ASSUMPTION PARISH POLICE JURY

Louisiana

DRAINAGE & FLOOD MITIGATION MASTER PLAN

PREPARED BY:

GTS ENGINEERING LLC

ASSUMPTION PARISH POLICE JURY
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DRAINAGE & FLOOD MITIGATION MASTER PLAN

Presented to:

Assumption Parish Police Jury

Mr. Ron Alcorn – Ward 1

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ABBREVIATIONS

AEP	Annual Exceedance Probability
BFE	Base Flood Elevation
CDBG	Community Development Block Program
cfs	Cubic Feet per Second
CMP	Corrugated Metal Pipe
CPRA	Costal Protection and Restoration Authority
CRS	Community Rating System
CWSRF	Clean Water State Revolving Fund
EPA	Environmental Protection Agency
EWP	Emergency Watershed Protection
FBFM	Flood Boundary and Floodway Map
FDPO	Flood Damage Prevention Ordinance
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Maps
FIRM	Federal Insurance Rate Map
FIS	Flood Insurance Study
FMP	Floodplain Management Plan
FPE	Floodplain Easement
FRP	Flood Response Preparations
GIS	Geographic Information System
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness
GPS	Global Positioning System
H&H	Hydrologic and Hydraulic
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center Hydrologic River Analysis System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HY8	HY-8 Culvert Hydraulic Analysis Program
LADOTD	Louisiana Department of Transportation and Development
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife and Fisheries
LIDAR	Light Detection and Ranging
LOMR	Letter of Map Revision
LSU	Louisiana State University
MDP	Master Drainage Plan
NFIP	National Flood Insurance Program
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service
OCD	Office of Community Development
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete Pipe
ROW	Right-of-way
SFCP	Statewide Flood Control Program
SFHA	Special Flood Hazard Area
SRL	Severe Repetitive Loss
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WRDA	Water Resources Development Act
WSE	Water Surface Elevation

INTRODUCTION

GIS Engineering, LLC (GISE) was contracted by the Assumption Parish Police Jury (APPJ) to prepare a Drainage & Flood Mitigation Master Plan (DFMMP) with the purpose of building a flood risk reduction plan to protect the local communities through a variety of drainage improvement projects. Funding for these projects will look at utilizing current and future parish funds to leverage any outside funding sources available, through State and Federal level grant programs, non-profit and/or private entities.

1.1 PROJECT PURPOSE

With the purpose of building a flood risk reduction plan to protect the local communities, through a combination of levees, pump stations, and other drainage and flood mitigation improvement projects, the preliminary Drainage & Flood Mitigation Master Plan – Phase I included a review of existing project & plans, development of drainage basins and study areas, defining Parish wide drainage goals and possible funding sources, and developing a list of preliminary projects to be included in the Drainage & Flood Mitigation Master Plan. Phase II included engineering analyses, topographic & bathymetric surveying, and hydrologic & hydraulic modeling to determine the feasibility of the proposed projects and construction cost estimates.

1.2 STUDY AREA

For purposes of this DFMMP, the study area consisted of the entirety of Assumption Parish, as shown in Figure 1-2 below.

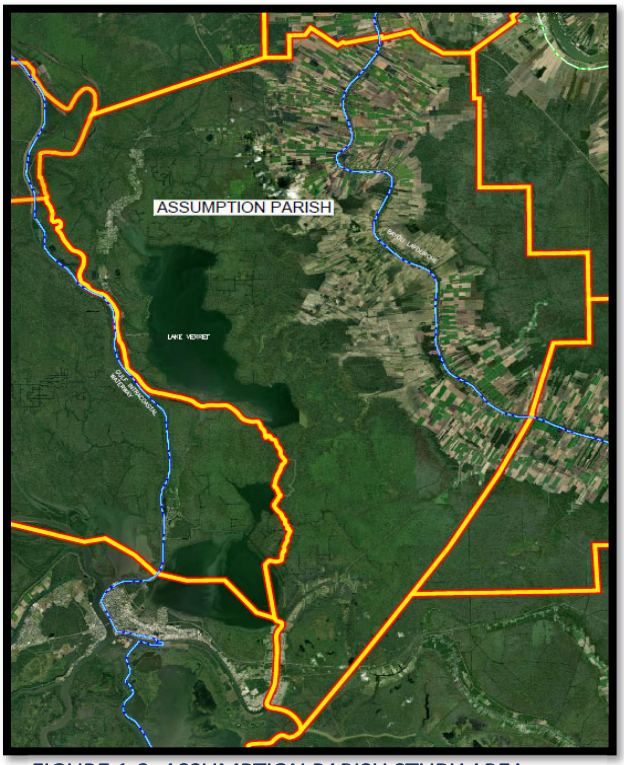


FIGURE 1-2: ASSUMPTION PARISH STUDY AREA

Assumption Parish is located between Iberville, Terrebonne, St. James, St. Martin, and Lafourche parishes. According to the U.S. Census Bureau, Assumption parish is home to approximately 20,600 residents (https://www.census.gov/quickfacts/fact/table/assumptionparishlouisiana#). The residents of Assumption have historically been exposed to flood risk. Assumption Parish predominantly consists of agricultural land along Bayou Lafourche. Moving away from Bayou Lafourche, the land changes to primarily swamp and marshes.

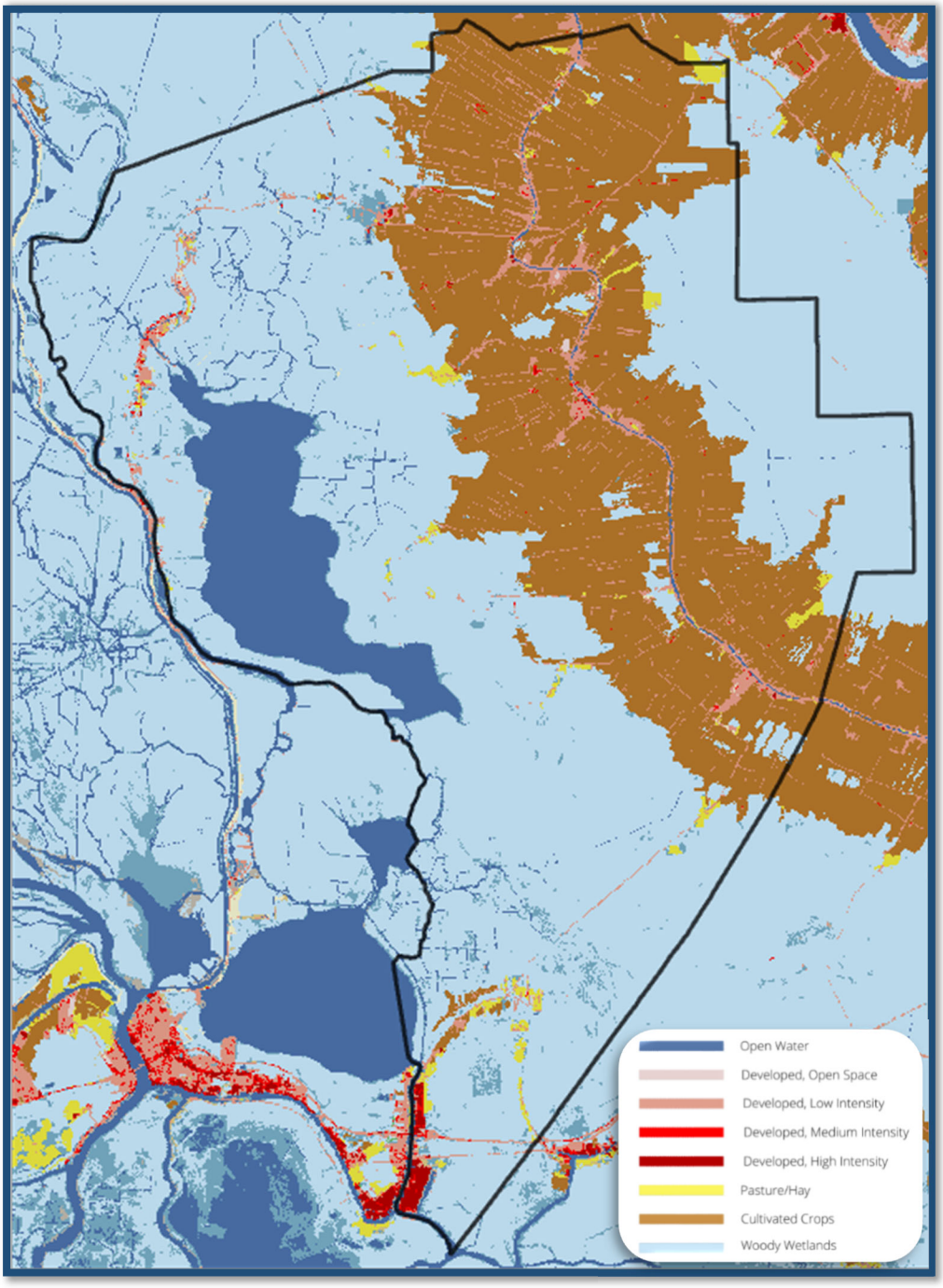


FIGURE 1-2: LAND USE MAP OF ASSUMPTION PARISH

Although this DFMMP is for Assumption Parish, it is important to recognize that Assumption Parish is within two larger watersheds. Therefore, in preparation of this report, GISE took into consideration the larger watershed effects on Assumption Parish.

2.0 EXISTING CONDITIONS

2.1 GENERAL INFORMATION

The overall drainage in Assumption Parish is divided into two main watersheds by Bayou Lafourche, as shown in Figure 2-1 below.

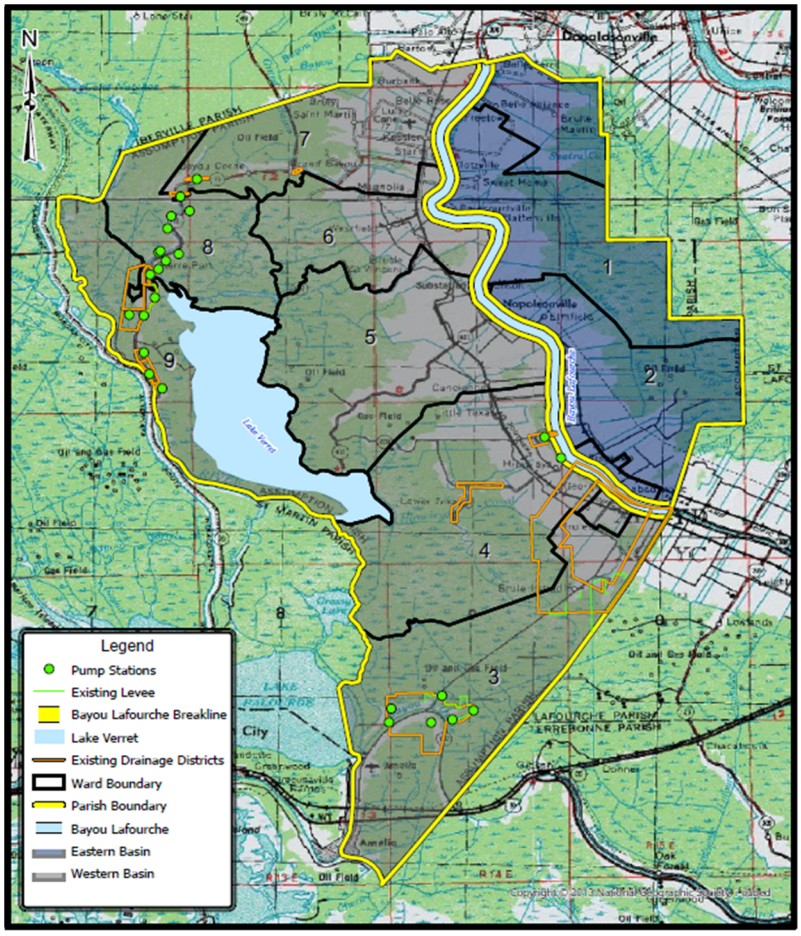


FIGURE 2-1 – OVERALL ASSUMPTION PARISH MAP WITH WARDS

To the west side of Bayou Lafourche, Assumption Parish wards 3, 4, 5, 6, 7, 8 & 9 are part of the Terrebonne Basin. To the east side of Bayou Lafourche, Assumption Parish wards 1, 2 & a portion of 7 are part of the Barataria Basin. Both the Terrebonne and the Barataria Basins are shown in Figure 2-2 below.

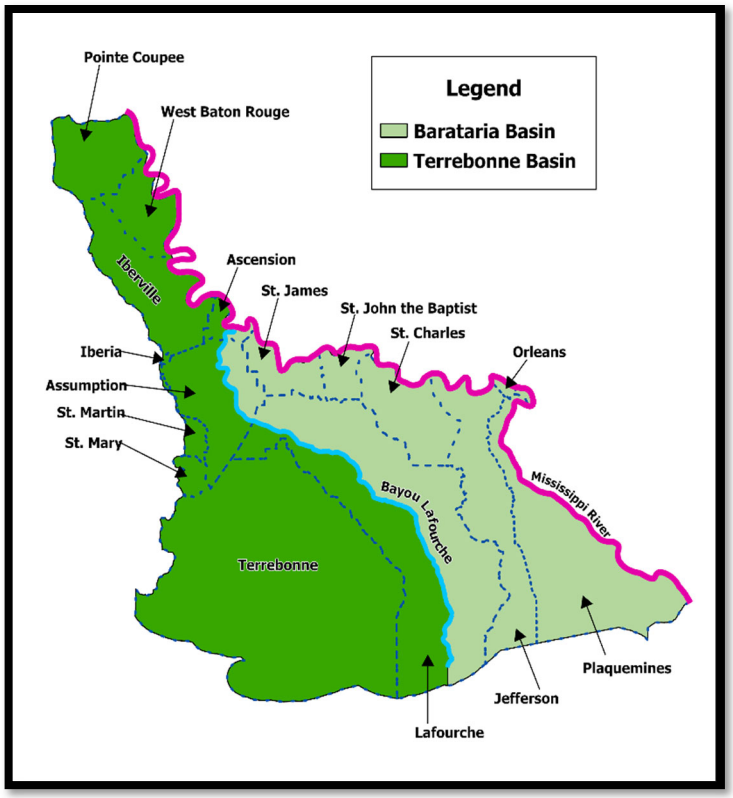


FIGURE 2-2: EXISTING DRAINAGE BASINS

TERREBONNE BASIN

1,712,500 acres
155,000 - Acres of swamp
574,000 - Acres of marsh
118,000 - Cypress swamp
728,700 - Acres of wetlands

BARATARIA BASIN

1,565,000 Acres
152,120 - Acres of Swamp
173,320 - Acres of Fresh Marsh
59,490 - Acres of Intermediate Marsh
102,720 - Acres of Brackish Marsh
133,600 – Acres of Saline Marsh

The Terrebonne Basin, begins in the Mississippi River bend in Point Coupee Parish and extends south to the Gulf of Mexico, and is bounded by the Mississippi River & Bayou Lafourche on the east end, and by the Atchafalaya Basin on the west end.

The Barataria Basin begins at the conceptual confluence point of the Mississippi River and Bayou Lafourche in Ascension Parish and extends south to the Gulf of Mexico. The Barataria basin is bounded by Bayou Lafourche on the west and by the Mississippi River on the east.

2.2 OVERALL PARISH DRAINAGE

As shown in Section 2.1 of this report, the overall drainage of Assumption Parish is divided into two regions. For the DFMMP purposes, the areas within Assumption Parish are divided into either East Bank or West Bank, with Bayou Lafourche being the main divider.

The West Bank Assumption Parish is comprised of seven wards and is part of the Terrebonne Basin watershed. Lake Verret is located near the parish border line with St. Martin Parish, and serves as the major drainage outlet for the entire West Bank. Currently, six of the seven West Bank wards drain primarily towards Lake Verret, which then flows south through several bayous into Grassy Lake and Lake Palourde, and eventually flowing into Bayou Boeuf near Amelia, LA. Ward 3 is the only ward in the West Bank that does not flow through Lake Verret and its tributaries, but instead flows directly into Bayou Boeuf mainly through Labadieville Canal and Bayou L'Ourse.

The existing West Bank drainage system is primarily an open-channel gravity flow system, with a few drainage districts having a forced drainage system. The general storm water drainage patterns observed are similar throughout the entire West Bank. The high elevation areas in the banks of Bayou Lafourche exhibit shallow overland flow towards the west and into drainage ditches or canals which then convey the storm water to Lake Verret. This same drainage pattern can be observed in Ward 3, with the difference that Labadieville Canal and Bayou L'Ourse flow directly into Bayou Boeuf.

The West Bank's drainage system capacity is severely diminished, or nullified in extreme situations, especially during annual spring level rise in the river and storm events due to storm surge from the Gulf of Mexico. During these events, the West Bank's gravity system does not have the same differential head (water surface elevation difference) to flow at its normal capacity.

The East Bank Assumption Parish consists of three wards total, with a small portion of Ward 7 located to the west of Bayou Lafourche. The East Bank is located at the northernmost end of the Barataria Basin watershed. Lac Des Allemands, located in St. John the Baptist Parish serves as the major drainage outlet for the East Bank. Similarly, to the West Bank's drainage pattern, the high banks of Bayou Lafourche on the east side exhibit shallow overland flow towards the east, into drainage canals which then flow towards Lake Boeuf and Lac Des Allemands.

As is the case with the West Bank, the East Bank drainage system is also primarily an open-channel gravity flow drainage system. Therefore, the drainage capacity of the system is severely diminished due to storm surge from the Gulf of Mexico.

2.3 EXISTING DRAINAGE DISTRICTS & DRAINAGE MAP

Assumption Parish currently has several existing drainage districts distributed throughout the parish, as listed below:

- BAYOU DRIVE EAST & DERRICK STREET
- PIERRE PART (NORTH WEST HWY. 70)
- KNOTTS S/D
- LOWER BELLE RIVER
- BAYOU PIERRE PART NORTH
- OAKRIDGE
- LANDRY SUBDIVISION
- LABADIEVILLE
- LOWER TEXAS
- MARAIS RECREATION DISTRICT
- GEORGETTE STREET
- BAYOU L'OURSE
- GRAND BAYOU
- CYPRESS RIDGE SUBDIVISION
- GRAND BAYOU AREA - WARD 8

Each existing drainage district is comprised of different infrastructure such as ring levees and small pumping systems that were installed by residents and communities aiming to alleviate flooding experienced during normal rain events.

For the purpose of this study and evaluating Assumption Parish in a larger scale, GISE developed a drainage basin map to better illustrate the existing drainage patterns within the entire parish. Figure 2-3 below shows the preliminary Assumption Parish drainage basins map including flow patterns and sub-basins.

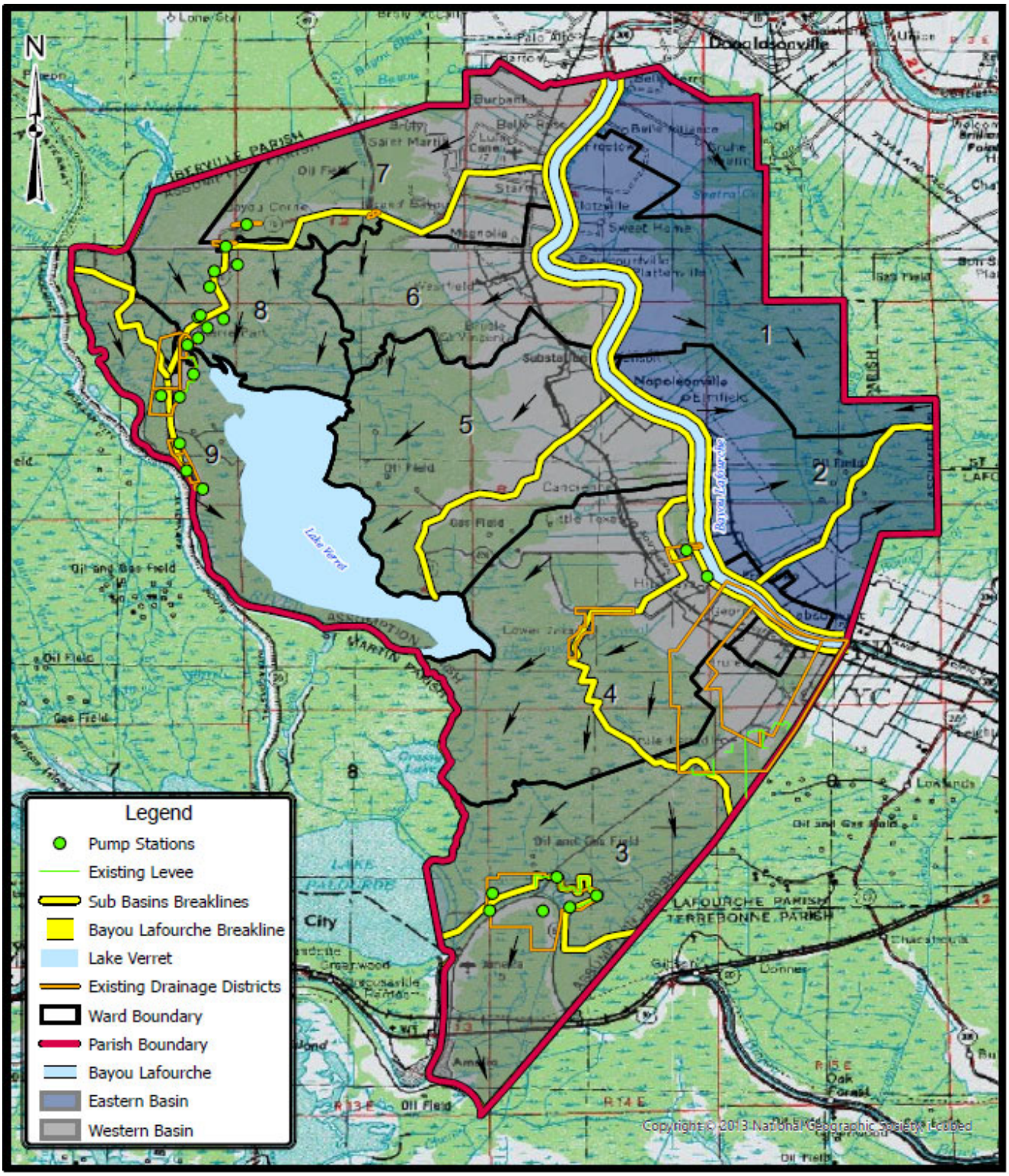


FIGURE 2-3 – ASSUMPTION PARISH PRELIMINARY DRAINAGE BASINS MAP

2.4 WARDS

2.4.1 Ward 1

Ward 1 is located on the East Bank of Assumption Parish and is bounded by Ward 7 to the North and Ward 2 to the south, as shown in Figure 2-4 below.

