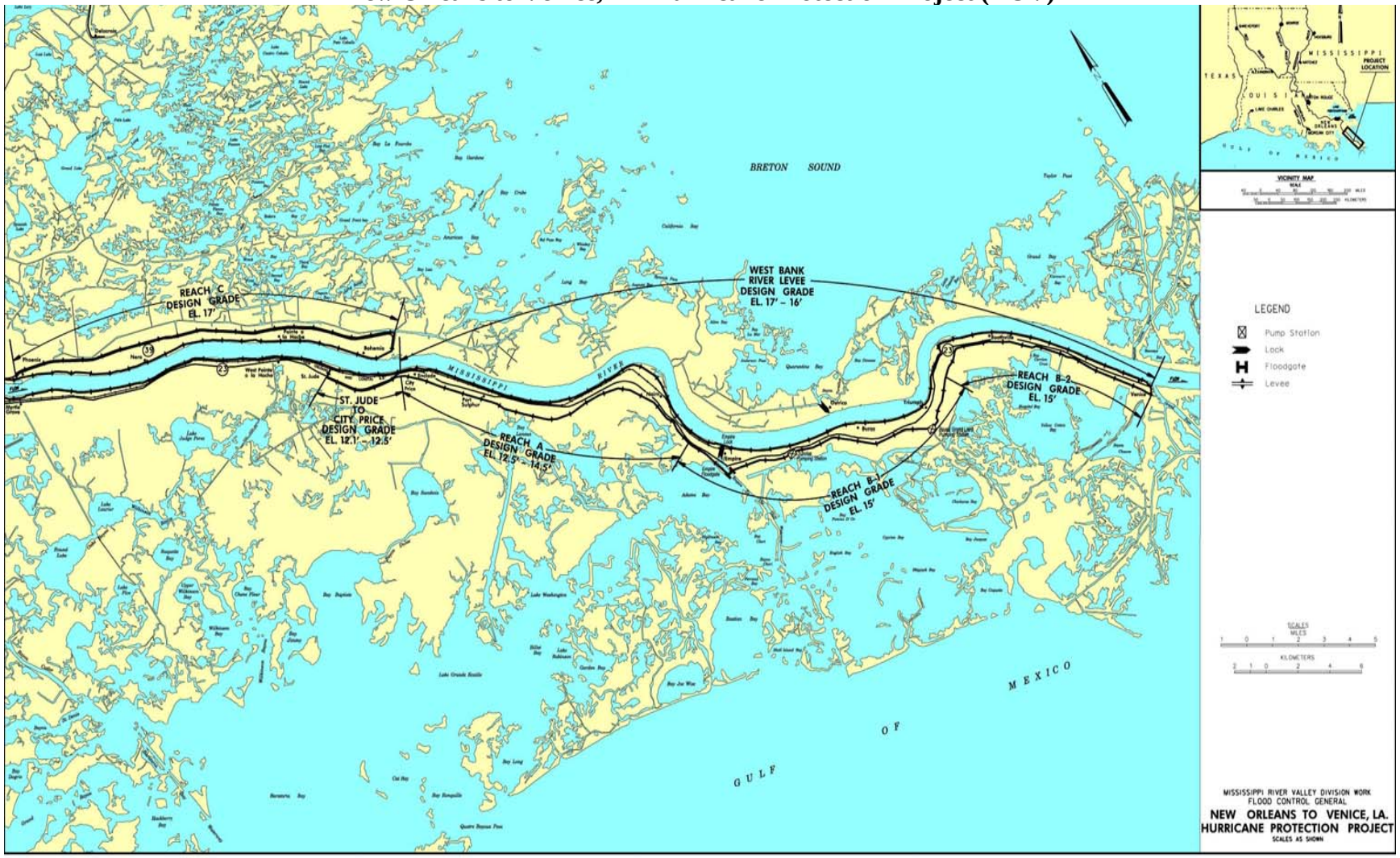
**Figure 6**
**New Orleans to Venice, LA Hurricane Protection Project (NOV)**



**East Bank Features**

**Reach C** - 16 miles of enlarged back levees from Phoenix to Bohemia (between approximate river miles 59.3 and 44.3 AHP) and 10 flap-gated culverts

Note: The NOV does not include the Mississippi River Levee (MRL) flood protection in Plaquemines Parish, which was constructed as part of the Mississippi River and Tributaries (MR&T). There are approximately 109 miles of MRL in Plaquemines Parish; of these, only 34 miles on the West Bank are also part of the NOV West Bank River Levee as enlarged for hurricane protection.

The NOV was damaged by Hurricane Katrina on August 29, 2005, when the storm made landfall near Buras-Triumph, which is part of Reach B-1. The surge from the storm exceeded the levees' constructed level of protection. The height of the existing hurricane protection on the back levees ranges from 12.1-12.5 ft NAVD 88 on the St. Jude – City Price reach to nearly 17 ft NAVD 88 on Reach C. The levees were overtopped and breached, resulting in erosion and scour along the East and West Bank back levees and the Mississippi River levees. In addition, there was damage to the floodgate at Empire and to the floodwalls along the MRL and back levees.

This recommended plan is to replace the damaged floodwalls with earthen landside enlargements. This plan provides for the replacement of floodwalls with an earthen levee section, consisting of a 1V on 4H riverside slope, a 10-foot wide crown at elevation 17 ft NAVD 88, and a 1V on 3H landside slope. The Mississippi River Levee will remain intact, and the floodside toe will not move. Only the configuration of the NOV protection will change in relationship to the Mississippi River Levee. The NOV levee centerline would be moved landward from its pre-Katrina location in order to maintain the authorized 1.3 factor of safety against failure into the river. The plan will require the following:

Commandeering of approximately 59 acres of land for levee landside enlargement design

- Impacts to 250 property owners
- Relocation of 0.75 miles of Hwy 23 in Port Sulphur
- Impacts to approximately 7 standing structures

Commandeering of approximately 108 acres of land for borrow material

- 45 acres at Myrtle Grove diversion channel
- 47 acres at Triumph
- 16 acres at Port Sulphur

## *PROPOSED WORK ON DAMAGED EAST BANK LEVEES*

1. Excavate and stockpile levee embankment materials at local sponsor-provided borrow areas for use in repairing the damaged levees. Allow the material to drain before it is hauled by truck to the damaged portions of the levees.