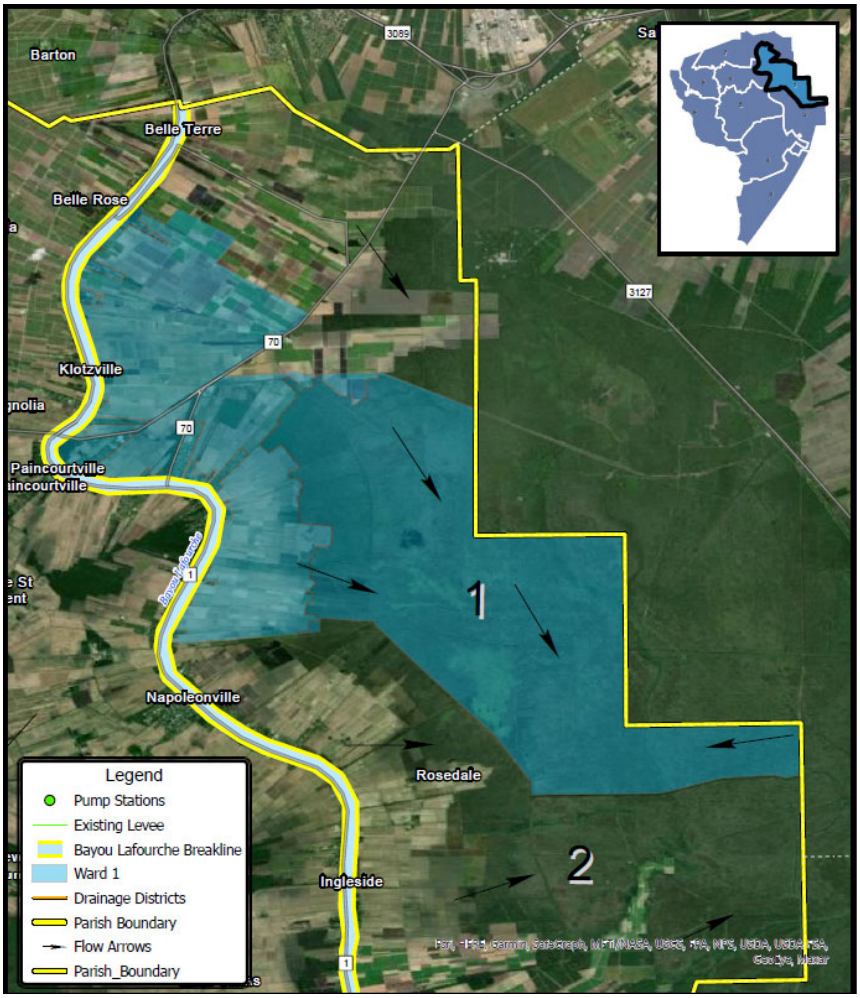


FIGURE 2-4 – WARD 1 MAP

The land use within Ward 1 is predominantly swamps and marshes. Table 2-1 below shows land use distribution throughout this ward.

TABLE 2-1 – WARD 1 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	6%
Agricultural	37%
Swamps & Marshes	57%

2.4.2 Ward 2

Ward 2 is located on the East Bank of Assumption Parish, immediately south of Ward 1. Outside of the Parish limits, Ward 2 is bounded by St. James and Lafourche Parishes, as shown in Figure 2-5 below.

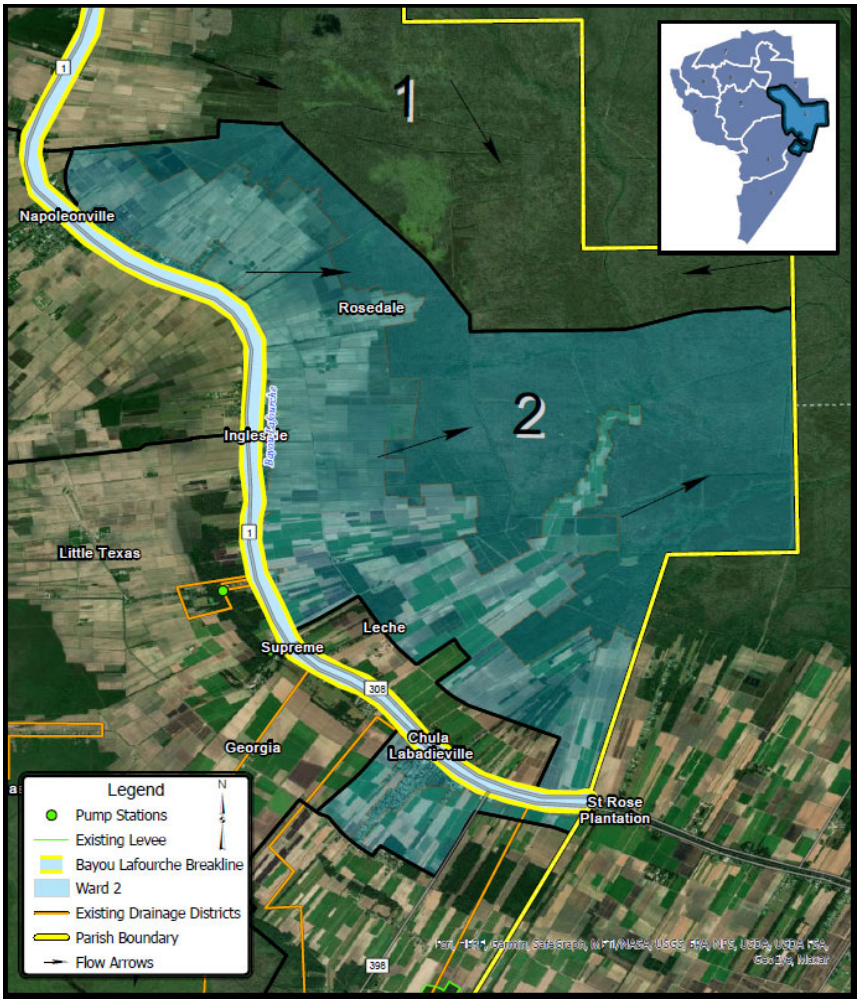


FIGURE 2-5 – WARD 2 MAP

The land use within Ward 2 is predominantly agricultural. Table 2-2 below shows land use distribution throughout this ward.

TABLE 2-2 – WARD 2 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	5%
Agricultural	51%
Swamps & Marshes	44%

2.4.3 Ward 3

Ward 3 is the southernmost ward within Assumption Parish, located on the West Bank. Ward 3 is bounded by Ward 4 on the north and the parish boundaries on the west, south, and east, as shown in Figure 2-6 below.

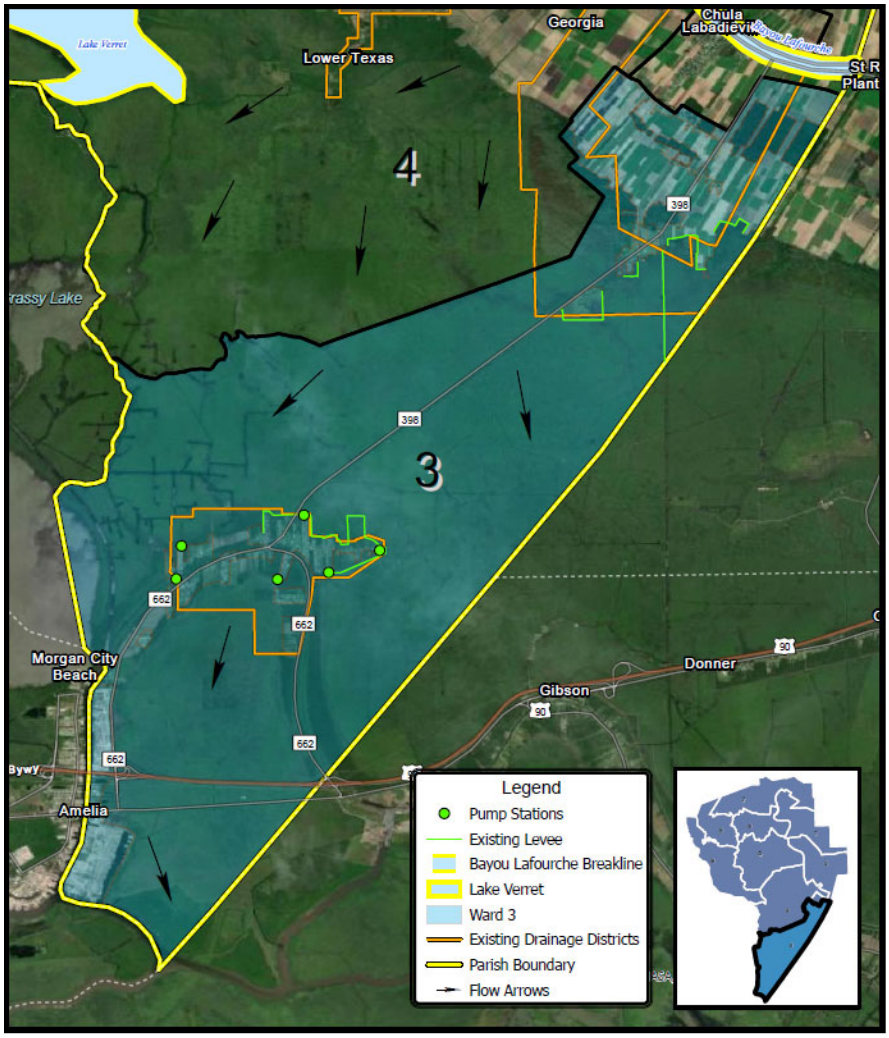


FIGURE 2-6 – WARD 3 MAP

The Bayou L'Ourse community is the largest residential area within Ward 3, in a wetland predominant ward. Table 2-3 below shows land use distribution throughout this ward.

TABLE 2-3 – WARD 3 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	7%
Agricultural	8%
Swamps & Marshes	85%

The entire perimeter of the Bayou L'Ourse community is protected by a combination of levees and existing natural ridges, with approximately one third of the area being protected by levees and the remaining two thirds by natural ridges. Additionally, the Bayou L'Ourse drainage system is supported by approximately nine (9) pump stations located throughout the community that drain either to Bayou L'Ourse or to the natural ridges located towards the south of the ward. Based on input from stakeholders and residents from this area, this existing drainage system works adequately and consistently to protect them from heavy rain or storm events.

Stakeholders expressed concern that existing elevations are not adequate protection for storm surges from the Gulf of Mexico.

2.4.4 Ward 4

Ward 4 is bounded by Wards 3 and 5 in the south and north respectively. Bayou Lafourche bounds the ward to the east, while the parish borders bound it to the west, as shown in Figure 2-7 below. The land use within Ward 4 is predominantly wetlands followed by agricultural. Labadieville and Supreme are the largest residential communities within Ward 4.

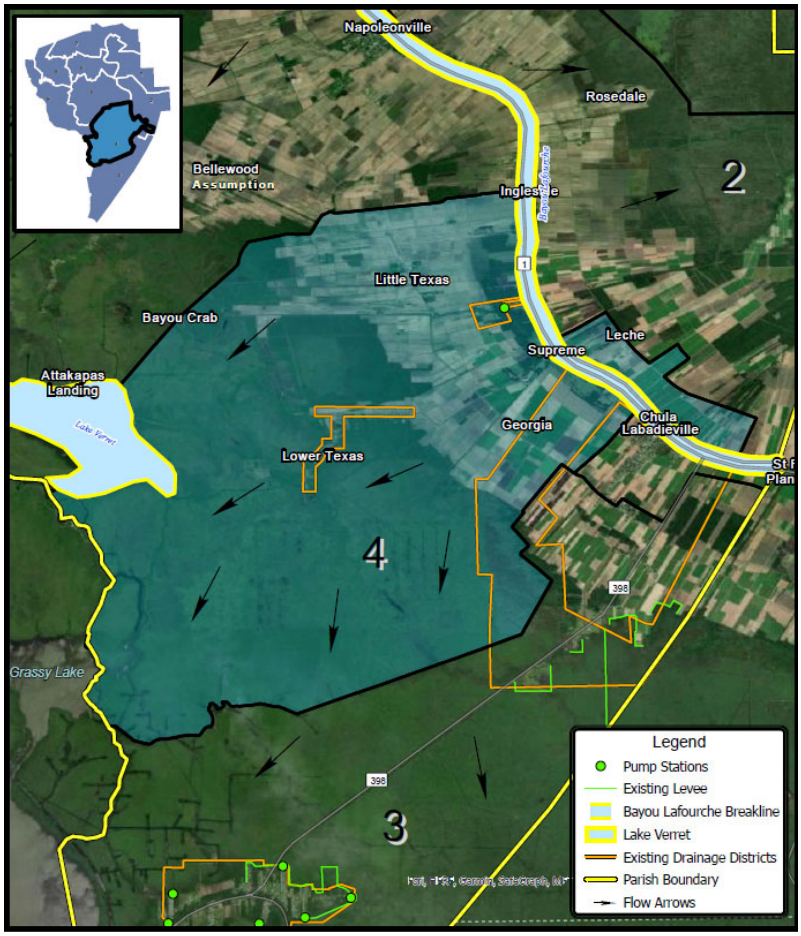


FIGURE 2-7 – WARD 4 MAP

Table 2-4 below shows land use distribution throughout this ward.

TABLE 2-4 – WARD 4 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	3%
Agricultural	32%
Swamps & Marshes	65%

2.4.5 Ward 5

Napoleonville, which serves as the parish seat of Assumption Parish, is located within Ward 5 and is the largest residential area within the ward. Ward 5 is bounded by Lake Verret to the west and Bayou Lafourche to the East, as shown in Figure 2-8 below. On the north, Ward 6 and a small portion of Ward 8 bound Ward 5, while Ward 4 bounds the south.

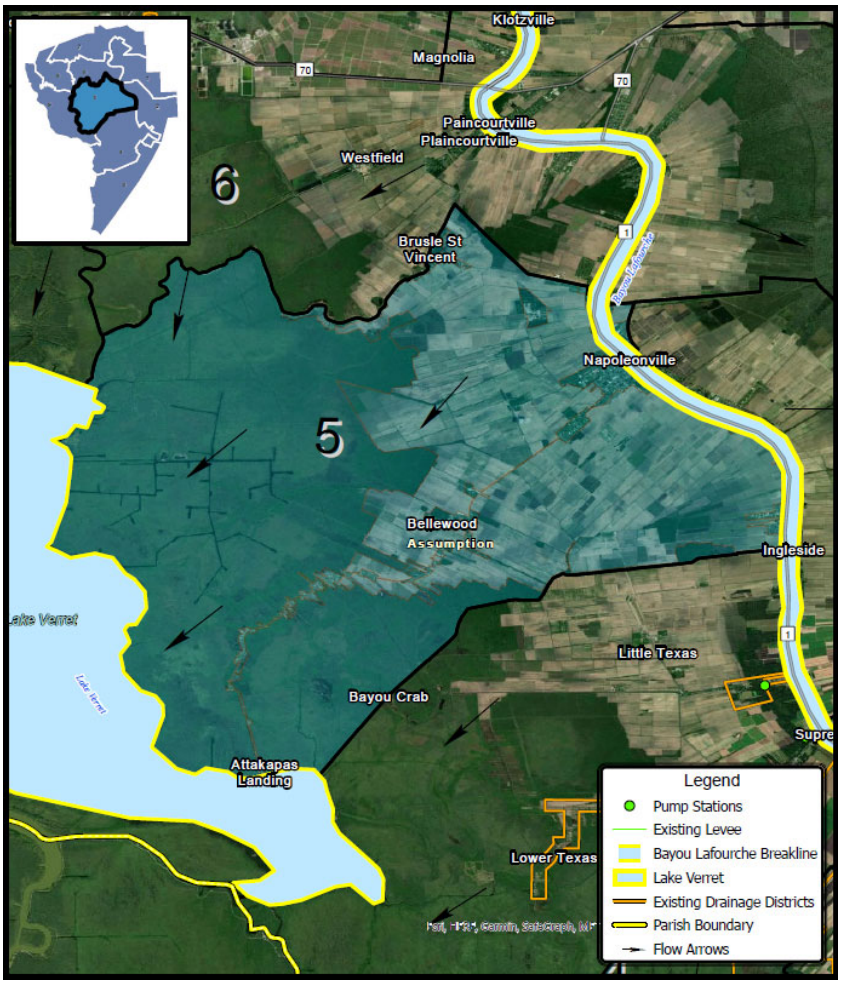


FIGURE 2-8 – WARD 5 MAP

The land use within Ward 5 is predominantly wetlands followed by agricultural. Table 2-5 below shows land use distribution throughout this ward.

TABLE 2-5 – WARD 5 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	6%
Agricultural	38%
Swamps & Marshes	56%

2.4.6 Ward 6

Ward 6 is bounded by Wards 5, 7, and 8 on the south, north, and west respectively, while Bayou Lafourche bounds to the east, as shown in Figure 2-9 below.

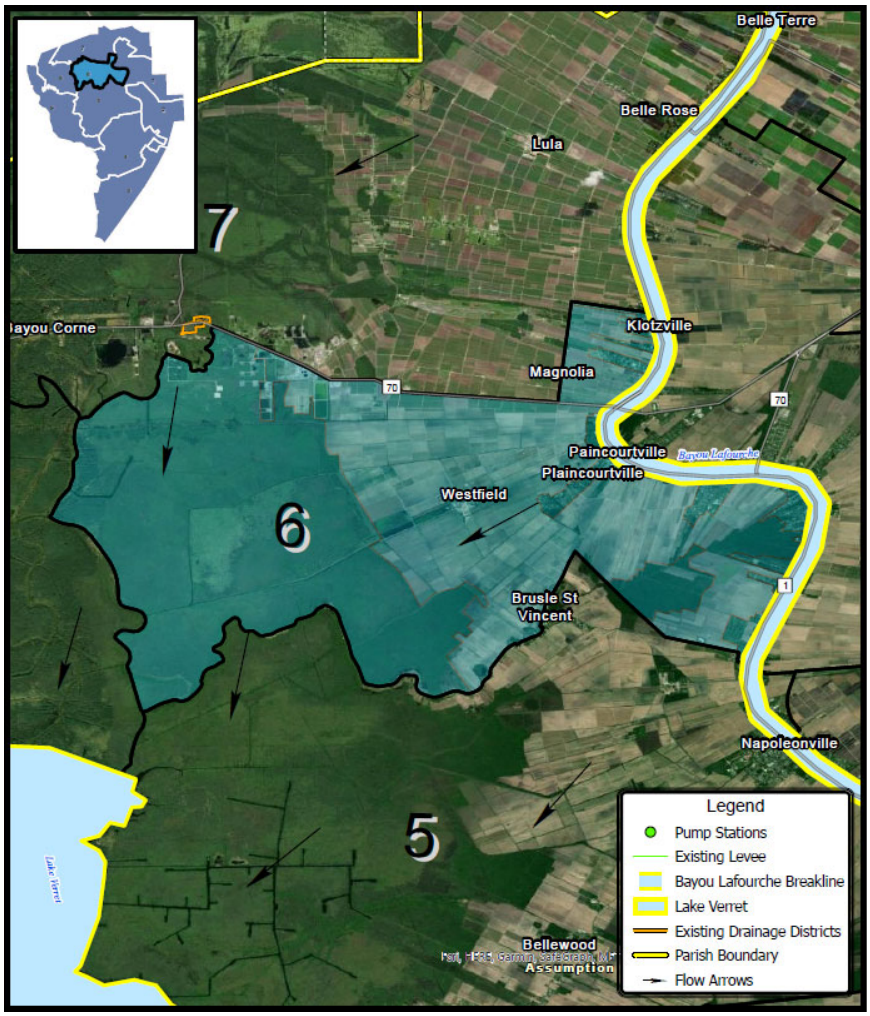


FIGURE 2-9 – WARD 6 MAP

The land use within Ward 6 is predominantly wetlands closely followed by agricultural. Table 2-6 below shows land use distribution throughout this ward.

TABLE 2-6 – WARD 6 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	7%
Agricultural	45%
Swamps & Marshes	48%

2.4.7 Ward 7

Ward 7 is located at the most northern parish border, encompassing land both at the west and east sides of Bayou Lafourche, bounded by Wards 1, 6 and 8 to the south, and by the parish limits to the east and a portion of the west of the ward. See the map for Ward 8 in Figure 2-10 below. The Belle Rose community is located within this Ward.

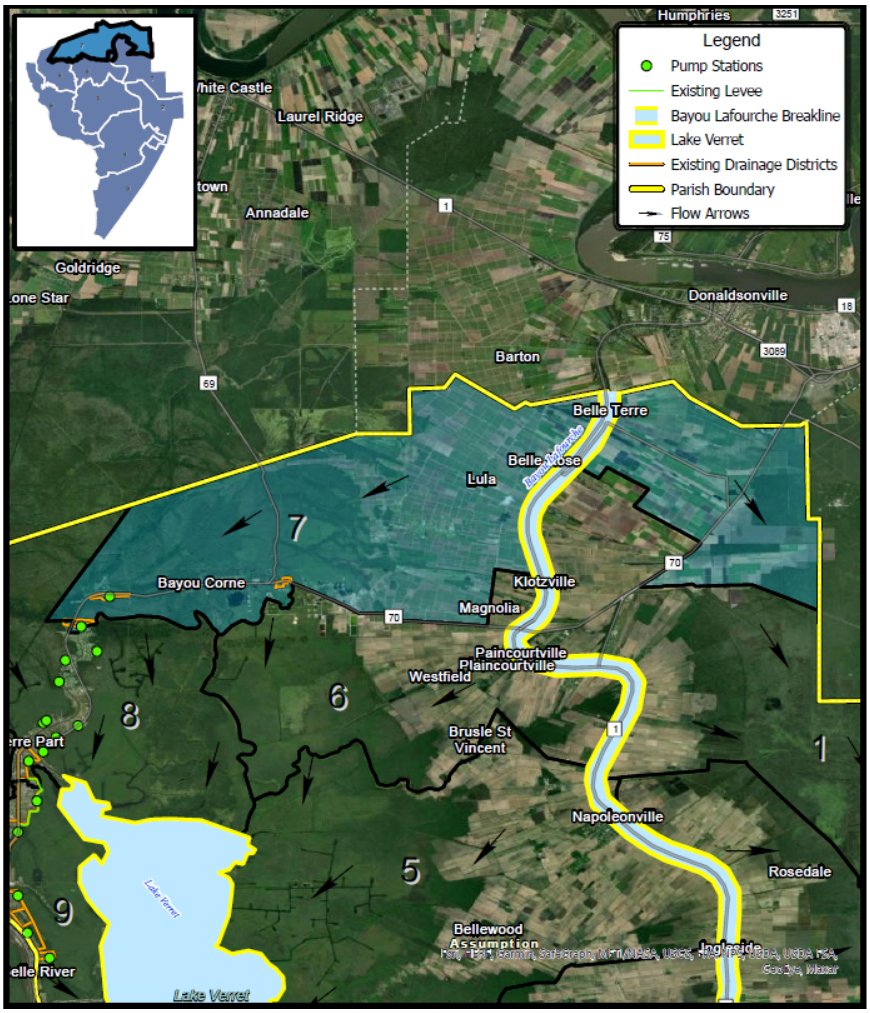


FIGURE 2-10 – WARD 7 MAP

The land use within Ward 7 is predominantly agricultural. Table 2-7 below shows land use distribution throughout this ward.