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2. Haul, spread, and compact the drained borrow material in the scour areas on the levee slopes and crown to return the project to its previous lift height plus overbuild on the completed reaches.

3. Slope pave the face of the levee breach below water level with riprap.

4. Fertilize and seed the freshly compacted embankment with a combination of annual rye grass and Bermuda grass seed.

5. Haul, spread, and compact crushed stone on the crown of the Mississippi River Levee for levee inspection vehicles.

## *PROPOSED WORK ON DAMAGED WEST BANK BACK LEVEES*

1. Remove approximately 90 feet of damaged I-wall protection abutting the Gainard Woods Pumping Station at NOV Reach A. (Significant scour occurred at the wall ends.) Drive new sections of steel piling to the required tip elevation and to the required design grade. Haul, spread, and compact embankment material. Fertilize and seed the freshly compacted embankment.

2. Remove approximately 55 feet of damaged I-wall protection in the vicinity of the Homeplace Marina at NOV Reach A. Drive new sections of steel sheet piling to the required tip elevation and to the required design grade. Haul spread and compact embankment material. Fertilize and seed the freshly compacted embankment.

3. Remove approximately 300 feet of damaged I-wall protection in the vicinity of the Freeport facility. Drive new sections of steel sheet piling to the required tip elevation and to the required design grade. Haul, spread, and compact embankment material. Fertilize and seed the freshly compacted embankment.

4. Repair T-wall to I-wall joints tying the NOV Reach A protection into Diamond Pump Station. These joints were damaged and disjointed.

## *PROPOSED WORK ON DAMAGED NOV FLOODWALLS*

1. Haul, spread, and compact levee embankment material on the landside berm of the existing levee. The enlargement will consist of a 45-ft wide wave berm, a 1V on 4H riverside slope, a 10-ft wide crown at elevation 17 NAVD 88, and 1V on 3H landside slope.

2. The enlargements will replace sections of damaged wall. Remove both capped and un-capped sheetpiles by burning the piles 2 feet below ground surface.

3. Fertilize and seed the freshly compacted embankment.

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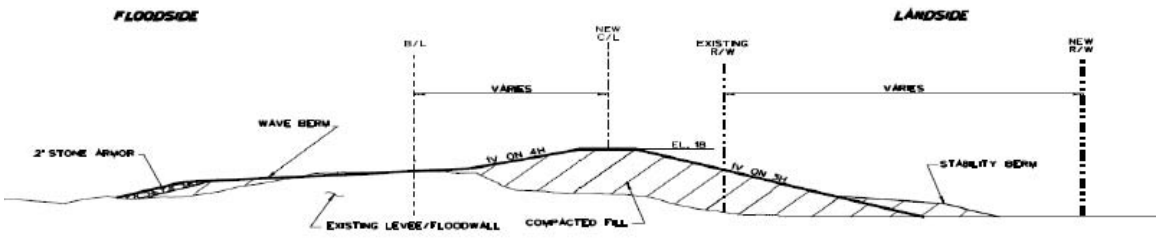


TYPICAL LEVEE SETBACK
NOT TO SCALE

## *LANDSIDE LEVEE ENLARGEMENTS*

B/L Sta. 236+00 to B/L Sta. 285+00

Clearing and Grubbing (33.3 acres)
Embankment, Semi-Compacted Fill 73,000 cy
Embankment, Un-Compacted Fill 12,000 cy
Surfacing 1,495 cy
Fertilizing and Seeding 14.0 ac
Mulching 14.0 ac

B/L Sta. 357+00 to B/L Sta. 650+00

Clearing and Grubbing (150 acres)
Embankment, Semi-Compacted Fill 225,000 cy
Embankment, Un-Compacted Fill 316,000 cy
Surfacing 8,139 cy
Fertilizing and Seeding 110.0 ac
Mulching 110.0 ac

B/L Sta. 650+00 to B/L Sta. 906+00

Clearing and Grubbing (80 acres)
Embankment, Semi-Compacted Fill 392,100 cy
Embankment, Un-Compacted Fill 200,000 cy
Surfacing 7,100 cy
Fertilizing and Seeding 63.0 ac
Mulching 25.0 ac

B/L Sta. 906+00 to B/L Sta. 1003+00
Clearing and Grubbing (60 acres)
Embankment, Semi-Compacted Fill 197,000 cy
Embankment, Un-Compacted Fill 87,000 cy

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Surfacing 2,695 cy
Fertilizing and Seeding 38.0 ac
Mulching 38.0 ac

Totals

Clearing and Grubbing 2,433 + acres
Embankment, Semi-Compacted Fill 887,100 cy
Embankment, Un-Compacted Fill 615,000 cy
Surfacing 19,429 cy
Fertilizing and Seeding 225 ac
Mulching 187 ac

# Pump Stations

Most of the developed areas in coastal Louisiana are protected from river flooding, storm surge, and tidal inflows by a network of levees. Although the levees provide protection to developed areas from external forces, they unfortunately also leave these same areas vulnerable to flooding from accumulated rainfall. Therefore, numerous canals and subsurface drainage features are employed within most leveed systems to collect and deliver storm water runoff to pump stations that discharge these waters primarily into adjacent wetlands. Many leveed areas are divided into sub-basins by natural and man-made barriers.

## *Orleans Pump Stations*

Orleans Parish is divided by the Mississippi River into east and west bank sections and is further subdivided by the IHNC to create four major parish basins: New Orleans East Bank, New Orleans East, Algiers, and the Lower Ninth Ward. Algiers is further divided into Lower Algiers and English Turn (Figure 8).

Orleans Parish pump stations were damaged by Hurricane Katrina when it made landfall near Buras-Triumph, immediately southeast of Jefferson Parish on August 29, 2005. The following outlines the damages that the pump stations incurred. The recommended alternative is to repair the stations to their pre-storm condition.

Pump Station No. 1. The pump station was flooded 1 foot above the operating floor. Repairs will consists of rewinding motors B, C, D, and E; replacing the inboard bearing for pumps G and F, the roof ridge line flashing, and the flooring and paneling in the control house; and repairing the roll-up door.

Pump Station No. 2. The pump station was flooded 15 inches above the operating floor and 5 inches above the floor in the control room. Repairs will consist of rewinding 4 motors (B, C, D, and E) and replacing both the inboard bearings in pumps F and G and the copper roof flashing. In the control room, the floor and wall paneling will also be replaced.

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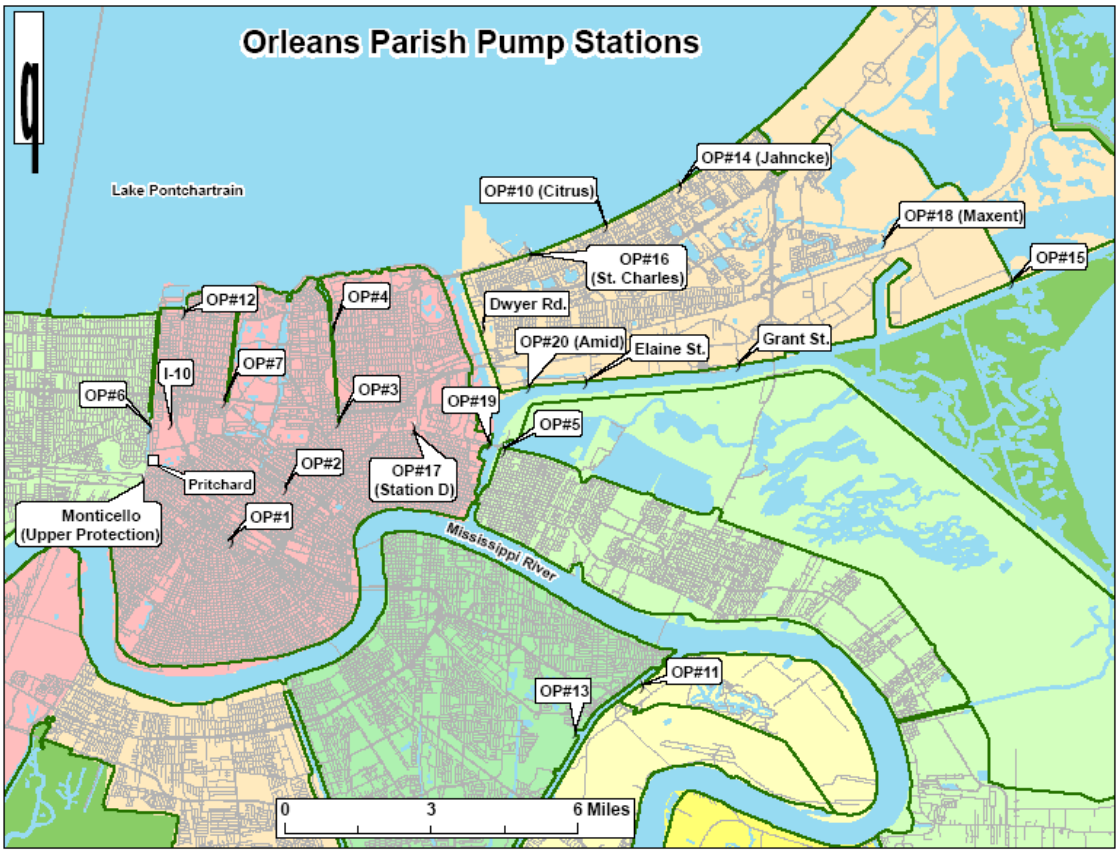
**Figure 8**
**Orleans Parish Pump Stations**




Pump Station No. 3. Water levels in the building were approximately 24 inches above the lower operating level and 6 inches above the upper operating level. The control room was flooded 12 inches above the floor level. Repairs will consist of rewinding 5 motors (A, B, C, D, and E). Pump D will require removal and inspection prior to any repairs. The roof of the pump station building will be repaired, and the flooring and wall panels in the operating room will be replaced. The site fence will be repaired as needed, and the storage building will receive a general cleaning and roof repairs.

Pump Station No. 4. Water levels in the building were approximately 12 inches above the floor level and 9 inches above the control room floor. Wiring in the basement will be replaced, as will the inboard bearings for pumps C, D, and E. The motors for the trash racks will require rewinding, and the gearboxes will be replaced. The control room flooring was damaged and requires replacement along with the fence and gates. The metal roof was also damaged.

Pump Station 5. The pump room was flooded to 9 feet above the operating floor, and the electrical equipment room was flooded to 4 feet above the operating floor. Pump motors A, B, and D were flooded and will require complete rewinding. All lighting and

low voltage wiring below the main floor area and equipment pits were submerged and will require replacement. The inboard bearing for pump D will be replaced, along with the entire fuel system. Motor and gear boxes for the trash racks were flooded and will be replaced. The entire asphalt shingled roof was damaged and requires replacement. The control room floor, doors, and windows were damaged by the floodwaters. The oil storage building was completely submerged, and the wood framed roof will require reconstruction, fascia, soffits, and exterior lighting.

Pump Station 6. Pump Station 6 has various floor levels with pumps, motors, and switchgear. Floodwaters reached levels damaging most of the electrical equipment. Pump motors C, D, E, and F were flooded and should be rewound. Motors for pumps A and B are being completely rewound by the SWB. The inboard bearings for pumps G, H, and I require replacement. The suction bay has a significant build-up of silt and trash and needs to be cleaned out. Damage to the roof, fencing, and gates was also evident.

Pump Station 7. Water levels in the building were 28 inches above the operating floor. Pump motors A and C require complete rewinding. There was some scour at the northwest corner of the stations. The station wall is cracked. The control was flooded and requires new paneling and flooring. The fence was damaged, and the suction bay contains a significant amount of silt and trash.

Pump Station 12. The floodwater in the station was 25 inches above the slab on grade, and peak water levels were significantly higher. The floor level of the build is about 15 inches higher than the exterior slab on grade. Pump D will be inspected and repaired. The office floor, doors, and window need replacement.

Pump Station 17 (D). Floodwaters inside the build reached a height of 2 feet. The motors for drainage pumps A and D and four motors for frequency changes 3 and 4 were submerged and will require rewinding. Medium voltage switchgear was flooded and requires replacement. The vacuum pump and ventilation fan unit was damaged. Three rollup doors were damaged, and the control room and restroom floor and paneling were damaged. Finally, the 48-inch discharge line was damaged near Claiborne Ave and at the river; this line will require repairs.

Oleander (Monticello) Pump Station. The building was not flooded; however, the wind damaged some ceramic ridge tiles.

Pritchard Place Pump Station. The building was not flooded; however, some wind and water damaged the generator muffler insulation, fuel line, and roof, and some scour developed near the discharge line.