TABLE 2-7 – WARD 7 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	7%
Agricultural	52%
Swamps & Marshes	41%

2.4.8 Ward 8

Ward 8 is located at the northwestern parish border, bounded by Iberville Parish and a portion of Ward 7 to the north, Wards 7 & 6 to the east, wards 5 & 9 to the south, and Iberia Parish and a portion of Ward 9 to the west. See the Ward 8 map in Figure 2-11 below.

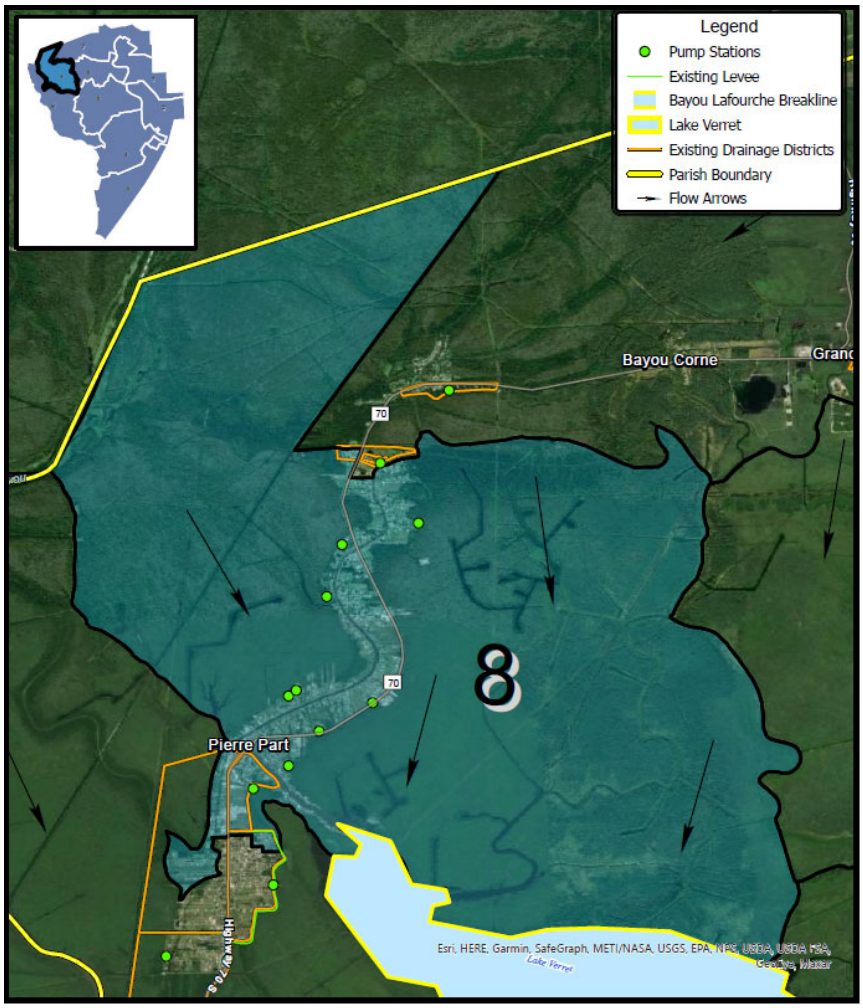


FIGURE 2-11 – WARD 8 MAP

The land use within Ward 8 is predominantly wetlands. Table 2-8 below shows land use distribution throughout this ward.

TABLE 2-8 – WARD 8 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	9%
Swamps & Marshes	91%

The community of Pierre Part is mainly located within Ward 8. This ward's drainage system is partly supported by a combination of existing ring levee systems and pump stations. However, the current drainage system in place seems to be inadequate to manage upstream flows coming directly from neighboring parishes located to the north of Assumption, especially during high storm events when Lake Verret is already at a high stage and cannot handle incoming flows.

The majority of this Ward is located within Flood Zones A and AE as designated by the Federal Emergency Management Agency (FEMA).

2.4.9 Ward 9

Ward 9 is the westernmost parish ward, bounded by Ward 8 and Ward 5 to the east, as shown in Figure 2-12 below. The community of Belle River and a portion of Pierre Part are located within Ward 9, along with Lake Verret.

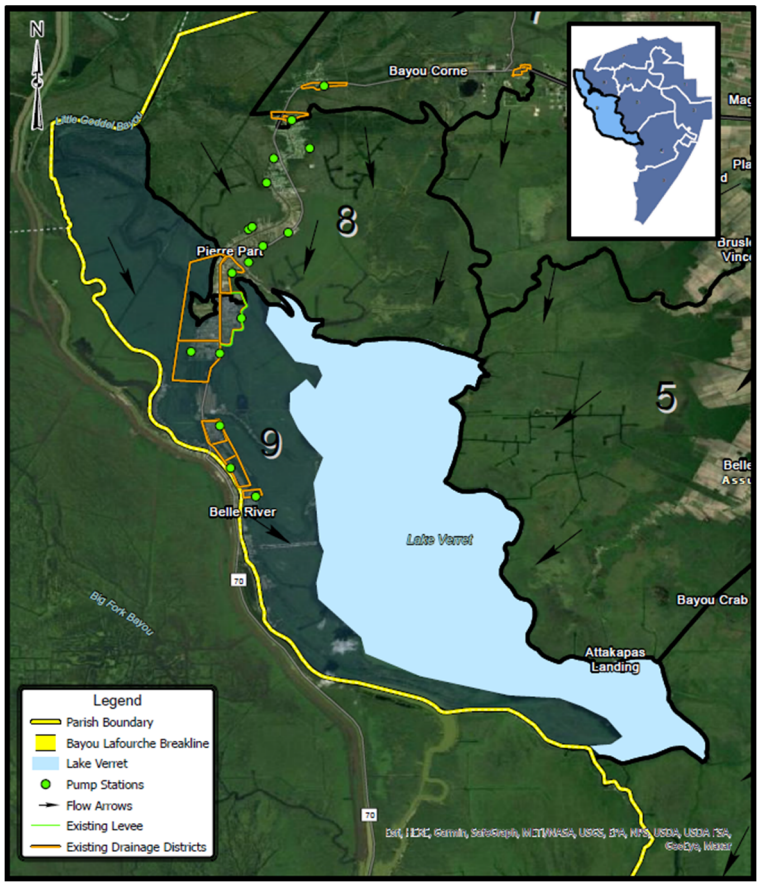


FIGURE 2-12 – WARD 9 MAP

The land use within Ward 9 is predominantly wetlands. Table 2-9 below shows land use distribution throughout this ward.

TABLE 2-9 – WARD 9 LAND USE DISTRIBUTION

Land Use	Percentage
Residential/Developed	10%
Swamp & Marshes	90%

The Ward 9 drainage system is partly supported by a combination of existing ring levee systems and smaller scale pump stations. However, the current drainage system in place seems to be inadequate to manage recurrent high-water events in Belle River. Residents from this Ward expressed concerns about this area experiencing increasingly higher water levels along Belle River for extended periods of time throughout the last couple of years.

The majority of this Ward is located within Flood Zone AE as designated by FEMA.

2.5 FEMA FLOOD ZONES

Flood zones are geographic areas that FEMA has defined based on different levels of flood risk. The zones are depicted on a community's flood insurance rate map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the type of flooding in the area. Below Figure 2-13 shows the FEMA Flood Insurance Rate Map for Assumption Parish. The areas shaded in blue within Assumption Parish are designated as Flood Hazard Areas and areas not shaded are considered Flood Zone X.

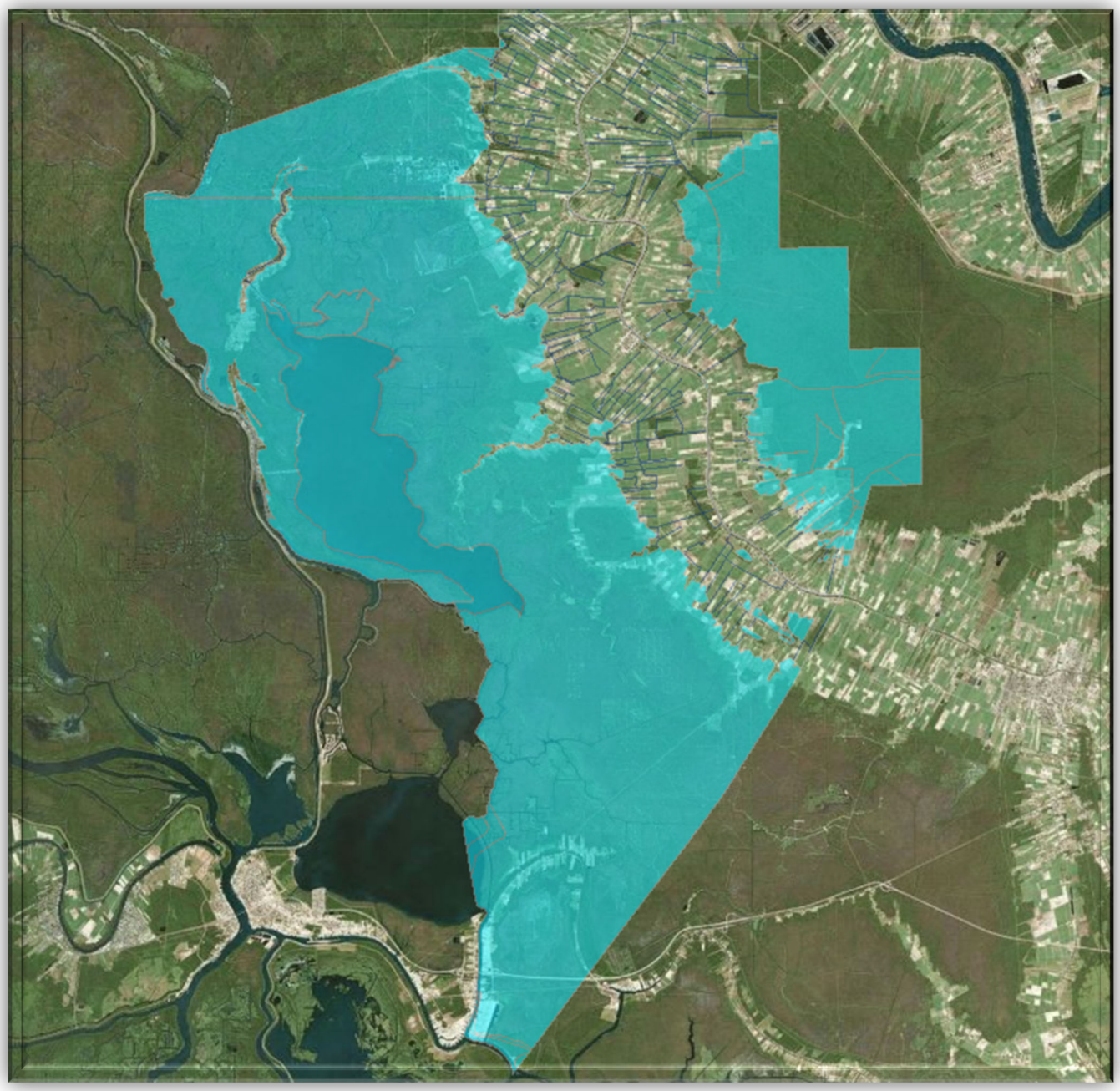


FIGURE 2-13: ASSUMPTION PARISH FEMA FIRM MAP

2.5.1 Letter Of Map Revision

A Letter Of Map Revision (LOMR) is FEMA's modification to an effective FIRM, or Flood Boundary and Floodway Map. LOMRs are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source. The LOMR is an official revision to the effective FIRM and sometimes the Flood Insurance Study (FIS) report. The LOMR is generally accompanied by an annotated copy of the affected portions of the FIRM or FIS report.

All requests for changes to effective maps must be made by FEMA or by the Chief Executive Officer of the community or an official designee. LOMRs are public records that must be maintained by the community.

LOMRs provide opportunities for communities to seek relief from mandatory flood insurance premiums in instances where FIRMs are not accurate in identifying areas of low risk.

2.6 SIGNIFICANT EVENTS

In the last 7 years Assumption Parish has been named in fifteen different Disaster Declaration and Emergency Declarations. Ten of those are associated with Tropical Storms and Hurricanes, but the other five are from severe weather/rain events. In the past 20 years, Assumption Parish has been affected by 45 Natural Disasters. A timeline of recent events is depicted below.

FIGURE 2-14: HISTORY OF RECENT NATURAL DISASTERS

One of the most recent flood events happened in May 2021, when widespread flooding was seen across the majority of Assumption Parish. Pictures from that event can be seen below in Figure 2-15.

FIGURE 2-15: ASSUMPTION PARISH MAY 2021 FLOODING

Aside from storm events, Assumption Parish has to deal with flooding from regular rain events on a more frequent basis. Additional flood fighting documentation can be found in Appendix H.

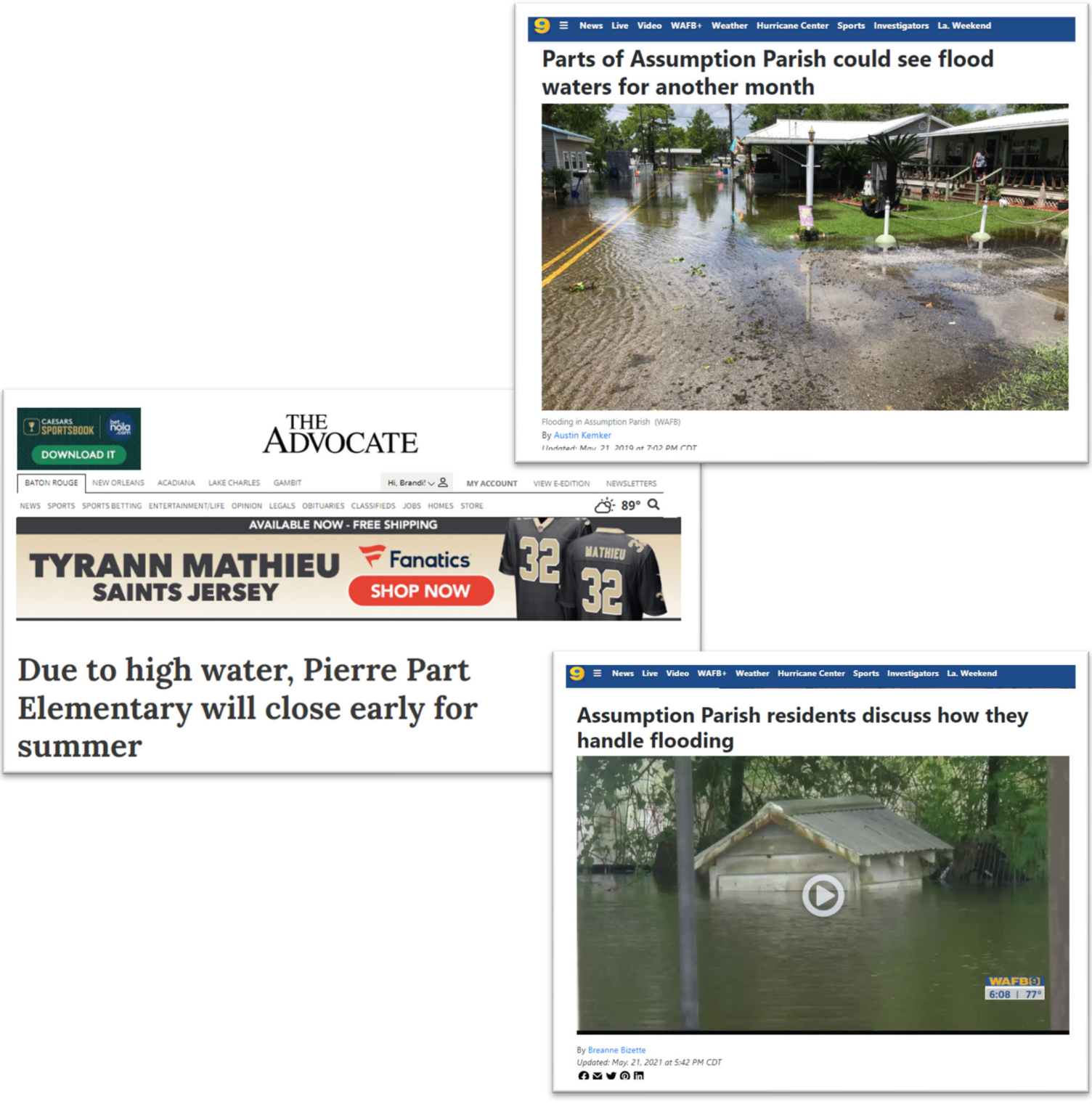


FIGURE 2-16: LOCAL NEWS ARTICLES CAPTURING ASSUMPTION PARISH REOCCURING FLOODING

3.0 ECONOMICS

3.1 LOCAL ECONOMY

The importance of a good and reliable drainage system is imperative for a successful and growing economy. GISE performed an overall economic impacts analysis to better understand economic drivers for Assumption Parish that are at risk due to poor drainage. Using data available from the Bureau of Economic Analysis - U.S. Department of Commerce, the Assumption Parish industry total Gross Domestic Product (GDP) from 2015 through 2020 were analyzed and plotted in **Error! Reference source not found.** below.

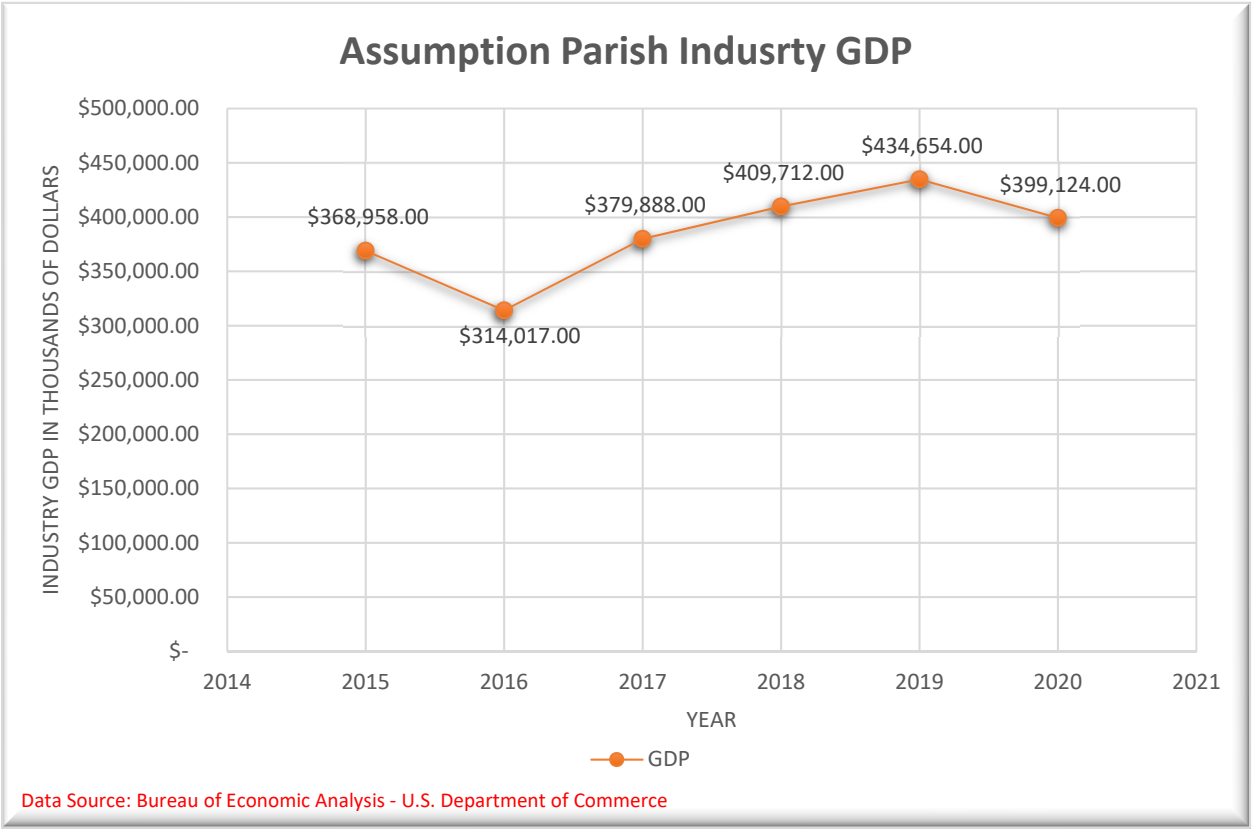


FIGURE 3-1: ASSUMPTION PARISH INDUSTRY TOTAL GDP

As it can be seen, the GDP had a 14.89% decrease in 2016 compared to the previous year. One can deduce that a main driver for the decrease is directly correlated to the 2016 flooding that affected Assumption and neighboring parishes directly and indirectly.