I-10 Underpass Pump Station. While floodwaters inundated the first floor, the operating floor was not flooded. The bearings for pumps 1, 2, and 3 require replacement because raw water was used to operate the pumps when clean water was not available during the storm. The waste oil system and the sump pump controls were damaged,

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along with the expansion joint of the 12-inch discharge line. Building damage consists of roof leaks and damaged ceiling tiles, doors, and fencing.

Carrollton Frequency Changer. Floodwaters reached a height of 2 feet above the floor slab. The operating level is about 5 feet above the first floor. However, the motor pits were flooded inside the building, and the transformers outside received about 2 feet of water. The four frequency changers motors require full rewinding, along with conductors in the pits, and the battery rack and drip pans require replacement. The outdoor electrical equipment requires cleaning and repairs.

Pump Station 11. While the station was not flooded, high winds damaged the roof, necessitating its total replacement. Rainwater damage consists of damage to the acoustic ceiling in the control house. The switchgear and motor control centers were damaged by the rainwater and require replacement.

Pump Station 13. The basement was flooded, but the operating floor was above the floodwaters. Roof damage allowed rainwater to damage switchgear. Low voltage wiring, switches, and lighting in the sump were damaged, along with sump pumps. Wind damaged the roof, skylights, gutters, rollup doors, screens intake pipe, and vent stakes.

Pump Station 10 Citrus. Floodwaters did not reach the operating floor of the station. However, 75 percent of the roof was damaged, causing rainwater damage in the stations. Damaged switchgear and motor control centers will require repair or replacement. The bearings for pumps 1, 2, 3, and 4 require replacement. Trash screen motors were flooded. Building damage consists damage to the roof, gutters, downspouts, control room ceiling tiles, and security fence.

Pump Station 14 Jahncke. The pump motors, diesel generator, and switchgear are on an elevated platform approximately 15 feet above grade and were not flooded. The trash rack motors were flooded. The float house was flooded, damaging the low voltage wiring, switches, and lighting. The motor control center, controls, and sump pump were damaged. Because clean water was not available during the storm, the pump was run with dirty water, and the bearings for pumps 1, 2, 3, and 4 were damaged. The vacuum system was damaged from pumps 2 and 4. The entire float built up roof and copper flashing were damaged. The building's concrete block was damaged structurally. The control room was damaged by rainwater, and the fence was damaged by the wind. The float house roof was damaged and requires replacement.

Pump Station 15. Floodwaters were approximately 2 feet below the operating floor. Because clean water was not available after the storm, raw water was used to lubricate the bearings. The dirty water caused damage to the bearings for pumps 1, 2, and 3. The gearboxes for the three pumps also require service. Damage to the building consists of damage to the basement level doors, fence, roof vents, and trash rack supports.

Pump Station 16 St. Charles. The operating floor was not flooded, but the float house was. The screen motors and starters and gearboxes require replacement, as do low

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voltage wiring, switches, and light fixtures in the basement of the float house. The auto/manual controls in the pump house were damaged. The sump pump requires replacement. Bearings were damaged on three pumps. Building damage consists of damage to the entire flat built-up roof; structural damage to the concrete block wall; and damage to floor tiles, interior walls, and ceilings due to rainwater. The fence was destroyed, as was the air conditioner located on the roof.

Pump Station 18, Maxent. The floodwater was below the operating floor. The chain link fence was damaged.

Pump Station 19. The station has three levels: the ground level, the second level, and the control level. Floodwaters reached 18 inches above the ground level. Everything at that level will require replacement, including the sewer grinder pump and the sump pump. The pump bearings for vertical pumps 1 and 2 and horizontal pump 2 require replacement. The hydraulic oil system needs to be drained, tested, and replaced. One ventilation fan is damaged, as is the pipe railing around the suction basin. The roof is leaking, and the chain link fence is damaged. Evident erosion around the building will require fill material and replacement of sidewalks, pavement, and curb and gutter.

Pump Station 20 Amid. The operating floor is elevated about 15 feet above grade. The underneath portions were flooded with about 7 to 10 feet of water. The trash rack motors, starters chains, and bars were damaged. The generator was flooded. Pump 2 has damage to the impeller. Scour is evident around the building, and the access road and parking lot need fill and aggregate. One wall of the generator building will require replacement. The roof of the office building is damaged and will require replacement. The chain link fence and light poles were also damaged.

Pump Station Elaine. The station's electric pump motors and vacuum pump motors were submerged under 8 feet of water. They will require replacement. The bearings for pumps 1 and 2 require replacement. The site has considerable scour and will require fill material. A steel door will not open, and tie down straps on the outlet pipes are damaged. Additionally, a 12-foot steel support member has collapsed.

Pump Station Grant. The station has outdoor pumps 1, 2, 3, and 4, along with pumps 5 and 6 enclosed in a raised pump house. The outdoor pumps are lower than the pump house and were flooded. The four outdoor pump motors should be rewound. All lighting and low voltage power and devices below the platform require replacement. The switchgear and motor controls require replacement. The bearings for the four outdoor pumps require replacement. Scour is evident at the site, and fill and aggregate are required, along with the replacement of pavement. Roof flashing and site fencing were damaged.

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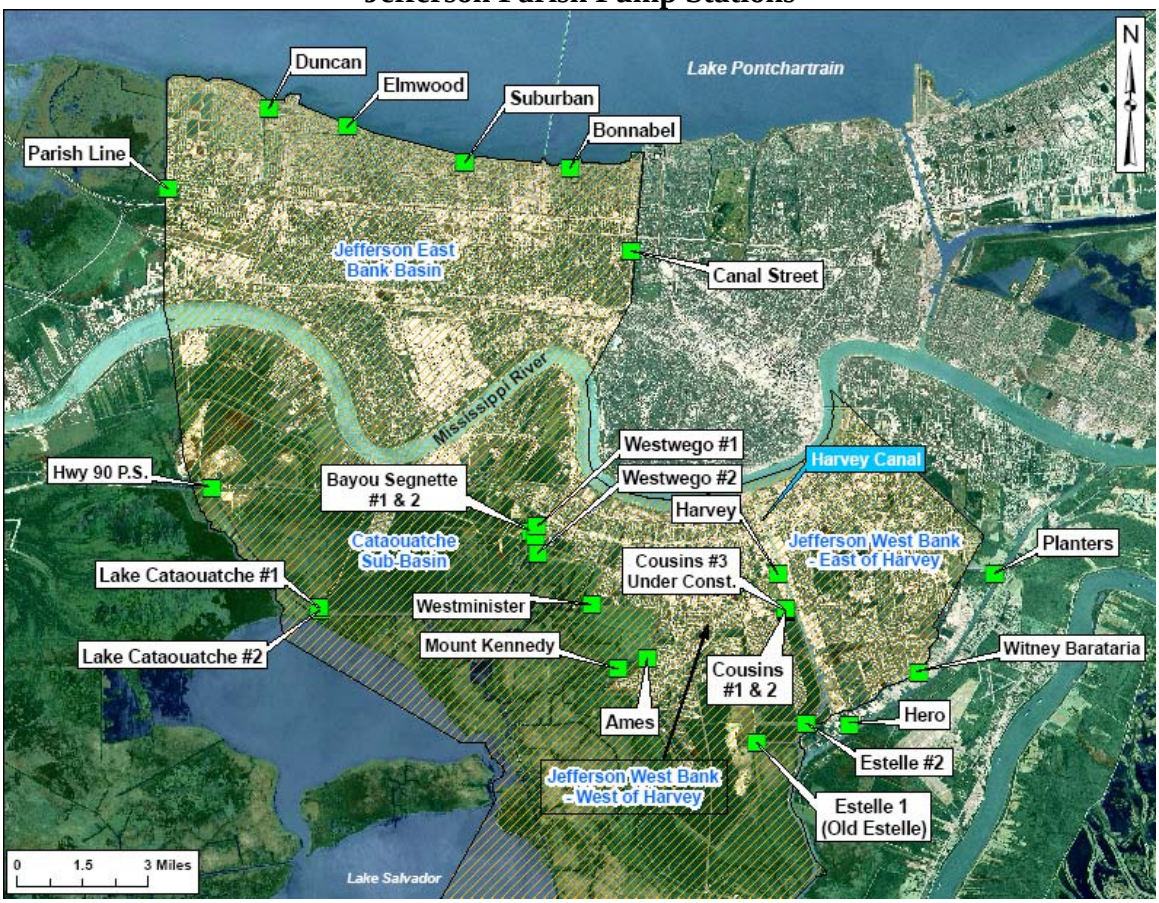
## *Jefferson Parish Pump Stations*

Jefferson Parish is divided by the Mississippi River into east and west bank sections. The west bank section is further subdivided by the Harvey Canal, resulting in three major parish basins: Jefferson East Bank, Jefferson West Bank - East of Harvey Canal, Jefferson West Bank - West of Harvey Canal (Figure 9).

**Figure 9**
**Jefferson Parish Pump Stations**




The pump stations in Jefferson Parish were damaged by Hurricane Katrina when the storm made landfall near Buras-Triumph immediately southeast of Jefferson Parish on August 29, 2005. The recommended alternative is to repair these stations to their pre-storm condition.

<u>Bonnabel Pump Station.</u> Damage to the pump station includes damage to the roof (6,300 sq. ft.), gutters, louvers for exhaust fans and generator, vent pipes for the fuel day tanks, lightning rods and cables, and heating elements for the interior heaters.

<u>Suburban Pump Station.</u> Damage to the station consists of two control panels for the sump pumps, doors, and flapper for exhaust cover, lighting, and motor operated valves.

Elmwood Pump Station. Damage to the station consists of damage to the roof, windows, vent stack, exhaust covers, and lighting.

Duncan Pump Station. Damage to the pump station includes damage to the roof (7,700 sq. ft.), gutters, exhaust covers, lightning rods, cables, and exterior lighting.

Ames Pump Station. Damage to the station consists of extensive damage to the skylight wall panels and flashing and minor damage to the GenSet enclosure.

Bayou Segnette No. 1. Damage consists of minor damage to the corrugated metal roof.

Bayou Segnette No. 2. Damage consists of minor damage to the building's gutters.

Cousins No. 1. Damage to the building consists of three broken windows.

Cousins No. 2. Damage to the station consists of damage to the roof (6,000 sq. ft.), gutters, lightning rods, and exhaust fan covers.

Estelle No. 1. Damage to the station consists of damage to the trash rack, office door, corrugated metal roof, light pole, exterior lighting, lightning rods, and fuel line.

Harvey. Damage consists of damage to the louvers and roof.

Hero. Damage to the station includes damage to the roof, vents, flashing, exhaust stacks, and electric cable tray.

Planters. Damage consists of damage to the skylight wall panels, flashing, and roof.

Lake Cataouatche No. 2. Damage consists of damage to the corrugated fiberglass skylight panel and roof.

Whitney Barataria. Damage to the station consists of damaged gutters, flashing, roof ridge cap, metal guard for electrical wiring, controller for a GenSet, lightning rods and fence.

Westwego No. 1. Damage to the station consists of damage to the roof and windows.

Westwego No. 2. Damage to the station consists of broken windows and a leaking roof.