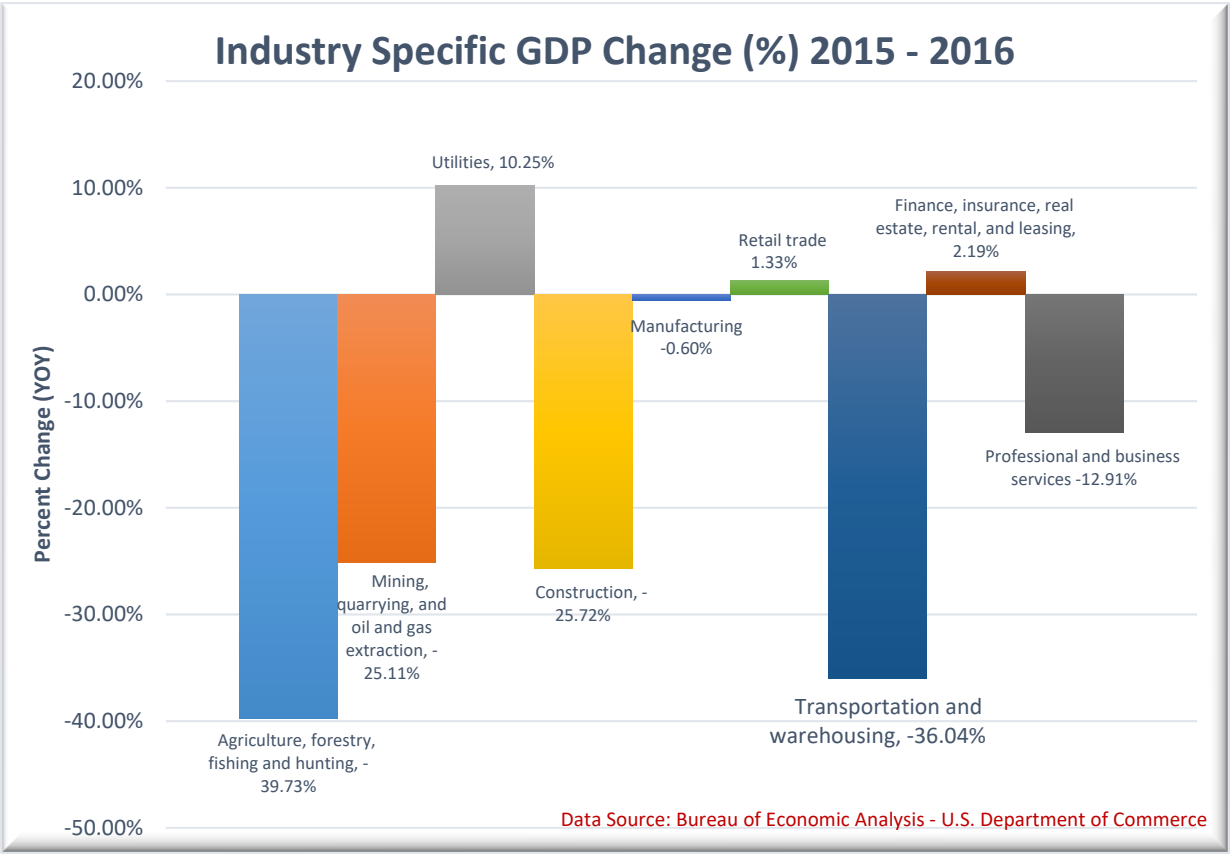


FIGURE 3-2: INDUSTRY SPECIFIC GDP CHANGE 2015-2016

Figure 3-2 above shows the specific industry percent change in GDP year over year from 2015 through 2016. The data shown demonstrates that flooding was likely the cause for the steep decline in GDP, particularly in the Agriculture, Oil & Gas, Construction, and Transportation industries.

Figure 3-**Error! Reference source not found.**4 below displays a breakdown of each industry and their contributing percent to the overall industry GDP. From this data, about 48% or more of the industries could be negatively impacted due to poor drainage conditions. The industries that are more susceptible to drainage losses are:

- Agriculture, forestry, fishing and hunting, recreation
- Mining, quarrying, and oil & gas extraction
- Construction
- Manufacturing
- Transportation and warehousing
- Real estate, rental, and leasing

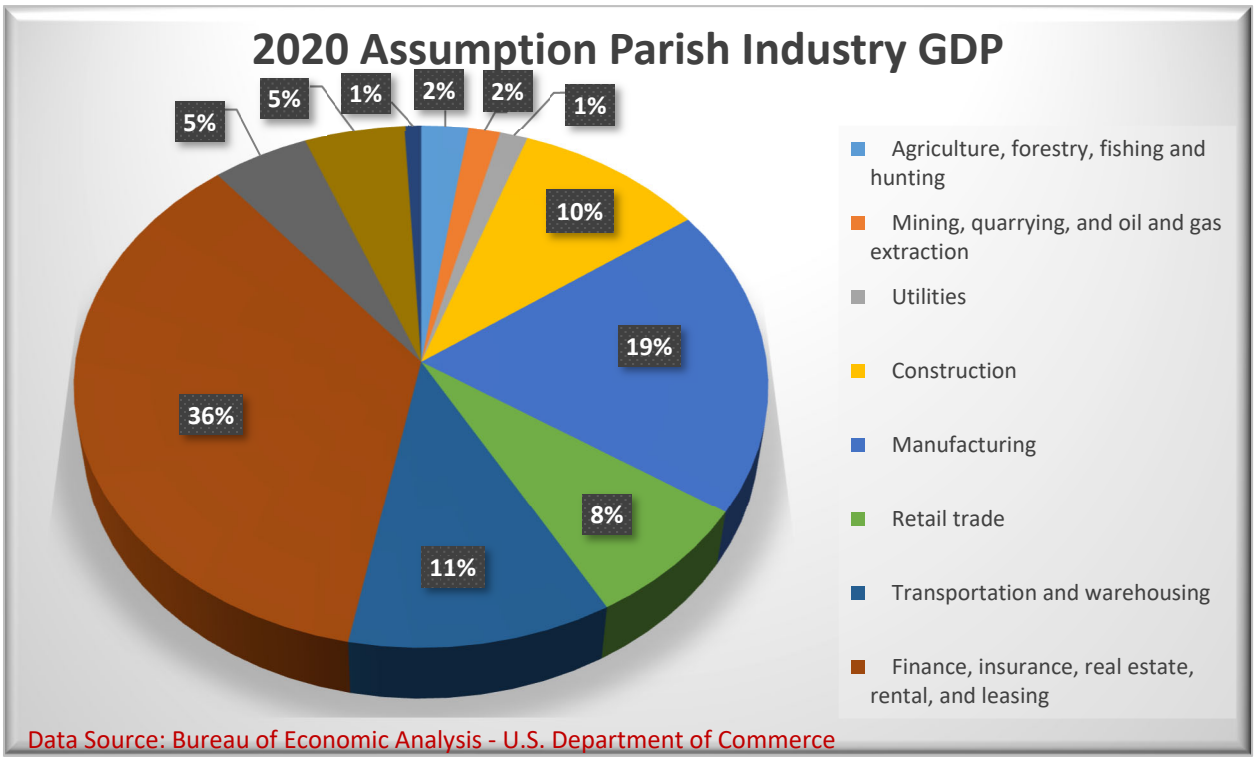


FIGURE 3-3: 2020 ASSUMPTION PARISH INDUSTRY TOTAL GDP

Therefore, it can be concluded that a good overall drainage system is crucial in order to have a healthy local economy with continued growth year over year.

In addition, there are factors that may not be portrayed in the economic data analysis. For example, Lake Verret has historically been a recreational lake attracting local visitors as well as visitors. For the past few years, it is believed that the usage of Lake Verret has significantly dropped due to the consistent high water and no-wake zones put in effect. This has hindered the Parish tourism economy which in turn causes loss of sales tax. The high-water stage and no-wake zones could also be deterring the financial real estate economy.

3.2 SOCIOECONOMICS

3.2.1 Environmental Justice

Environmental Justice guarantees that all people, no matter their race or socioeconomic status, have equal access to a healthy, safe, and sustainable environment, as well as equal protection from environmental hazards.

As Assumption Parish continues to experience worsening natural disasters and more frequent flooding with increasingly negative impacts, we must take a careful look at the low to moderate income and minority communities who may be marginalized, and make every effort to create an environmentally just future for everyone. Assumption parish is home to nearly 21,000 residents, which is approximately an 11.5 % decrease from the 2010 census. According to U.S. Census Bureau, Assumption parish has a Median Household Income of $44,742 which is below the National Average of $64,994. The poverty rate is also well above the national average, at 15.8%. Figure 3-5 shows that Census Tracts 502, 505, and 506 have poverty rates much closer to 25%.

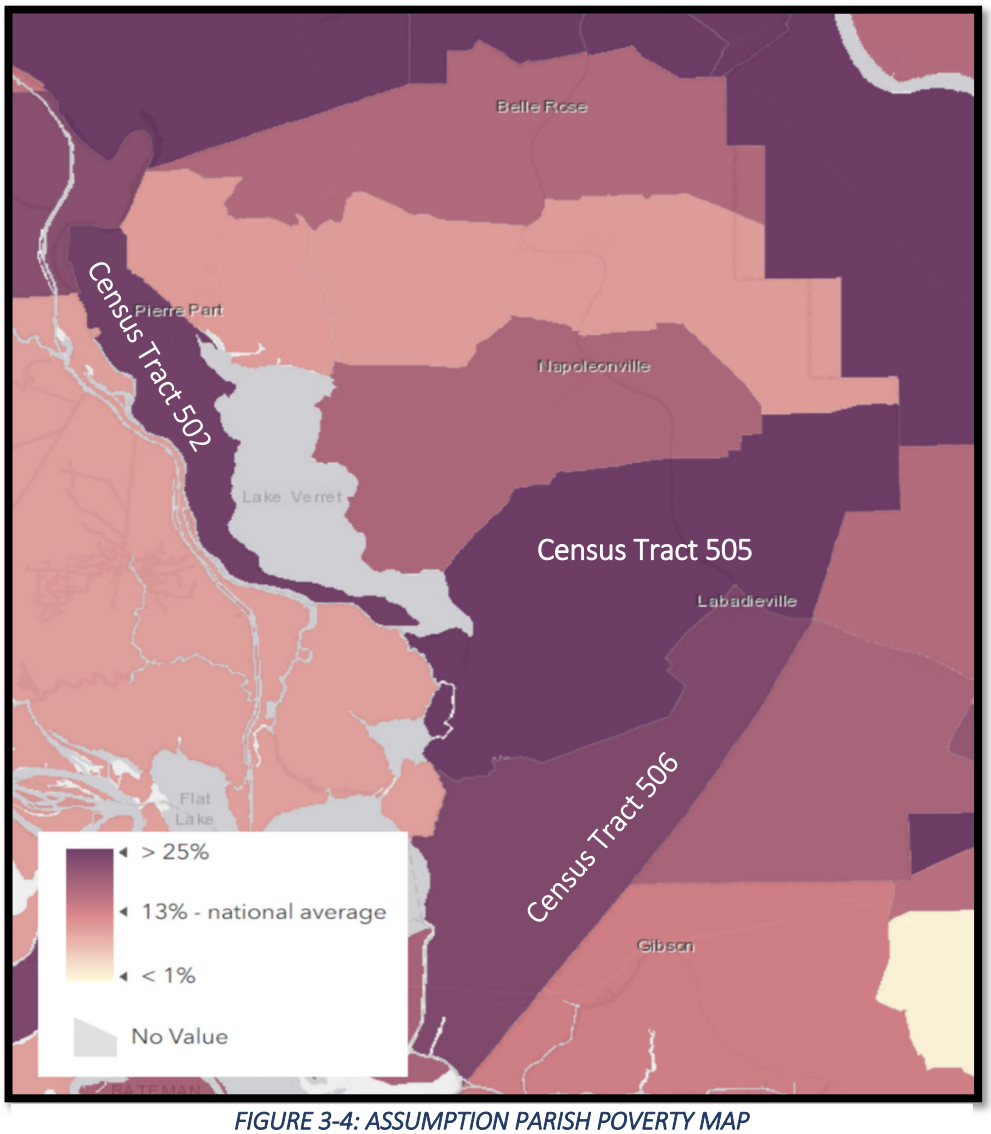


FIGURE 3-4: ASSUMPTION PARISH POVERTY MAP

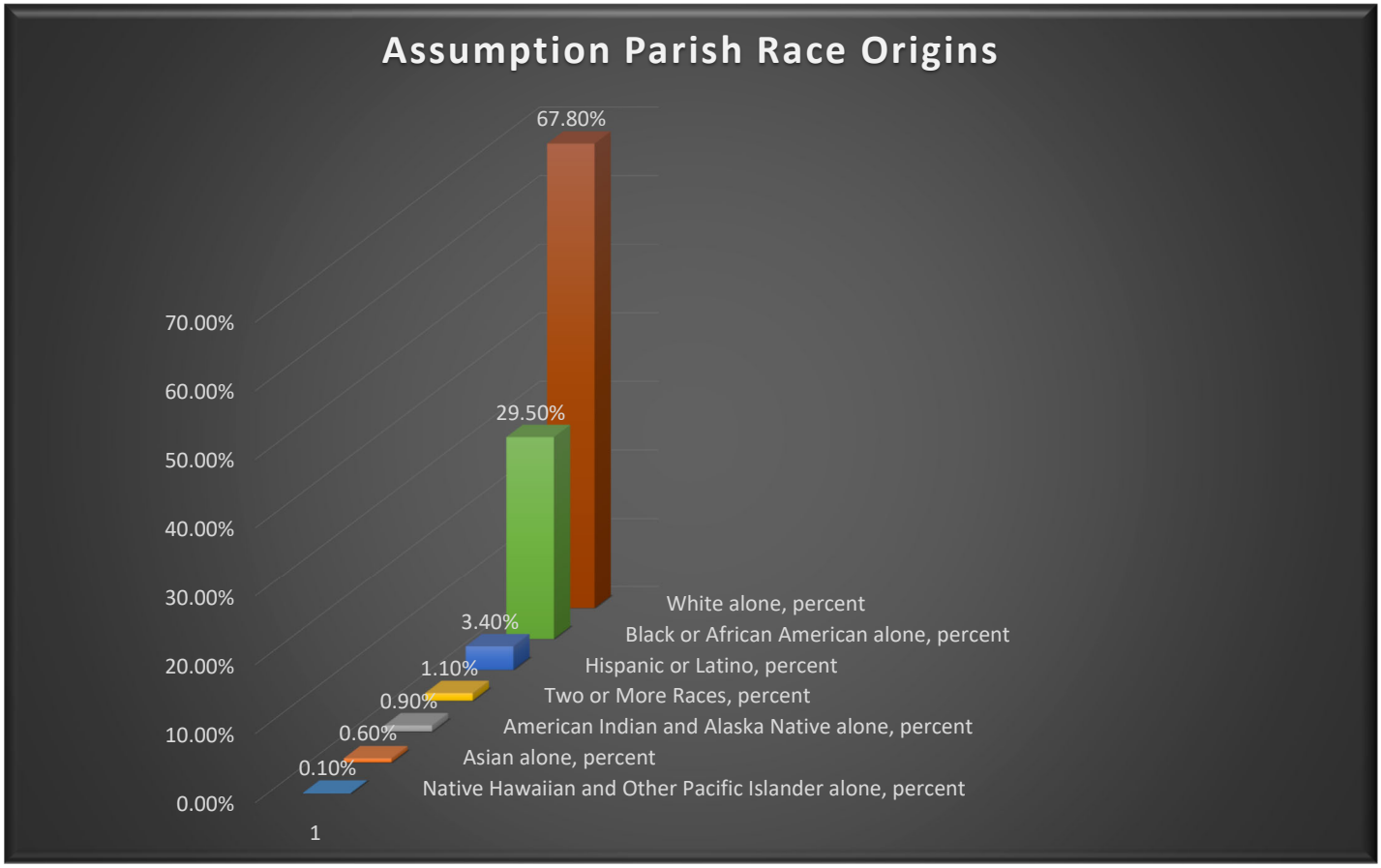


FIGURE 3-5: ASSUMPTION PARISH RACE ORIGINS

*Source: U.S. Census Bureau

The race makeup of Assumption Parish can be seen in Figure 3-6 above. The minority population makes up nearly 32 percent compared to the national average of 24.2 percent.

3.2.2 Climate & Economic Justice

Figure 3-7 below highlights the disadvantaged census tracts in Assumption parish, according to the U.S. Government's Climate and Economic Justice Screening tool.

Communities are considered disadvantaged if they are in a census tract that meets the thresholds for at least one of the tool's categories of burden or if they are on land within the boundaries of Federally Recognized Tribes. In addition, census tracts that are completely surrounded by disadvantaged communities and is at or above the 50% percentile for low income is also considered disadvantaged. It can be seen that ***all census tracts in Assumption Parish are classified disadvantaged according to the criteria set forth by the U.S. Government***.

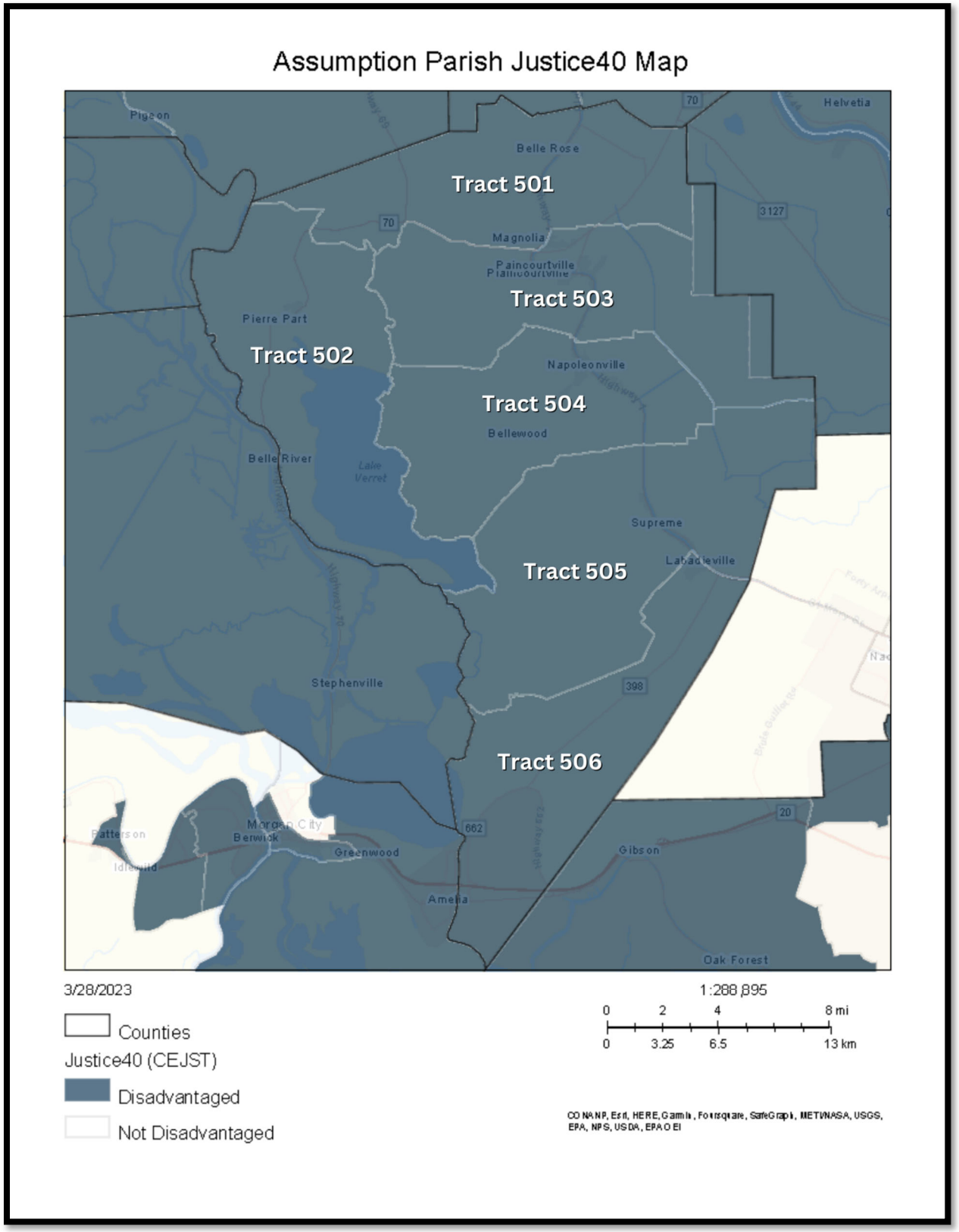


FIGURE 3-6: ASSUMPTION PARISH JUSTICE 40 DISADVANTAGE COMMUNITIES

3.2.3 Transportation Disadvantaged Communities

The U.S. Department of Transportation has developed a definition for highly disadvantage communities using existing, publicly available data sets and where source data did not exist (Tribal lands, Puerto Rico, Guam and the Northern Mariana Islands) OMB's Common Conditions definition. The disadvantaged Census Tracts, as identified with the EJ Screening tool, exceeded the 50th percentile (75th for resilience) across at least four of the following six transportation disadvantaged indicators. Each of the six disadvantage indicators are assembled at the Census Tract level using data from the- CDC Social Vulnerability Index, Census America Community Survey, EPA Smart Location Map, HUD Location Affordability Index, EPA EJ Screen, FEMA Resilience Analysis & Planning Tool and FEMA National Risk Index.

1. Transportation Access disadvantage identifies communities and places that spend more, and longer, to get where they need to go. (CDC Social Vulnerability Index, Census America Community Survey, EPA Smart Location Map, HUD Location Affordability Index)
2. Health disadvantage identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures. (CDC Social Vulnerability Index)
3. Environmental disadvantage identifies communities with disproportionate pollution burden and inferior environmental quality. (EPA EJ Screen)
4. Economic disadvantage identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality. (CDC Social Vulnerability Index, Census America Community Survey, FEMA Resilience Analysis & Planning Tool)
5. Resilience disadvantage identifies communities vulnerable to hazards caused by climate change. (FEMA National Risk Index)
6. Equity disadvantage identifies communities with a high percentile of persons (age 5+) who speak English "less than well." (CDC Social Vulnerability Index)

As shown in Figure 3-8 below, all of the census tracts in Assumption Parish exceed the 50th percentile in at least 4 of the categories listed above, indicating they are all historically disadvantaged communities.

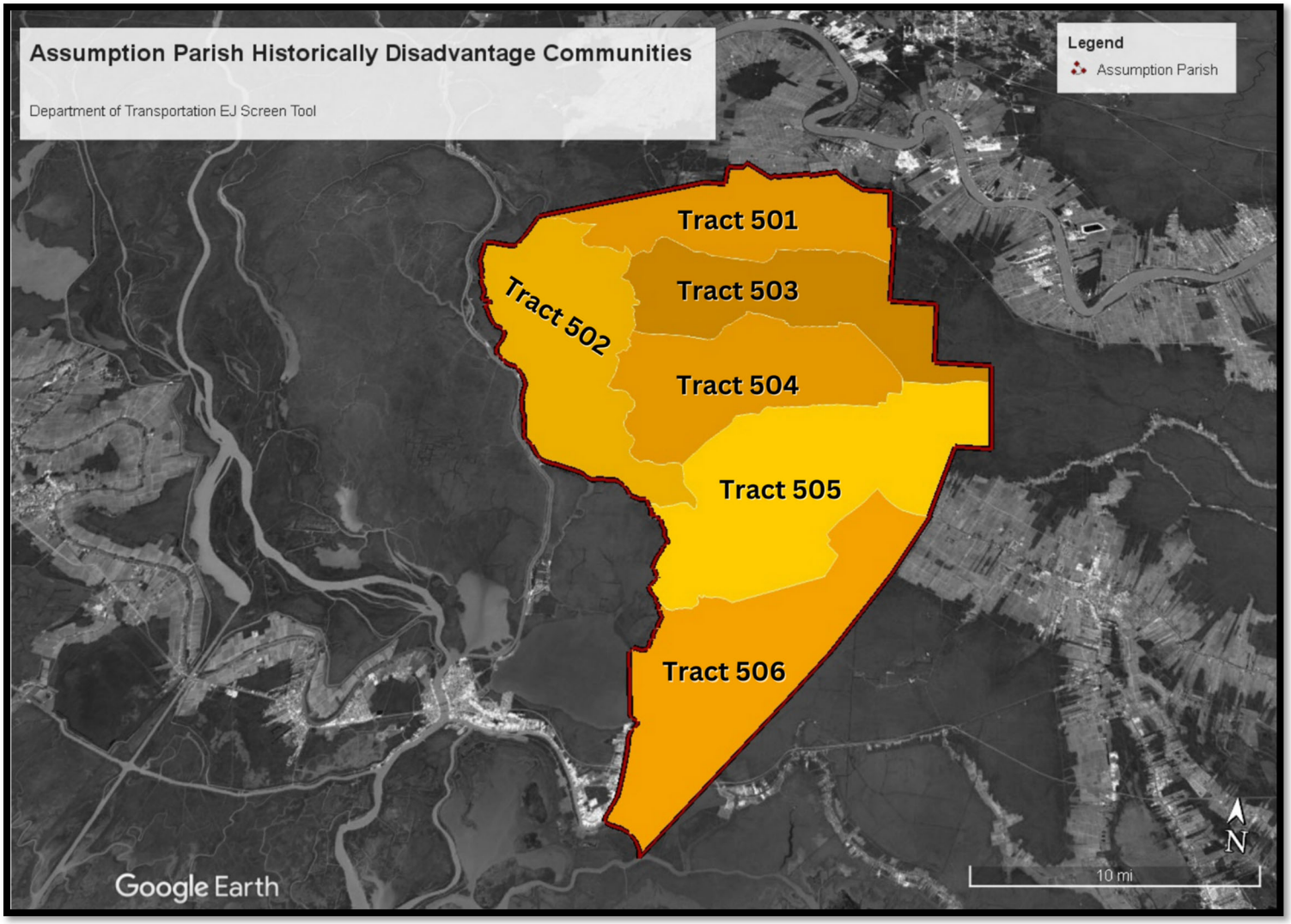


FIGURE 3-7: DEPARTMENT OF TRANSPORTATION'S DISADVATANGED COMMUNITIES IN ASSUMPTION PARISH

4.0 NEARBY PROJECTS OF SIGNIFICANCE

As a part of the research and development of the Assumption Parish DFMMP, projects located in the vicinity of Assumption Parish were investigated. This section will list and discuss nearby projects considered to be significant for the Assumption Parish overall drainage.

4.1 CPRA MASTER PLAN

The Coastal Protection and Restoration Authority (CPRA) 2017 master plan includes high priority and high performing projects that could be implemented along the entire Louisiana coast, both in the near future and long term, to provide direct restoration and risk reduction benefits for the Louisiana residents.

4.1.1 Bayou Chene Flood Protection Structure

The Bayou Chene Flood Protection Structure is located south of Avoca Island, along the St. Mary and Terrebonne Parishes. See Figure 4-1 below for location of this flood protection structure.

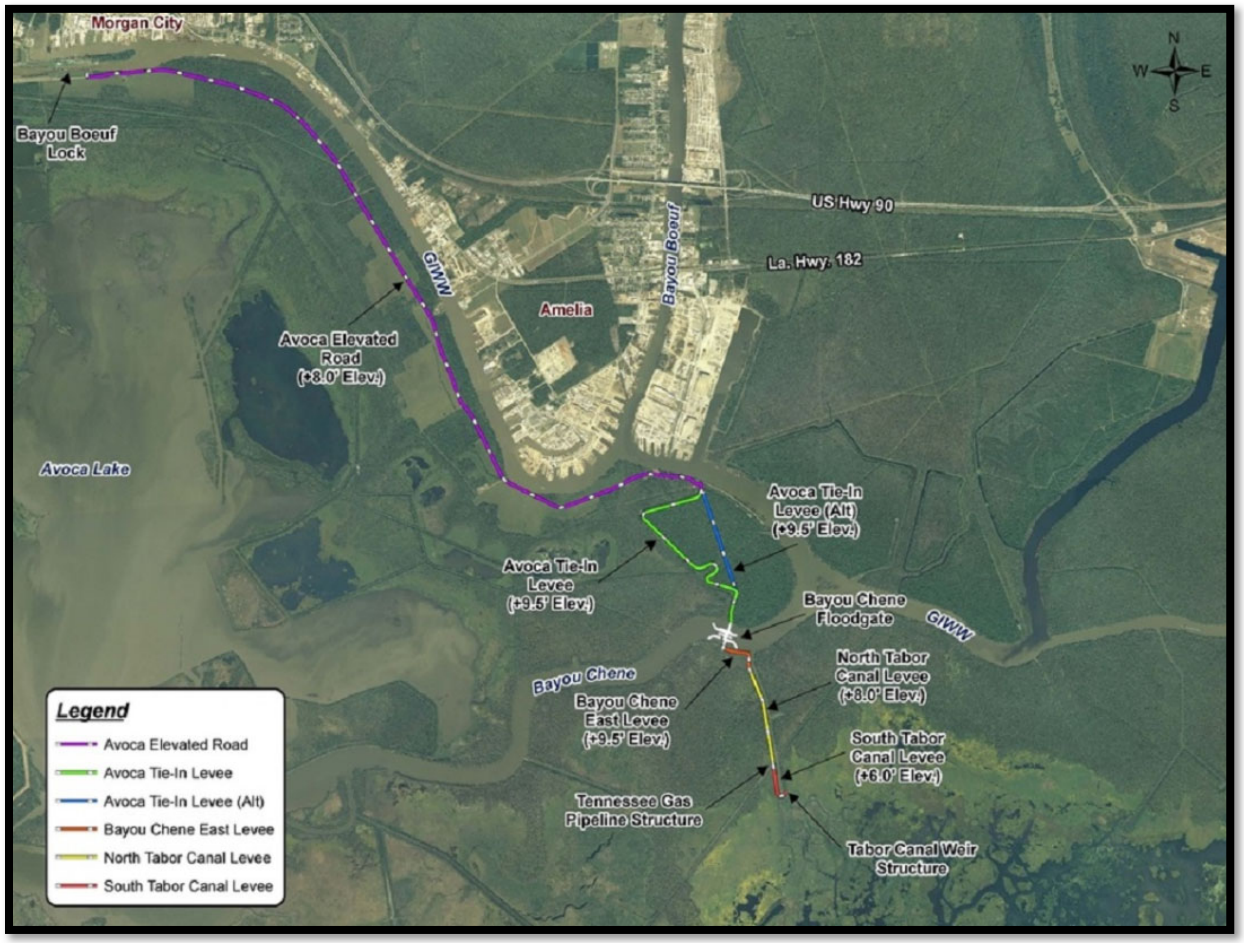


FIGURE 4-1 - BAYOU CHENE FLOOD PROTECTION STRUCTURE

The purpose of the Bayou Chene Flood Protection Structure is to mitigate backwater flooding coming from the Atchafalaya River, during a Mississippi River high water event, into the Terrebonne basin. The design of this flood protection structure has been completed with the following features:

- Steel receiving structure with top elevation at +8.0'
- Floodgate structure with top elevation at +10.0' and a 400' clear channel opening
- Braced steel sheet pile floodwalls to an elevation of +10.0'
- Elevate the existing Avoca Road to elevation +8.0'
- An earthen levee from Avoca Road to the Structure along the existing borrow canal to elevation +8.0'
- An earthen levee with geotextile fabric from the south side of the closure structure to Tabor Canal to elevation +8.0'

- Earthen levees along Tabor Canal utilizing the existing berm and geotextile fabric to elevation +8.0'
- A weir structure at the end of Tabor Canal to an elevation of +6.0'

The operation and closure of this flood protection structure will follow the permitted criteria that was approved by the United States Army Corp of Engineers (USACE), as defined below.

Stage 1

When the USACE Gauge near Morgan City, LA measures +6.0' (MLG), a Notice of Intent (NOI) will be provided to USACE, USCG, and Local Stakeholders

Stage 2

When the USACE Gauge near Morgan City, LA measures +7.0' (MLG), the closure of the Bayou Chene Floodgate gate will be initiated, under slack tide or flood tide condition. The floodgate closure time is expected to be less than 5 hours.

Stage 3

After flood crest, USGS Bayou Penchant Gauge measures +4.0' or lower and the difference in water surface elevation between flood side and protected side of the Bayou Chene floodgate is no greater than 1.0', the opening of the gate will be initiated under slack tide or ebb tide condition. The floodgate opening time is expected to be less than 5 hours.

The Bayou Chene Flood Protection Structure is currently under construction and it is anticipated to be completed late in 2021. Once constructed and fully operational, this permanent structure will reduce backwater flooding, providing increased flood risk protection for communities and infrastructure within Assumption Parish, as well as St. Mary, Terrebonne, Lafourche, Lower St. Martin, and Iberville Parishes.

4.1.2 Amelia Levee Improvements (Project No. 03b.HP.08)

The Amelia Levee Improvements project will consist of the construction of a levee system to an elevation of 22' NAVD88 along the Gulf Intracoastal Waterway (GIWW), between Lake Palourde and the Bayou Boeuf Lock near Amelia, LA. See Figure 4-2 below for location of the proposed levee project and other improvements, including the following major features:

- Approx. 46,400 feet of earthen levee
- Approx. 13,400 feet of T-wall
- (4) 40-foot roller gates
- (1) 250-foot barge gate
- (1) 110-foot barge gate
- 5,000 cfs pump station

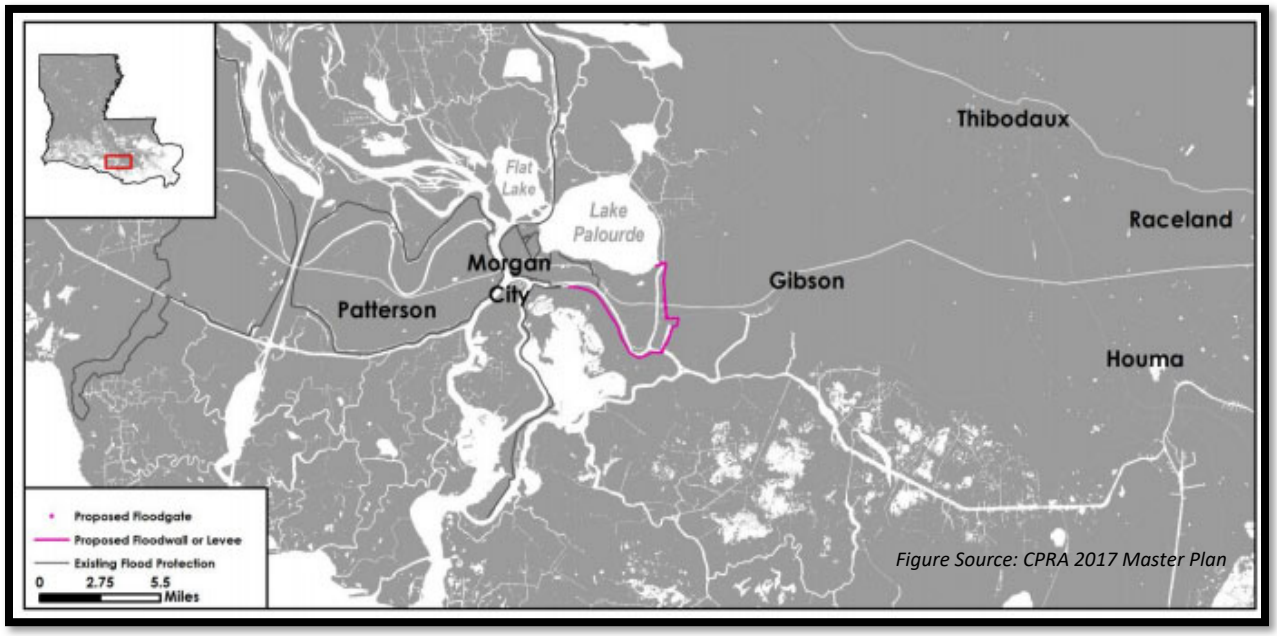


FIGURE 4-2 – AMELIA LEVEE IMPROVEMENTS PROJECT LOCATION

The Amelia levee improvements project will provide increased flood protection against storm surge for the risk areas listed in the table below, as estimated by CPRA, providing significant economic benefits to Assumption Parish of approximately $852 million in savings on reduced flood damage.

Table 3: Economic Damage by Return Period at Year 50

Risk Region	*50 Year*		*100 Year*		*500 Year*	
	FWOA	*FWP*	*FWOA*	*FWP*	*FWOA*	*FWP*
Assumption	$4,411 M	$3,559 M	$4,466 M	$3,734 M	$4,507 M	$3,869 M
Assumption - Amelia	$49 M	$46 M	$50 M	$46 M	$50 M	$47 M
St. Martin	$615 M	$530 M	$621 M	$574 M	$625 M	$583 M
St. Mary - Lower	$4,564 M	$2,754 M	$4,783 M	$2,880 M	$4,848 M	$3,197 M
St. Mary - Morgan City	$10,556 M	$7,654 M	$10,878 M	$7,705 M	$11,666 M	$7,959 M
Terrebonne - Lower	$1,129 M	$1,129 M	$1,138 M	$1,141 M	$1,150 M	$1,149 M
Total	**$21,324 M**	**$15,671 M**	**$21,935 M**	**$16,080 M**	**$22,845 M**	**$16,804 M**

Data Source: CPRA 2017 Master Plan

4.1.3 Upper Barataria Risk Reduction

The Upper Barataria Risk Reduction (UBRR) Project provides continuous hurricane and storm damage risk reduction from LA Hwy 308 in Lafourche Parish to the Davis Pond Freshwater Diversion West Guide Levee in St. Charles Parish, affording risk reduction benefits for the six parishes in the project area, including Ascension, Assumption, Lafourche, St. Charles, St. James, and St. John the Baptist.

FIGURE 4-3 - UBRR PROJECT ALIGNMENT

The inclusion of the UBRR Project in the Louisiana's 2017 Comprehensive Master Plan for a Sustainable Coast was a major step forward to providing a vital link in storm risk reduction between the western end of the West Bank and Vicinity (WBV) hurricane protection project and the Morganza to the Gulf (MTG) project near Raceland, LA. The Master Plan recognizes the fundamental problem in the Barataria Basin is that the project area is very vulnerable not only to storm surge from the Gulf of Mexico, but also from rainfall inundation, threatening a large concentration of petrochemical plants and oil & gas facilities, as well as numerous homes, schools, businesses, and historic sites.

The UBRR project includes the construction and enlargement of approximately 33 miles of hurricane risk reduction between LA Hwy 308 on the western end and the Davis Pond Diversion West Guide Levee on the eastern end. The project includes earthen levees, a 270' steel barge swing gate floodgate in Bayou Des Allemands, a steel rollergate across LA Hwy 306, tidal interchange structures, concrete T-Wall floodwalls, and pump station frontal protection. The project is divided into the following five (5) segments, as shown in Figure 4-3 above:

Segment 1 – Davis Pond Diversion to Paradis Canal

Segment 2 – Sunset Levee District Improvements (Paradis Canal to Bayou Des Allemands)

Segment 3 – Bayou Des Allemands Floodgate

Segment 4 – US Hwy 90 Tie-in along Midway Canal

Segment 5 – Midway Canal to LA Hwy 308

The UBRR project will significantly improve the drainage conditions in the East Bank of Assumption Parish by providing a storm surge barrier and thereby allowing Lac Des Allemands, and its incoming tributaries, to remain relatively low and therefore drain during storm events.

4.1.4 Increase Atchafalaya Flow to Terrebonne (TE-0110)

The purpose of this sediment diversion project is to utilize freshwater and sediment from the Atchafalaya River in order to build, sustain, and maintain wetlands within the Terrebonne Basin. The 900,000 acres project area located between the Wax Lake Outlet and Bayou Lafourche, as shown in Figure 4-4 below, currently receives very little water and sediments from the Atchafalaya and Mississippi rivers, resulting in decreased freshwater supply and increased saltwater intrusion into this region. Lower sediment input has compounded high subsidence rates and reduced the ability of marshes to maintain their elevation in relation to sea level.

The scope of this project includes dredging the GIWW east of the Atchafalaya river and installing a bypass structure at Bayou Boeuf Lock with a 20,000 cfs to increase freshwater and sediment flows from Atchafalaya River to Terrebonne marshes in St. Mary and Terrebonne parishes. Implementation of the proposed bypass structure may reduce drainage capacity of Bayou Boeuf, possibly affecting Lake Verret's capacity to drain during normal rain events. Although this project is currently at the very early stages of design, GISE will coordinate with CPRA during Phase II of this DFMMP to determine feasibility and possible negative impacts to Assumption Parish.

FIGURE 4-4 – INCREASE ATCHAFALAYA FLOW INTO TERREBONNE MARSHES PROJECT LOCATION

5.0 STAKEHOLDER INPUT

In order to better understand the existing hydrology and flooding issues, GISE organized and held several meetings with stakeholders and residents from the different wards of Assumption Parish during September of 2020. GISE's aim was to hear first-hand what the drainage issues are for each stakeholder, since, provided the natural geography of the parish not all stakeholders have the same issues.

5.1 STAKEHOLDER AGENCIES

5.1.1 Assumption Parish Police Jury Members

GIS Engineering, LLC (GISE) was contracted by the Assumption Parish Police Jury (APPJ) to prepare a Drainage & Flood Mitigation Master Plan (DFMMP) with the purpose of building a flood risk reduction plan to protect the local communities through a variety of drainage improvement projects. GISE received feedback from many of the police jury members and parish officials throughout the formulation of the master plan.

5.1.2 Political Leadership

The Assumption Parish Police Jury voted to contract GIS Engineering to prepare a Flood & Drainage Mitigation Master Plan and were very involved and provided key insight to the areas with issues in their respective Wards. Several state political leaders, including Representative Ken Brass (District 58) and Senator Ed Price (District 2), were engaged in the process, not only for awareness but for support to bring awareness to the federal level. U.S. Congressman Garrett Graves and his staff visited with Assumption Parish officials in order to gain knowledge and awareness of the impending needs for Flood & Drainage Mitigation, and also for Assumption Parish officials to gain guidance on possible funding avenues and project selections based on aligning with the most recent grant programs that are available for Assumption Parish. The Assumption Parish Police Jury and GIS Engineering representative visited U.S. Congressmen Garrett Graves and Troy Carter along with U.S. Congresswoman Julia Letlow in Washington D.C. to shine a light on the ever-growing flood and drainage needs of not only Assumption parish, but the benefits that could be realized for the entire Terrebonne Basin.

5.1.3 CPRA

CPRA was consulted on behalf of Assumption Parish to seek their input and concurrence on proposed projects to make sure that all proposed projects are in line with CPRA's Master Coastal Plan, and will not cause negative effects to any local or regional CPRA project.

5.1.4 Public Outreach

The invaluable input received during each stakeholder meeting was noted and later analyzed by GISE, in order to determine possible projects that would, on a preliminary basis, mitigate some of the issues that stakeholders are currently dealing with. In general, some of the main recurring issues that stakeholders conveyed are:

- Maintenance dredging of canals, ditches, and bayous has not taken place in years.
- Existing canals and bayous have “silted-in” and lost drainage capacity.

A summary of the major findings and notes from all stakeholders’ meetings is included in Appendix E.

6.0 SURVEY

6.1 SURVEY COLLECTION METHODOLOGY

GISE evaluated the existing geography and overall watershed features in order to better understand existing hydrologic patterns and flow paths. With the aid of LiDAR data, hydrologic sub-basins within Assumption Parish were delineated. As mentioned previously, the drainage within Assumption Parish is divided by Bayou Lafourche. The west bank of Bayou Lafourche generally flows west or southwest, whereas the east bank flows east or southeast.

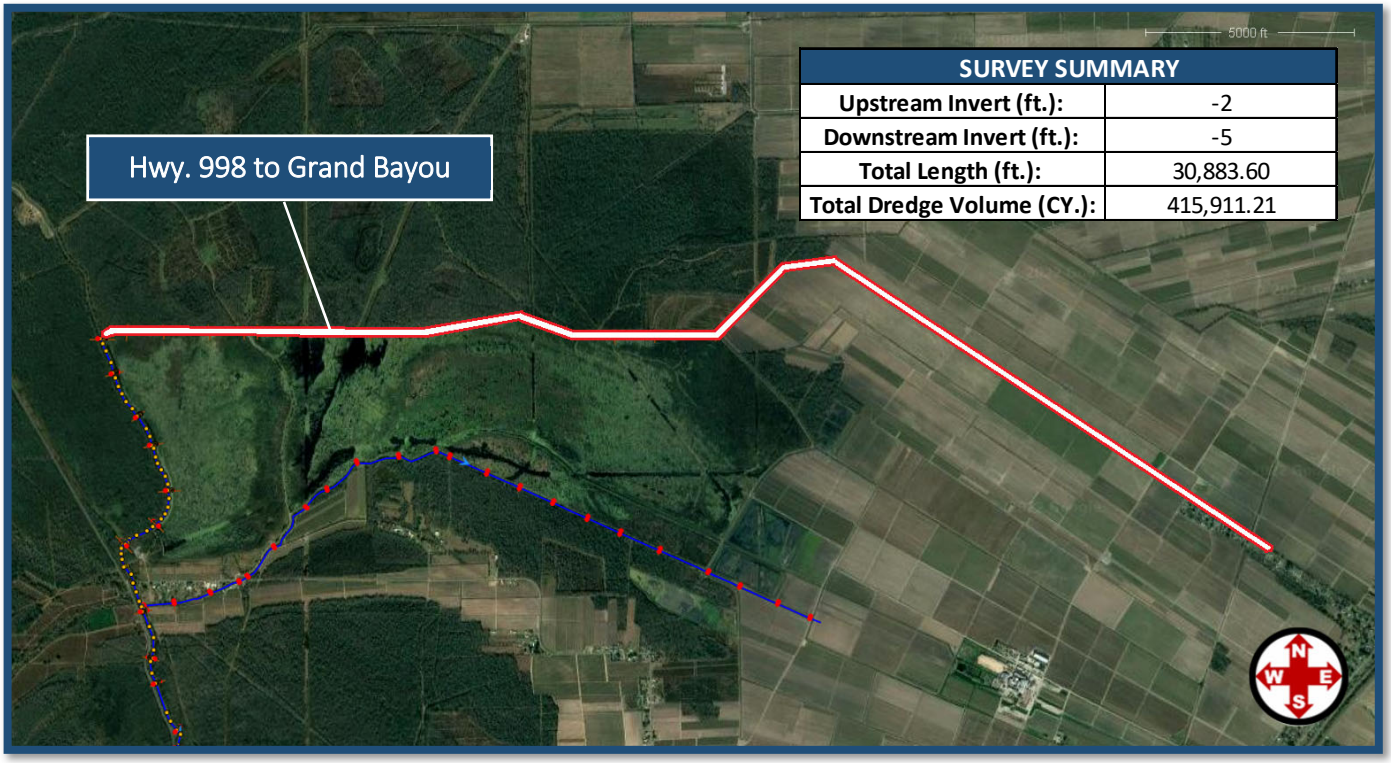
GISE conducted stakeholder meetings with Assumption Parish constituents and stakeholders. During these interactive workshops or open forum meetings, residents relayed invaluable information about historical flooding and existing drainage problems. With this information, GISE was able to confirm the existing drainage patterns, and identify existing projects requiring improvements. With the input from Assumption Parish constituents and stakeholders, and information gathered from Phase I, GISE mobilized its survey team to perform topographic and bathymetric surveys that encompassed over 185 miles of waterways. From stakeholder input, GISE was able to prioritize the proposed projects based on the local community's needs.