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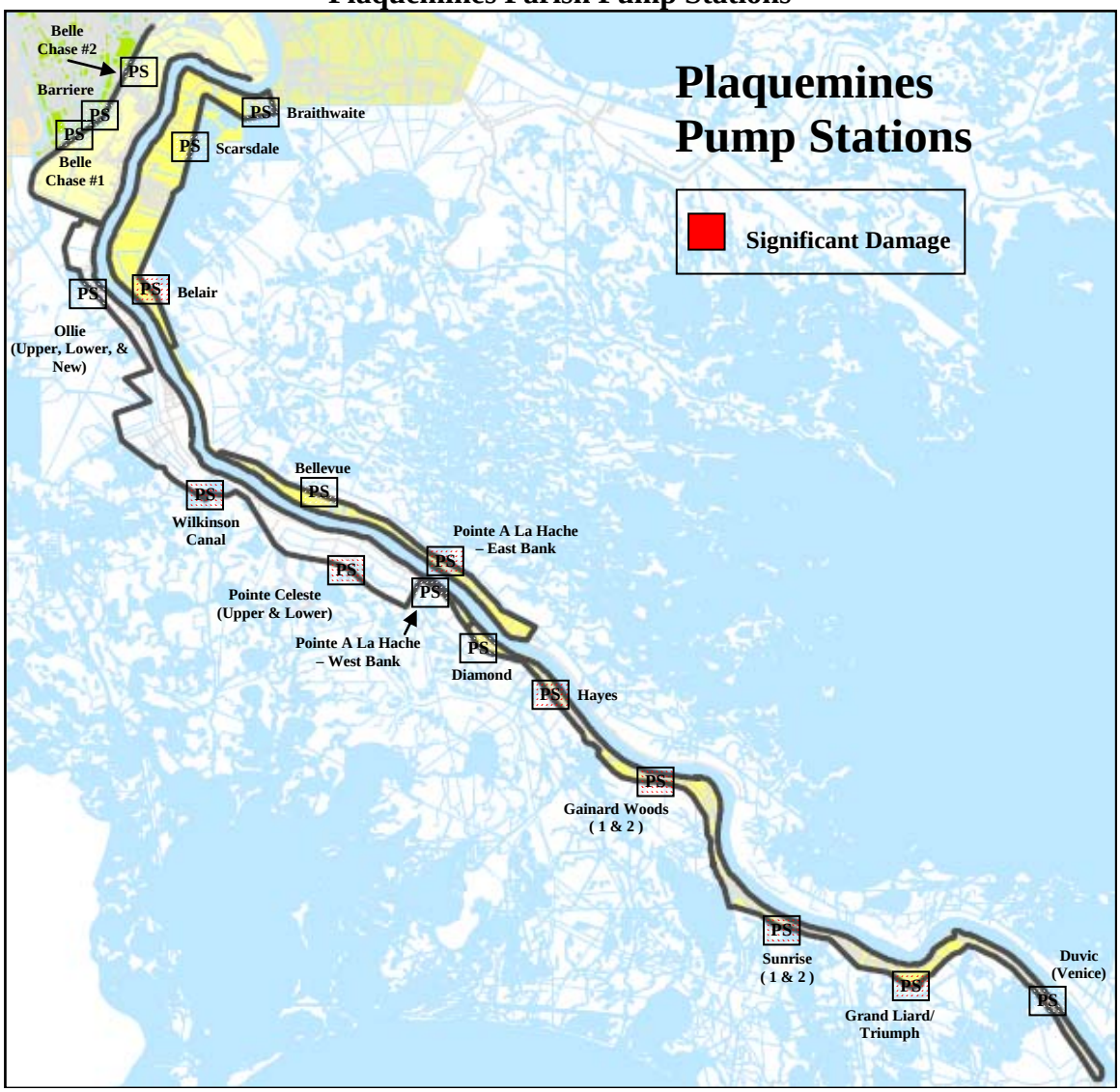
## *Plaquemines Parish Pump Stations*

Plaquemines Parish is divided by the Mississippi River into east and west banks. Plaquemines Parish Government has 16 pumping stations located on either side of the Mississippi River. Five pump stations are located on the east bank of the Mississippi River, and 11 are on the west bank. In addition, there are two pump stations on the west bank owned and operated by a private interest, Citrus Lands Corporation (Figure 10).

**Figure 10**
**Plaquemines Parish Pump Stations**




Plaquemines Parish's pump stations were damaged by Hurricane Katrina when the storm made landfall near Buras-Triumph on August 29, 2005. Overtopping and breaching of both the east and west bank back levees and the Mississippi River levees occurred, causing significant flood damage to the pump stations. The pump stations also experienced damage from the high winds and wind-driven water. It is recommended that

this project undergo structural repair and that its diesel engines be elevated as described below.

FEMA tasked the Corps to repair the roofs of the pump stations under Mission Assignment Number 21, Critical Facilities Program (JFO-973 Tasker, see Appendix I). The repair work began in November and is scheduled to conclude in December 2005.

*EAST BANK*

Braithwaite Pump Station. Repairs to this station will include mechanical and electrical equipment items consisting of a generator, engine cooling system, fuel tanks, and fuel piping. Pump station building and site repairs will consist of handrail and intake screen repairs.

Belair Pump Station. The engine at the Belair Pump Station was flooded and cannot be repaired. The new engine cannot be elevated within the existing station; therefore, a new pump house will be constructed adjacent to the existing stations. The elevation of the slab will be at approximately the same elevation as the back levee. The dimensions of the building slab will be approximately 15 feet by 20 feet, and the design will include a prefabricated metal building to house the replacement engine. The pumping system will be converted to a hydraulic pump system, allowing the use of the existing pump and intake and discharge piping. Associated electrical equipment will be added, along with the fuel tank and fuel piping system. Intake screens will be repaired, and the perimeter fence will be replaced. The roof is being repaired under FEMA Tasker JFO-973, dated October 4, 2005. Finally, the access bridge to the station was damaged and has been rebuilt by the National Guard.

Scarsdale Pump Station. Repairs to this station will include replacing mechanical and electrical equipment items consisting of the basement sump, electrical panel and wiring, and fuel lines and rebuilding the chain drives. Pump station building and site repairs will consist of door and window repair, general site clean-up, intake screen repair, and perimeter fence repair. The roof is being repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Bellevue Pump Station. Repairs to this station will include repairing mechanical and electrical equipment items consisting of the basement sump and grease lube motor, rebuilding the lower bearing in the chain drive, and replacing the heating and lighting system. Pump station building and site repairs will consist of replacing the roll-up door and repairing the windows, perimeter fence, entrance gates, and intake screens. The roof is being repaired under FEMA Tasker JFO-973, dated October 4, 2005.

East Point a la Hache Pump Station. Repairs to this station will include repairing mechanical and electrical equipment items consisting of the drain pump, basement sump, generator, heating system, and electrical panel and replacing wiring, diesel engine, and fuel lines. Pump station building and site repairs will consist of door and window repair, intake screen repairs, general site clean-up, the addition of fill material eroded by the

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storm, and perimeter fence and entrance gate repair. The engines will be raised within the existing building approximately 6 to 7 feet above the floor slab. The roof is being repaired under FEMA Tasker JFO-973 dated October 4, 2005. The masonry block wall will be repaired under a separate FEMA Tasker.

*WEST BANK*

Barrier Road Pump Station. No repairs to this station are anticipated.

Belle Chasse Pump Station No. 1. Pump station building damage consists of damage to the roof and missing roof vents, windows, and storm shutters. The roof is being repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Belle Chasse Pump Station No. 2. Pump station building and site repairs will consist of building roof and trim repair. These repairs are being performed under FEMA Tasker JFO-973, dated October 4, 2005.

Ollie Pump Stations. Damage at the Ollie Pump Stations is limited to repairing the security fence. The roof and siding is being repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Diamond Pump Station. Repairs to this station will include replacing damaged electrical equipment items consisting of a generator, compressor motor, and electrical service and lighting. Pump station site repairs will consist of repairing or replacing the intake screen, guard railing, and fence and adding fill and gravel to repair eroded areas. Roof and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

West Point la Hache Pump Station. Repairs to this station will include replacing mechanical and electrical equipment items consisting of electric motor for pump, electrical panel and wiring, and intake screens. Pump station building and site repairs will consist of security fence and walkway repairs and site clean-up. Roof and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Hayes Pump Station. Repairs to this station will include replacing mechanical and electrical equipment items consisting of vacuum pump, air compressors, generator, diesel engine, electric panel and wiring, heating system, and canal screens. Pump station building and site repairs, including some undermining of the building foundation, will consist of repairing the door and window and the perimeter fence and gate. The two diesel engines will be elevated approximately 6 to 7 feet within the existing building. A hydraulic motor and pump will be added, negating the need for the engine shaft to align with the pump shaft. Roof and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Gainard Woods Pump Station. The Gainard Woods Pump Station consists of two separate buildings, Gainard Woods No. 1 and Gainard Woods No. 2. Repairs to these

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stations will include replacing mechanical and electrical equipment items consisting of air compressors, generator, diesel engine, fuel tank structure, electrical panel and wiring replacement, area lighting, heating system, and intake racks. The two diesel engines in Gainard Woods No. 1 will be elevated approximately 6 to 7 feet within the existing building. A hydraulic motor and pump will be added, negating the need for the engine shaft to align with the pump shaft. Roof, wall, and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Sunrise Pump Station. The Sunrise pumping facility consists of two separate buildings, Sunrise No. 1 and Sunrise No. 2. Repairs to these stations will include replacing mechanical and electrical equipment items consisting of air compressors, generator, diesel engine, fuel tank structure, electrical panel and wiring, area lighting/utilities, and intake racks. Pump station building and site repairs will consist of repairing the building roof and roof trim, wall, door, window, handrails, and perimeter fence and gate. The two diesel engines in Sunrise No. 1 will be elevated approximately 6 to 7 feet within the existing building. A hydraulic motor and pump will be added, negating the need for the engine shaft to align with the pump shaft. Roof, wall, and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Grand Liard/Triumph Pump Station. This facility consists of two stations, Grand Liard and Triumph. Repairs to these stations will include replacing mechanical and electrical equipment items consisting of air compressors, generator, diesel engine, fuel tank structure, electrical panel and wiring, area lighting/utilities, and intake racks. The single diesel engine at Triumph will be elevated approximately 6 to 7 feet within the existing building. A hydraulic motor and pump will be added, negating the need for the engine shaft to align with the pump shaft. Roof and trim damage will be repaired under FEMA Tasker JFO-973, dated October 4, 2005.

Duvic Pump Station. Repairs to this station will include replacing electrical service. Site repairs will consist of repairing the perimeter fence and gate and the intake screen. Pump station building repairs will be repaired under FEMA Tasker JFO-973, dated October 4, 2005. The damaged approach slab for the bridge will be repaired by the National Guard.

## *CITRUS LANDS DRAINAGE AREA (PRIVATE)*

Pointe Celeste Pump Station. Repairs will consist of replacing two diesel engines.

Wilkinson Canal Pump Station. Repairs will consist of replacing one diesel engine and one broken impeller.

The parish uses a backhoe to remove debris from the trash racks. This backhoe is used at multiple stations. During the storm event, the backhoe was flooded with salt water. The parish maintains that the backhoe is critical to efficient pump station operations because it is used to clear debris for the trash racks at the various stations. Further investigation will determine if it is repairable. If possible, repairs will be made.

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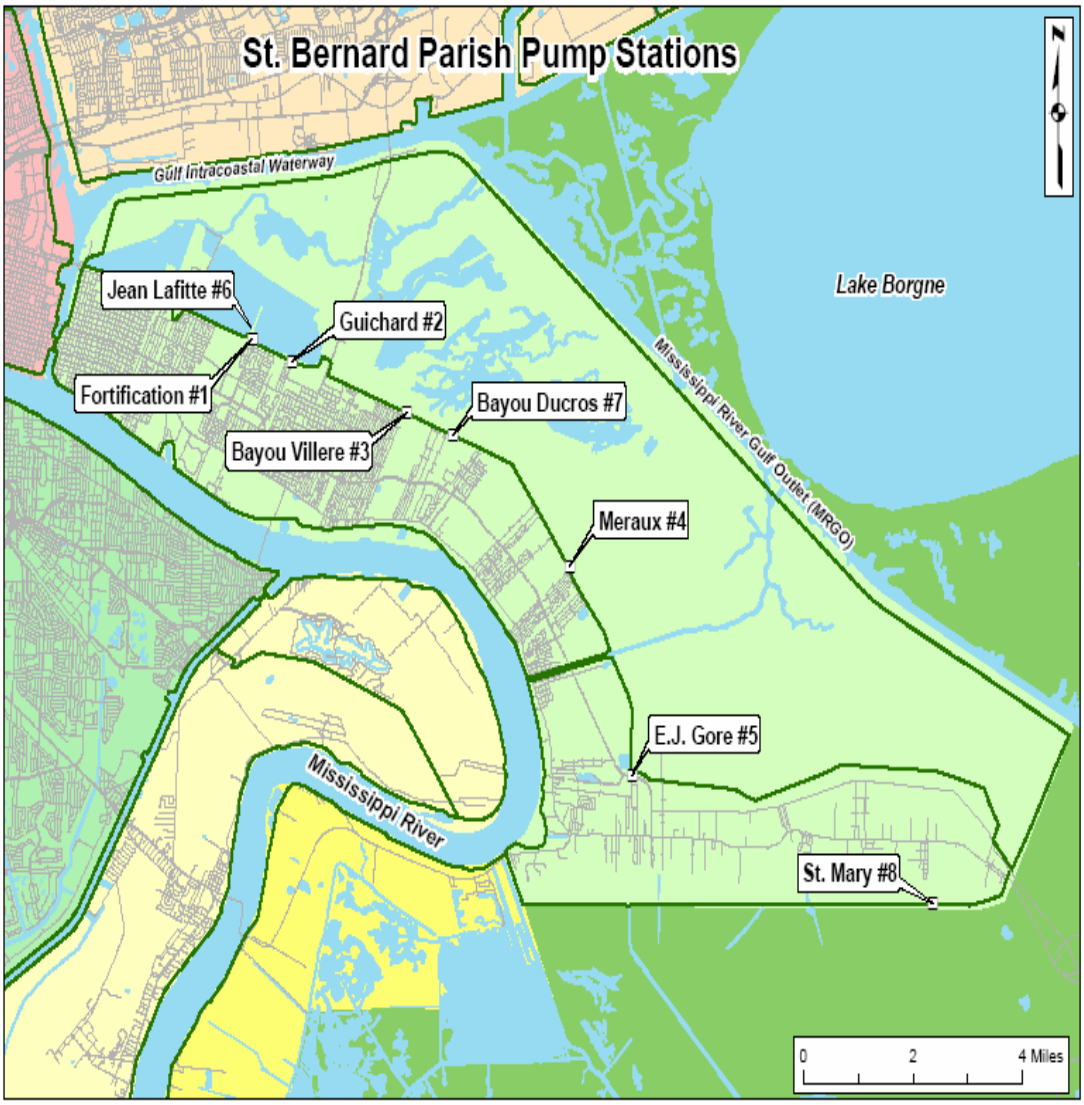
If the backhoe cannot be repaired, new equipment will be purchased, and the damaged equipment salvaged by the Government.