It is important to note that despite this report being an Assumption Parish focused drainage plan, some neighboring parishes are located within the same watershed and have flow paths toward Assumption Parish. In developing a list of possible projects to be included in the Assumption Parish drainage plan, GISE conceptually included the large-scale watershed effects on Assumption Parish. The overall watershed effects on Assumption Parish require significant modeling efforts in order to obtain more accurate findings and determine the feasibility of any larger scale projects.

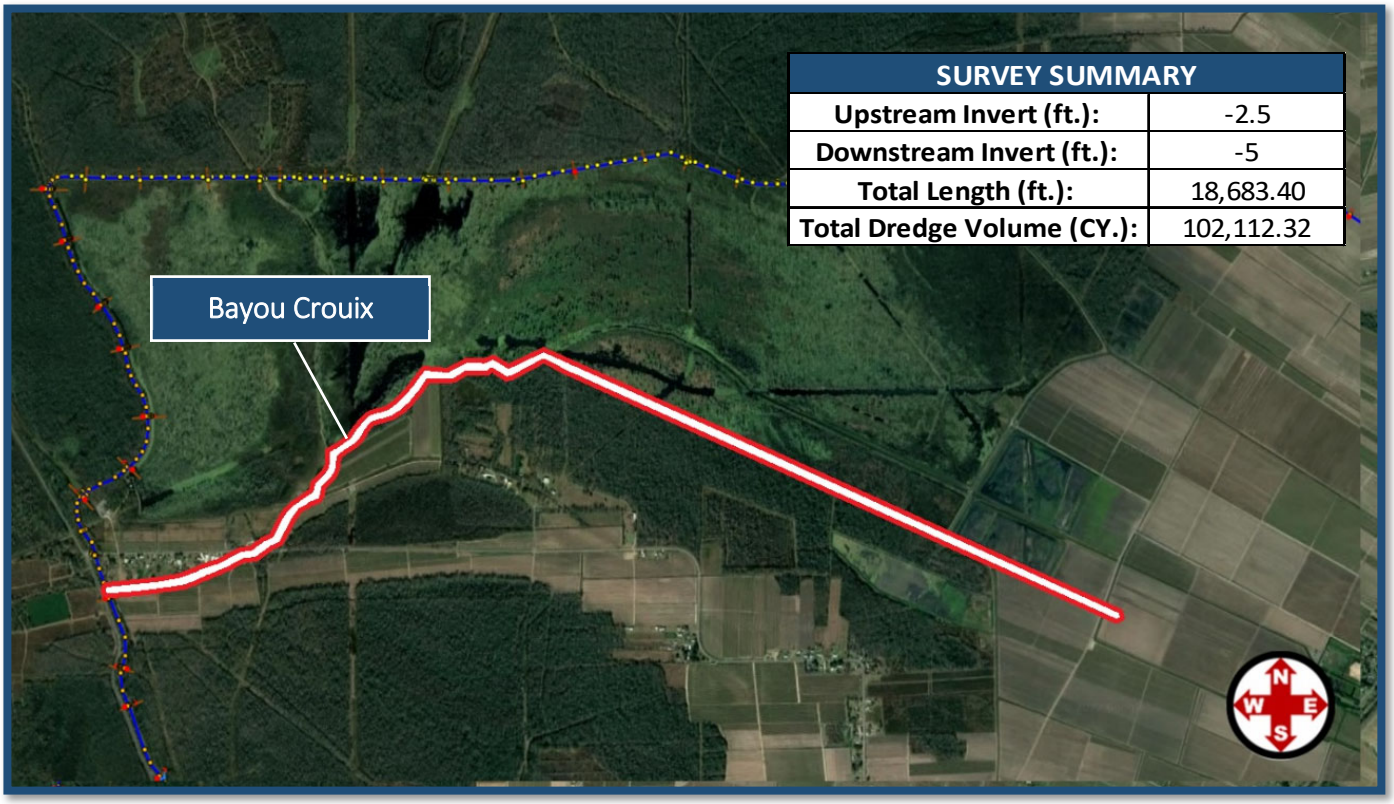
6.2 SURVEY RESULTS

Topographic and Bathymetric surveys were conducted on various channels, canals, lakes and bayous throughout Assumption parish based on research of existing drainage patterns and Assumption Parish constituents, resulting in over 185 miles of survey data. For the analysis of survey data and calculating total dredge volumes, the existing inverts were matched and a 30-foot bottom width was assumed. The following sections illustrate the survey effort.