### *St. Bernard Pump Stations*

St. Bernard Parish is on the east bank of the Mississippi River south of and contiguous to the city of New Orleans. The area is protected from Mississippi River and hurricane surge flooding by the Mississippi River Levee and by the Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project. The Lake Borgne Basin Levee District owns and operates eight pump stations located along the interior back levee. St. Bernard's pump stations were damaged by Hurricane Katrina when the storm made landfall near Buras-Triumph, immediately southeast of St. Bernard Parish, on August 29, 2005 (Figure 11).

**Figure 11**
**St. Bernard Pump Stations**



Five of the eight pump stations were only partially affected by flooding from the storm event. The operating floors of these five pumps stations were elevated approximately 12 feet above the ground surface, thereby avoiding the floodwaters. Three stations constructed at the elevation of the protected side toe of the interior back levee had an operating floor only marginally above natural ground and were completely inundated. They will require major rehabilitation/replacement. These three stations, Pump Stations 2, 3, and 5, provide approximately 20 percent of the system's drainage capacity.

The recommended alternative is to repair or replace damage caused by Katrina at Pump Stations 1, 4, 6, 7, and 8; to construct a new elevated building for Pump Stations 2 and 3; and elevate the diesel engines in place at Pump Station 5.

Pump Station 1—Fortification. Pump Station 1 sustained relatively minor damage because its operating floor elevation is 16 feet NGVD. Flooding from the storm flooded the lower level of the station, but the floodwaters were approximately three feet below the concrete operating floor level. Pump station equipment that was damaged includes an electric pump motor, generator, trash rack bearing and gearbox, and lighting. The building sustained damage to the metal siding and roof, and the diesel engine cooling system developed a leak. Auxiliary equipment damage included flooding of a bobcat used to remove debris from the trash racks.

Pump Station 2—Guichard. Pump Station 2 sustained substantial damage. With its operating floor at or near the natural ground elevation, the pump station was flooded to a depth of 6 to 7 feet. The four diesel engines were flooded along with control panels, compressors, motors, and vacuum pumps. The diesel fuel storage tank was moved off its concrete saddle foundation. All exterior and interior lighting was damaged. While the existing building was in poor condition prior to the storm, the wind and water caused additional damage to all four sides of the building and the building roof.

Pump Station 3—Bayou Villere. With its operating floor at or near the natural ground elevation, Pump Station 3 was flooded to a depth of 8 feet and sustained substantial damage. The three diesel engines and hydraulic drives were flooded, along with the vacuum pump system and ancillary equipment. The diesel fuel storage tank was moved off its foundation. All exterior and interior lighting was damaged. While the existing building was in poor condition prior to the storm, the wind and water caused additional damage to all four sides of the building.

Pump Station 4—Meraux. Pump Station 4 sustained relatively minor damage because its operating floor elevation is 16 feet NGVD. Flooding from the storm flooded the lower level of the station, but the floodwaters were approximately three feet below the concrete operating floor level. Pump station equipment that was damaged includes an air compressor, electomode heater, controller for compressed air dryer motor, and generator. The building sustained damage to metal siding and roof. Finally, one discharge flap gate was damaged and is not operational.

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Pump Station 5—E.J. Gore. Pump Station 5 sustained substantial damage. With the operating floor at approximately 2 feet NGVD, flood waters within the building reached a height of approximately 6 feet. The hydraulic pumps were damaged, along with the six diesel engines. The generator and the electric pump motor and its controller were flooded. The hydraulic oil tank is not on its foundation and is contaminated with salt water, as is the fuel system. The trash rack bar screens are damaged, along with the slope pavement adjacent to the discharge pipes. Building damage includes damage to the rollup door, roof, and building office and restroom facility.

Pump Station 6—Jean Lafitte. Pump Station 6 sustained relatively minor damage because its operating floor elevation is 16 feet NGVD. Flooding from the storm flooded the lower level of the station, but the floodwaters were approximately three feet below the concrete operating floor level. The building damage consists of damaged roof panels. Mechanical damage includes damage to the trash rack gearboxes, trash removal equipment, engine exhaust flappers, and sanitation plant. Electrical damage consists of damage to lighting and the remote engine alarm panel.

Pump Station 7—Bayou Ducros. Pump Station 7 sustained relatively minor damage because its operating floor elevation is 16 feet NGVD. Flooding from the storm flooded the lower level of the station, but the floodwaters were approximately three feet below the concrete operating floor level. Bearing and gears for the trash racks were damaged. Auxiliary equipment damage included flooding of a bobcat used to remove debris from the trash racks, fuel tank, and sanitation plant. Pump damage consists of a broken drain line. Engine damage consists of damage to an engine cooling motor, radiator leak and remote engine alarm panel. Two areas had some erosion including scour behind the station and near the west end stairs.

Pump Station 8—St. Mary. Pump Station 8 sustained relatively minor damage because its operating floor elevation is 16 feet NGVD. Flooding from the storm flooded the lower level of the station, but the floodwaters were approximately eight feet below the concrete operating floor level. Building damage consists of loose roof panels, scour near the discharge pipes, damaged light fixtures, and damage to the sewage aerator motor. Bearing and gears for the trash racks were also damaged. Damaged auxiliary equipment includes a front-end loader used to remove debris from the trash racks.

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