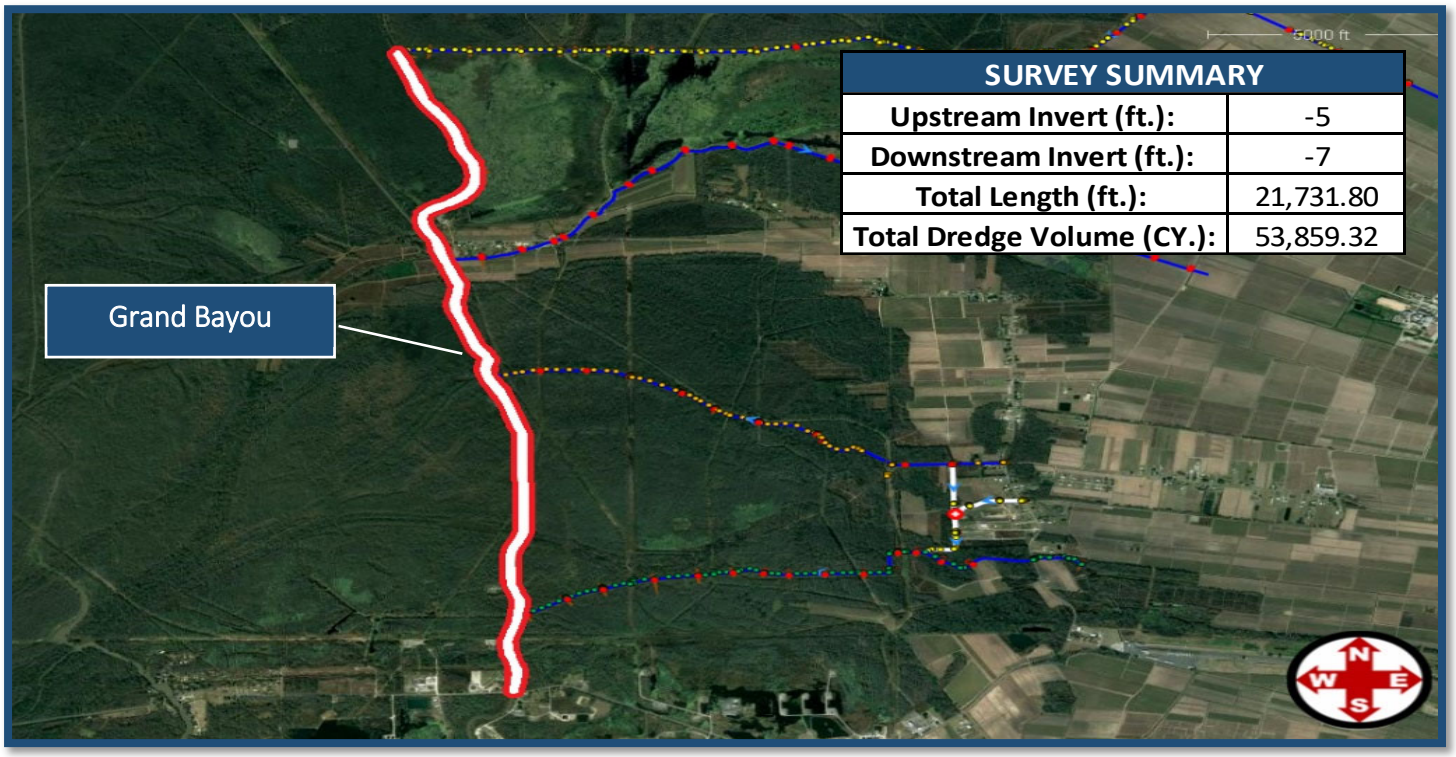
6.2.1 Hwy. 998 to Grand Bayou



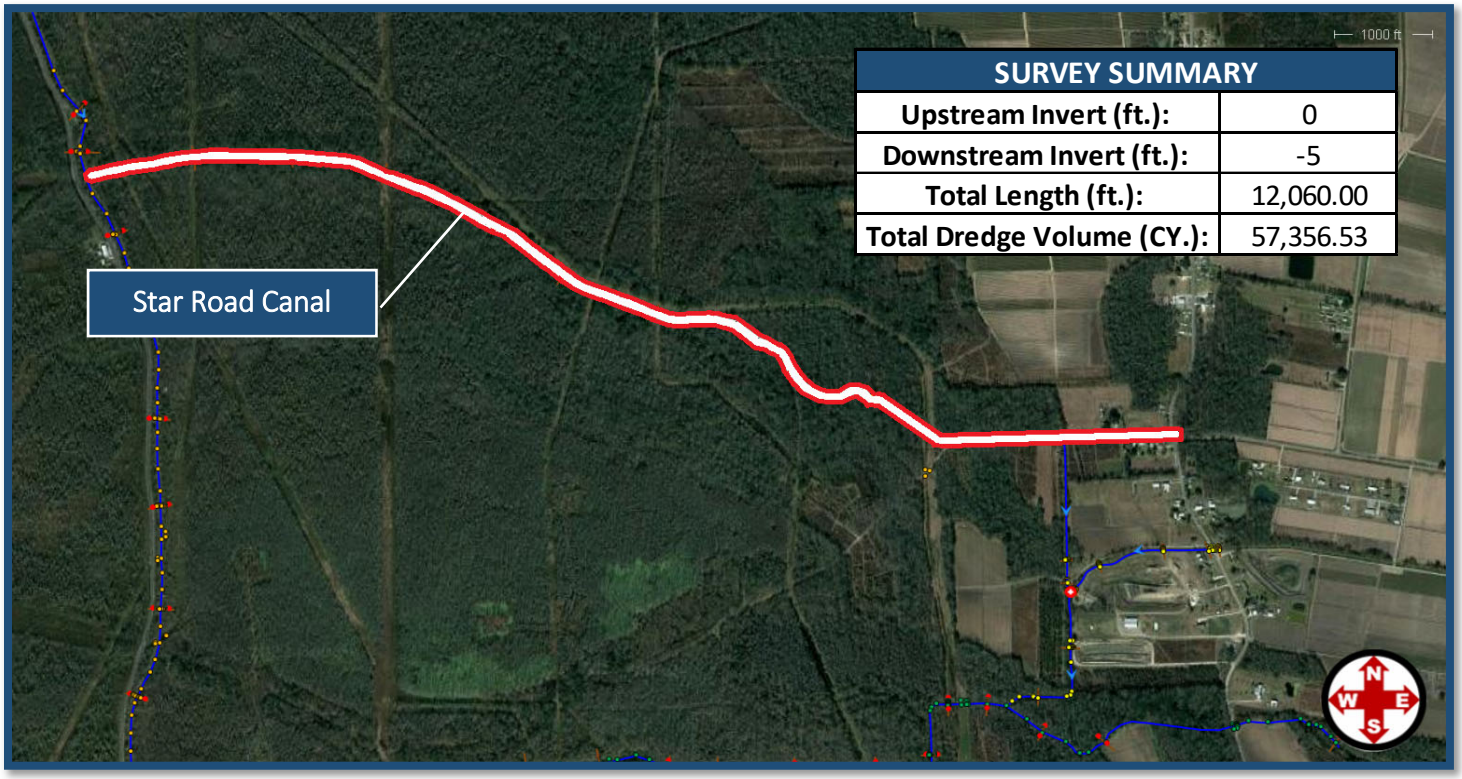
6.2.2 Bayou Crouix



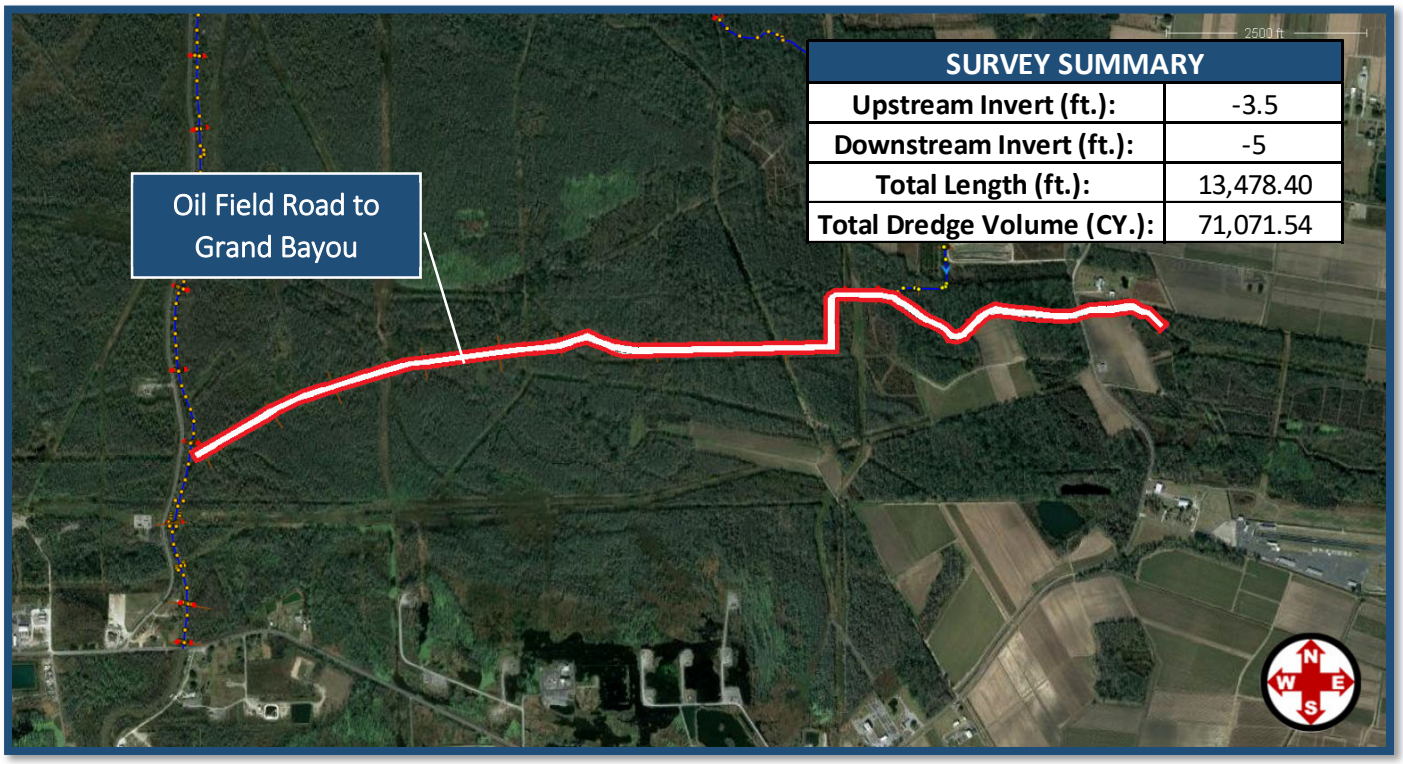
6.2.3 Grand Bayou



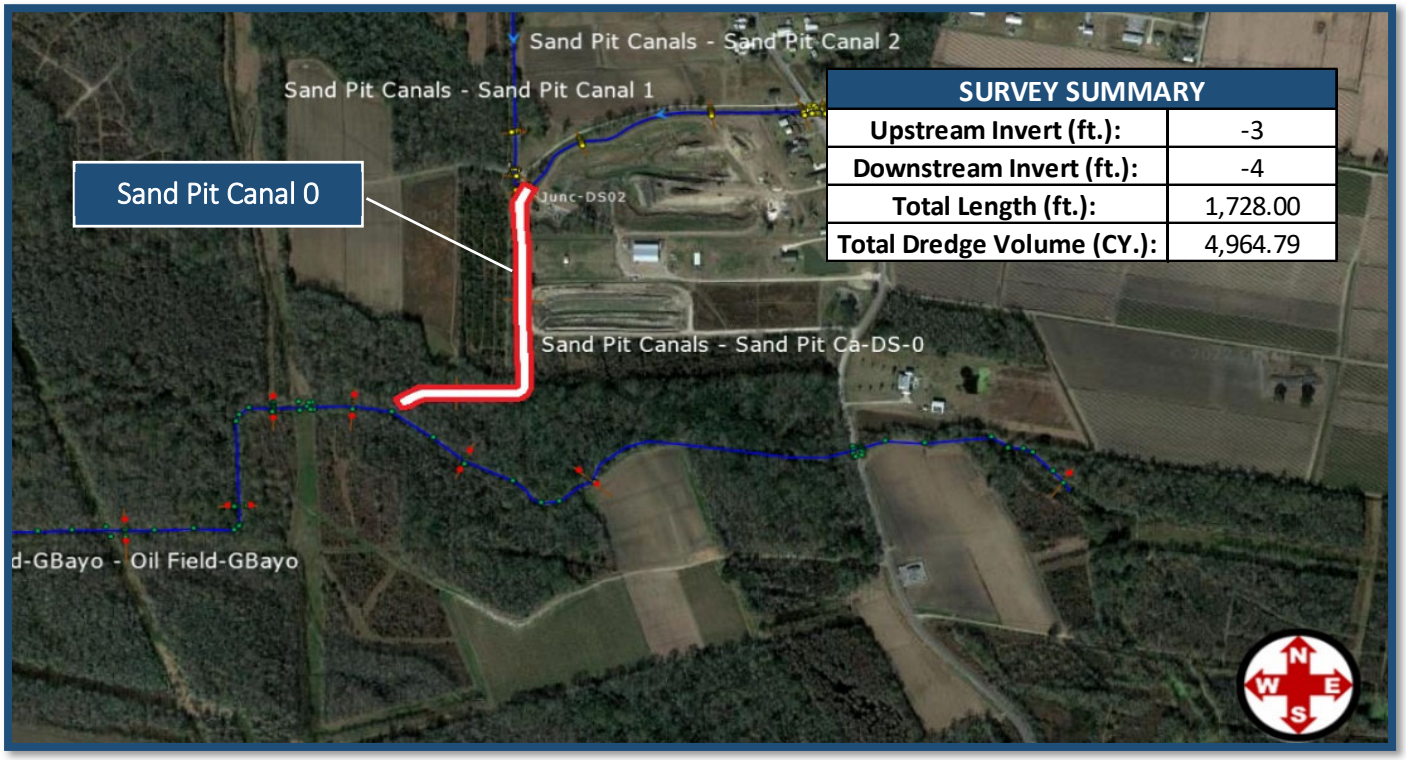
6.2.4 Star Road Canal



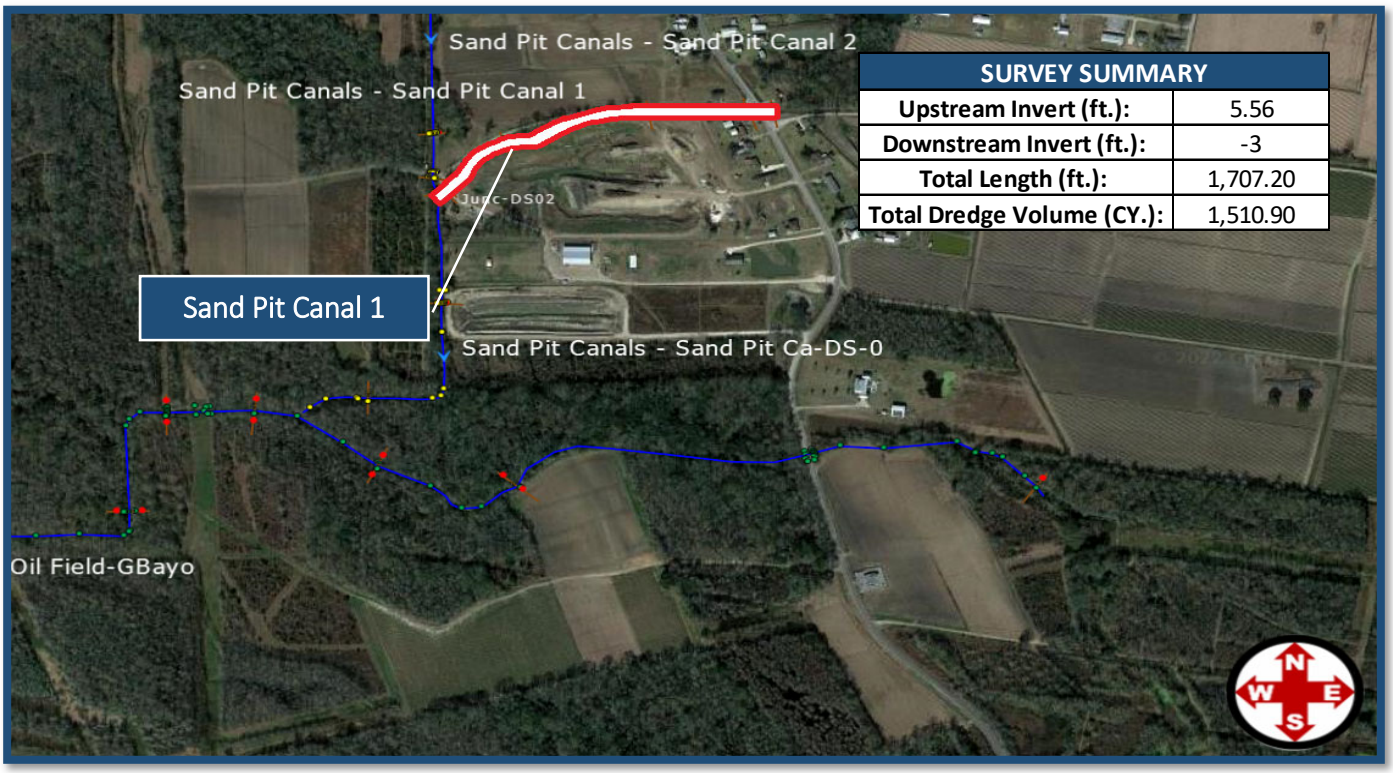
6.2.5 Oil Field Road to Grand Bayou



6.2.6 Sand Pit Canal

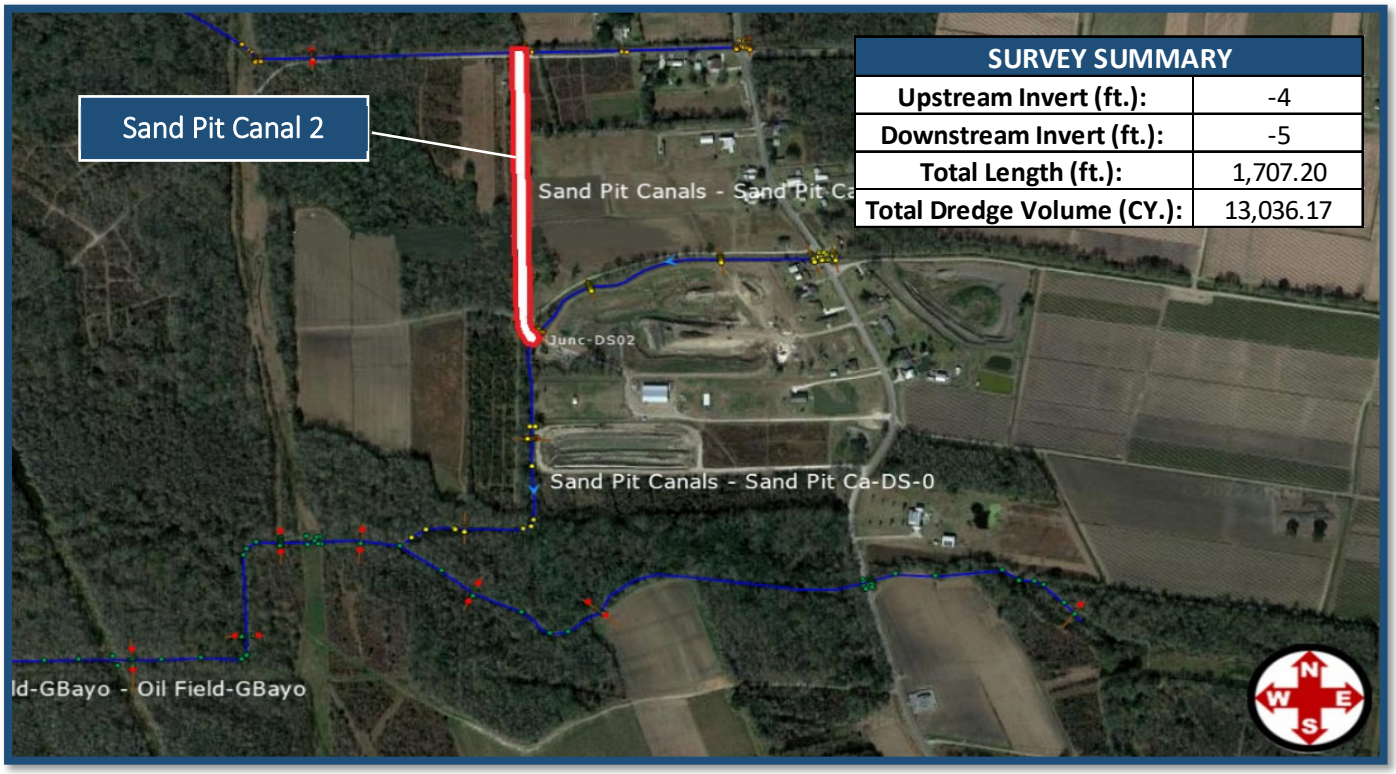


6.2.7 Sand Pit Canal 1



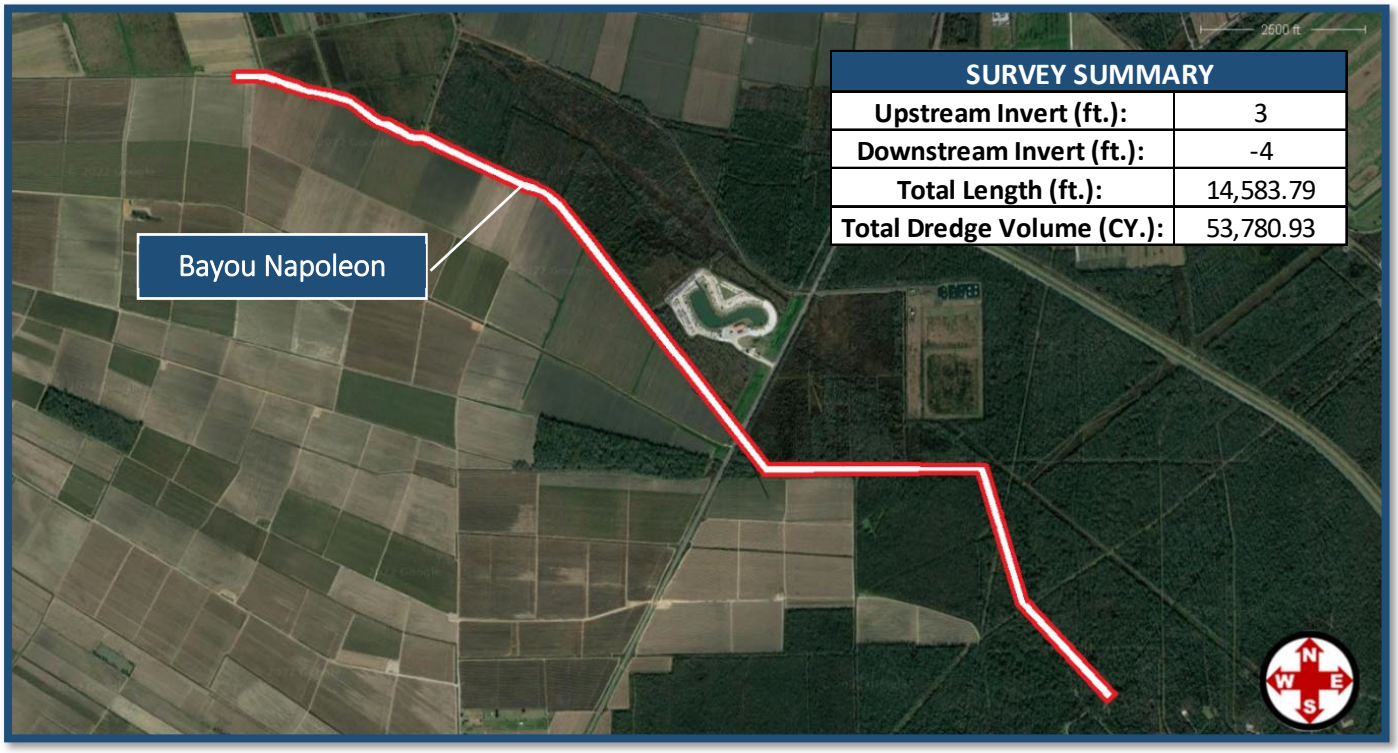
SURVEY SUMMARY	
Upstream Invert (ft.):	5.56
Downstream Invert (ft.):	-3
Total Length (ft.):	1,707.20
Total Dredge Volume (CY.):	1,510.90

6.2.8 Sand Pit Canal 2

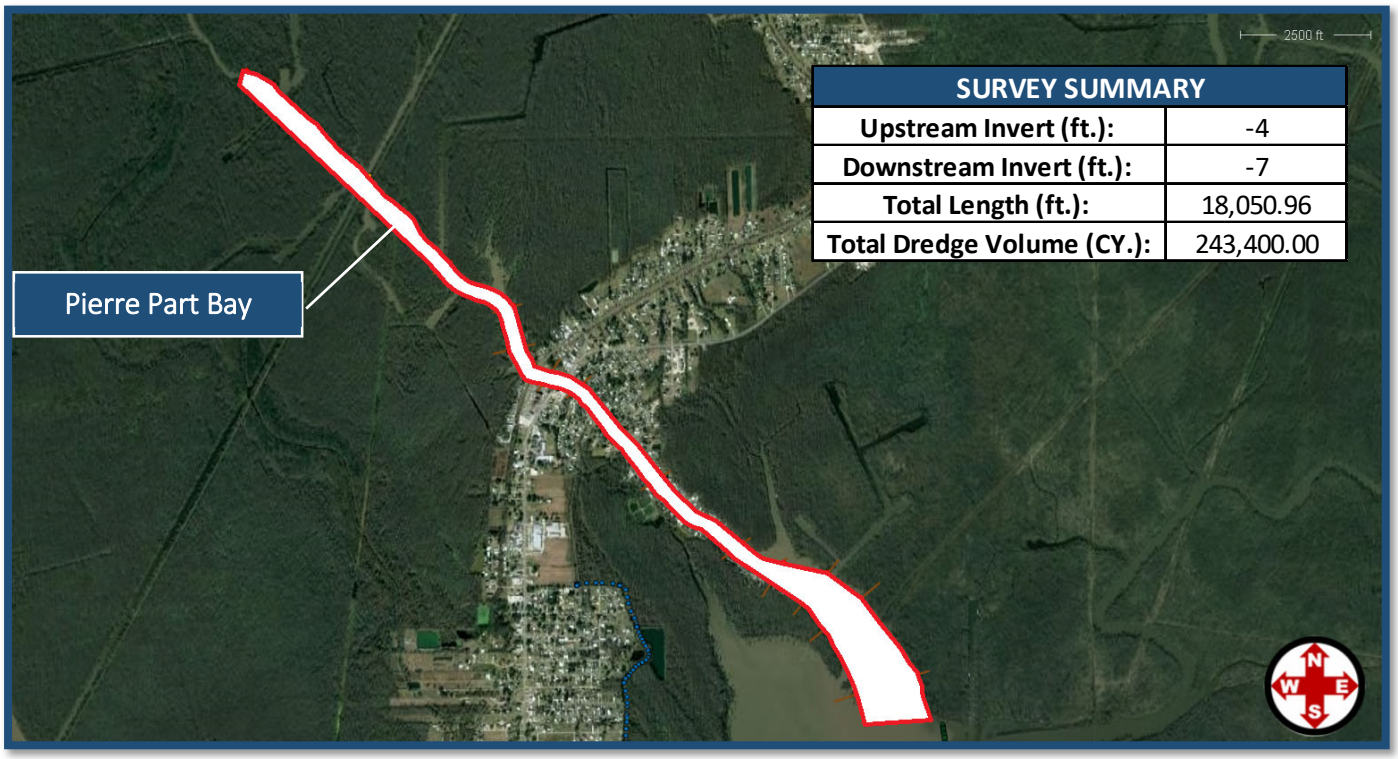


SURVEY SUMMARY	
Upstream Invert (ft.):	-4
Downstream Invert (ft.):	-5
Total Length (ft.):	1,707.20
Total Dredge Volume (CY.):	13,036.17

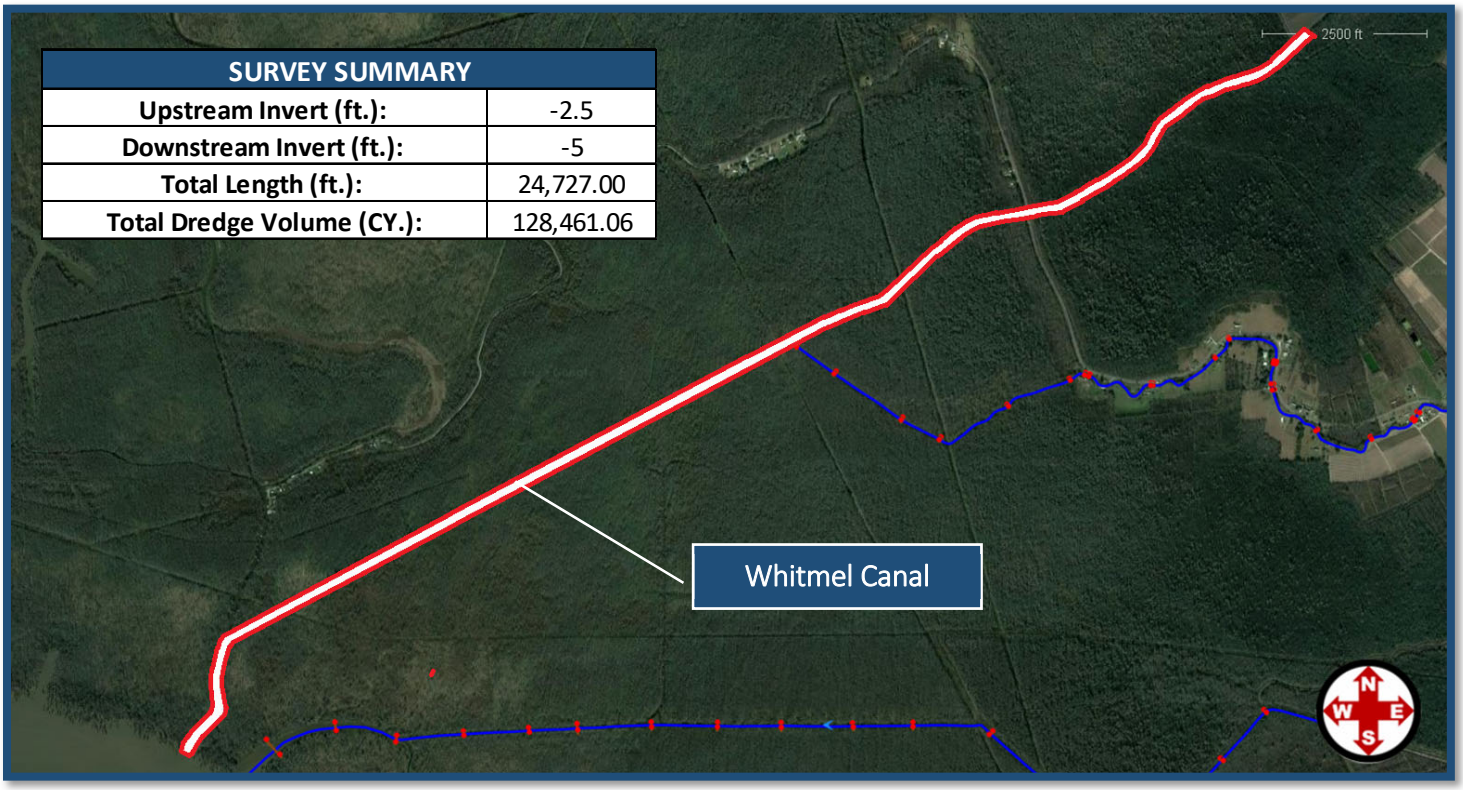
6.2.9 Bayou Napoleon



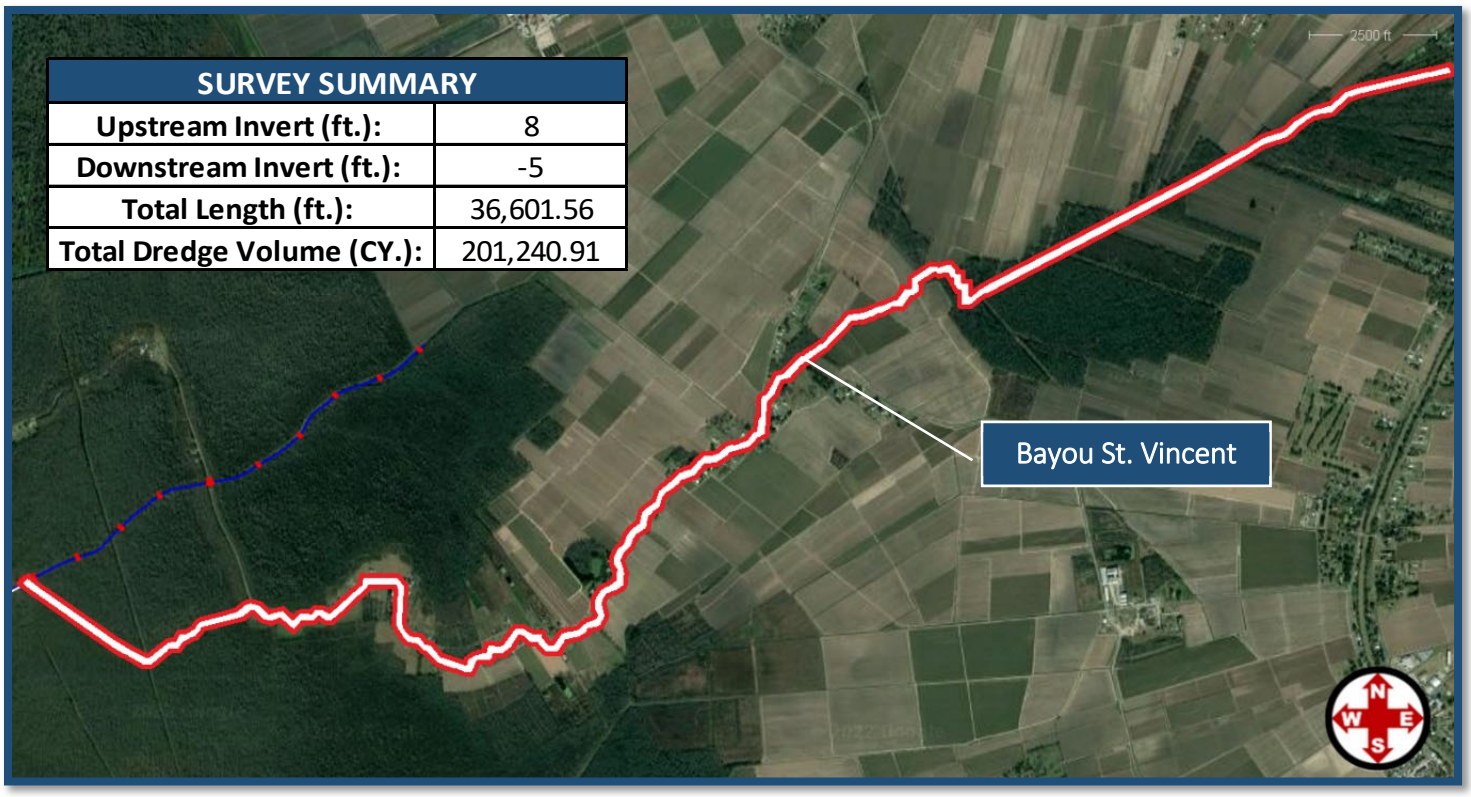
6.2.10 Pierre Part Bay



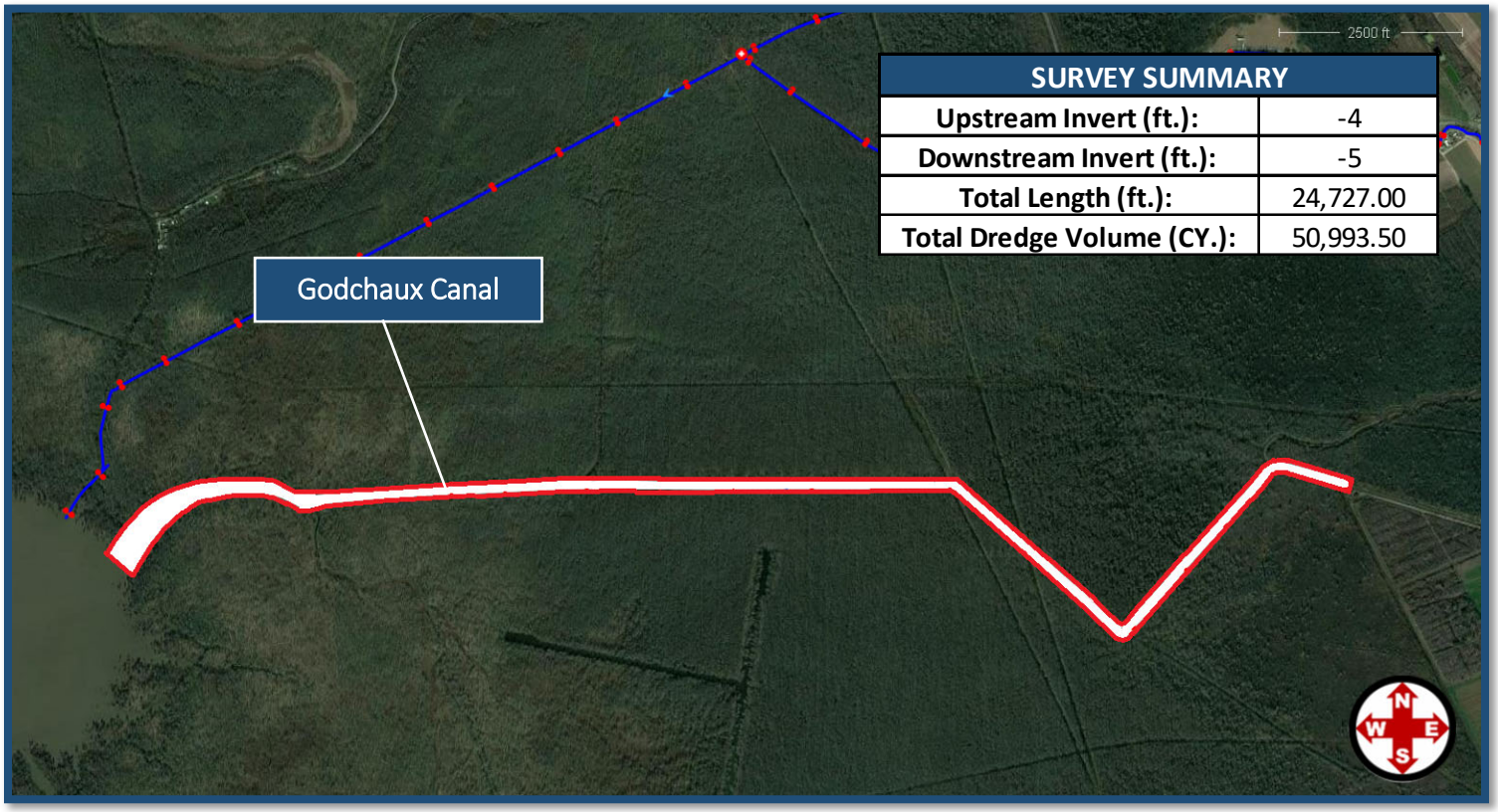
6.2.11 Whitmel Canal



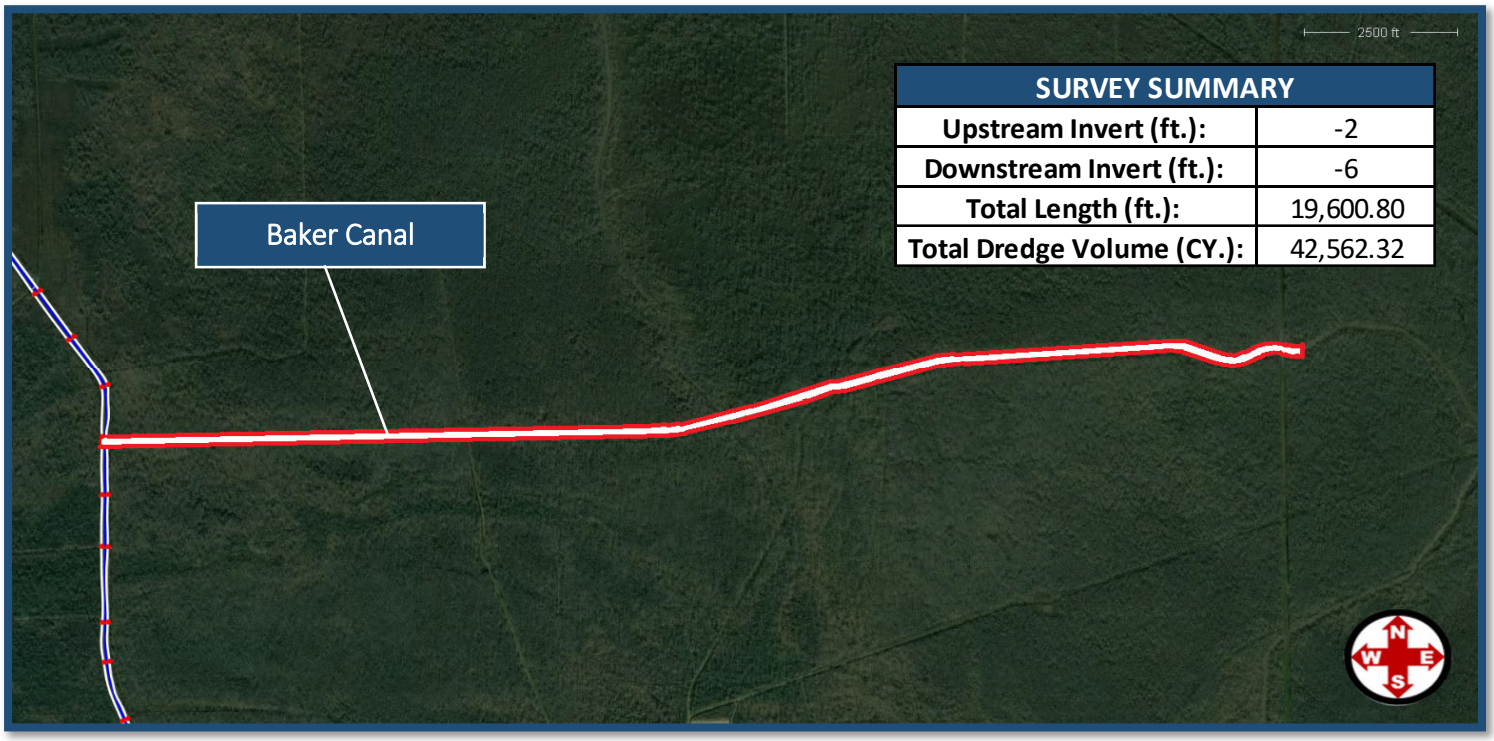
6.2.12 Bayou St. Vincent



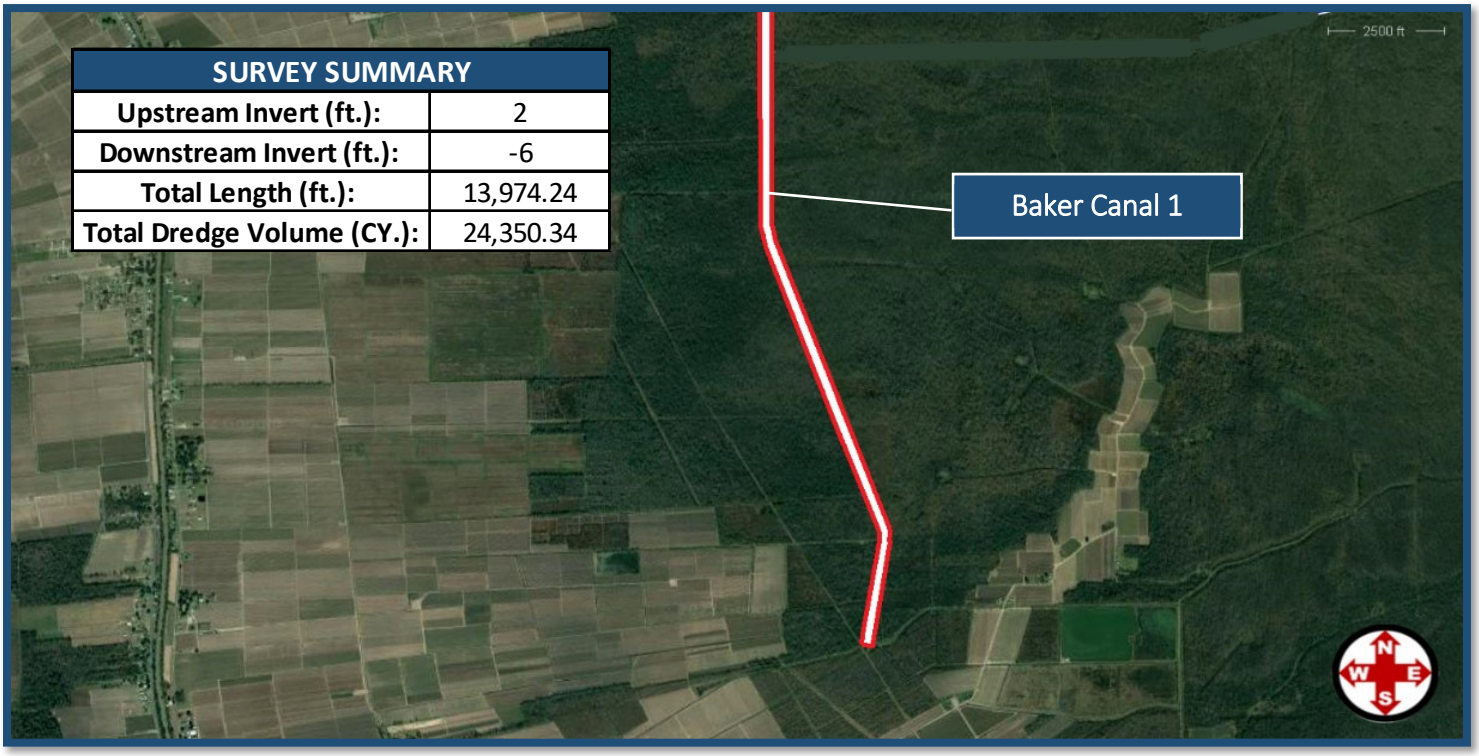
6.2.13 Godchaux Canal



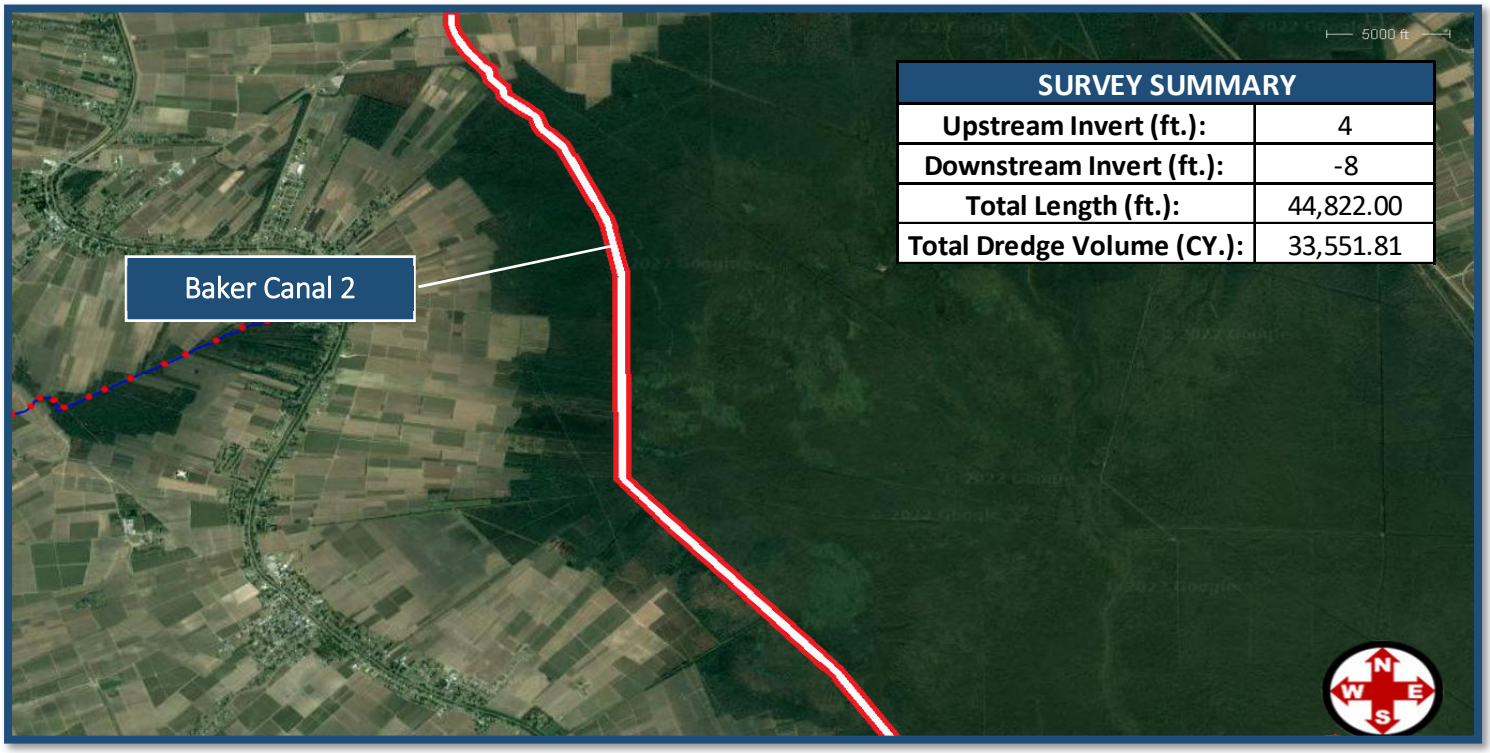
6.2.14 Baker Canal



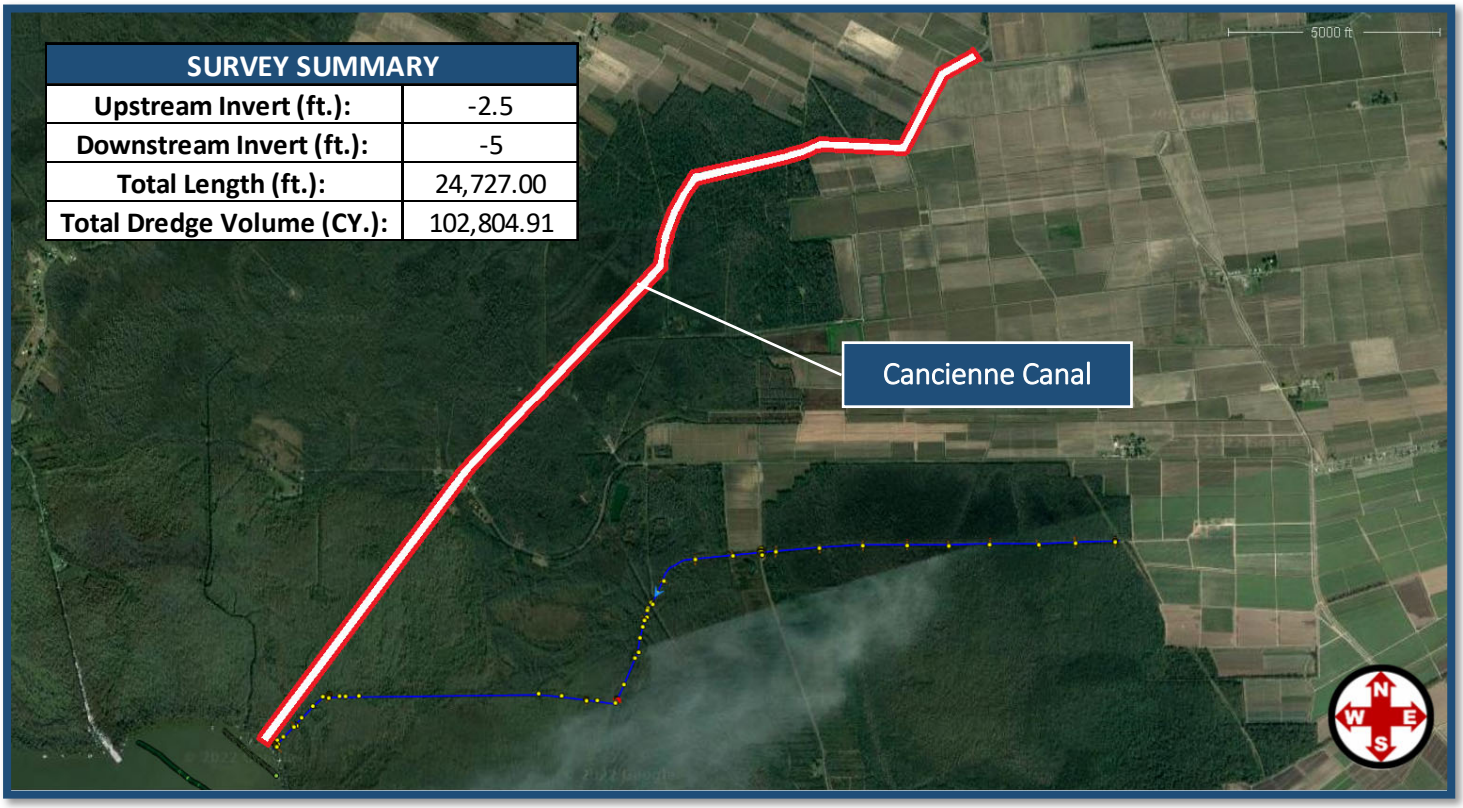
6.2.15 Baker Canal 1



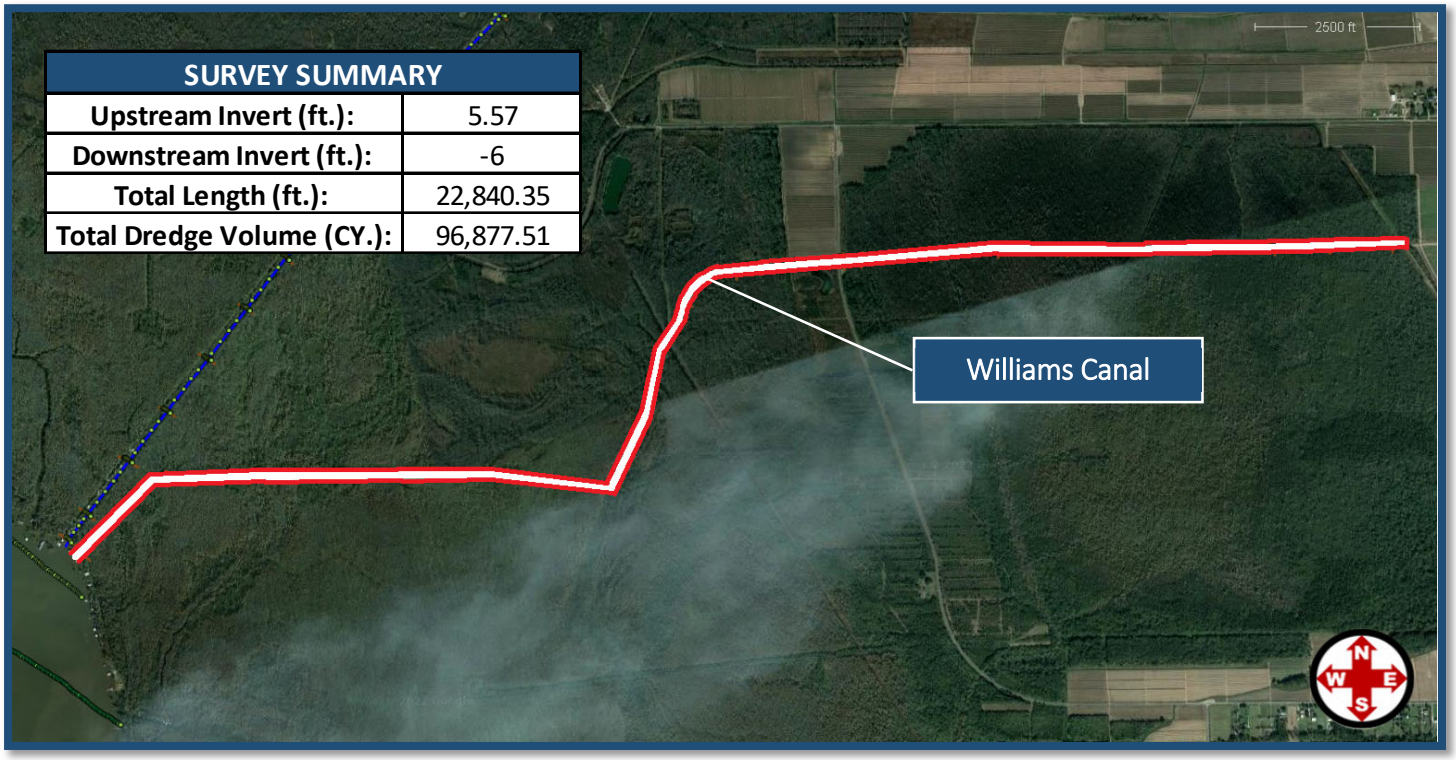
6.2.16 Baker Canal 2



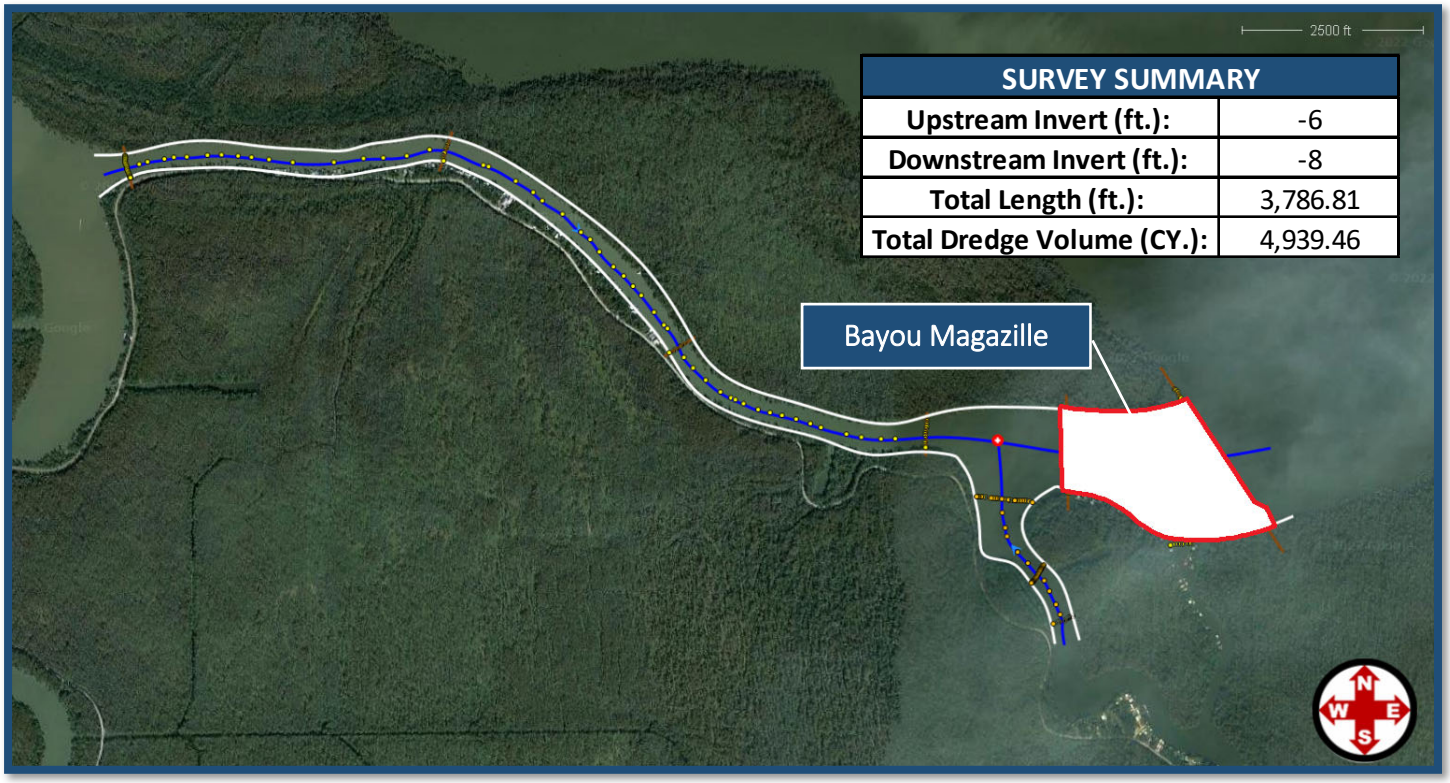
6.2.17 Cancienne Canal



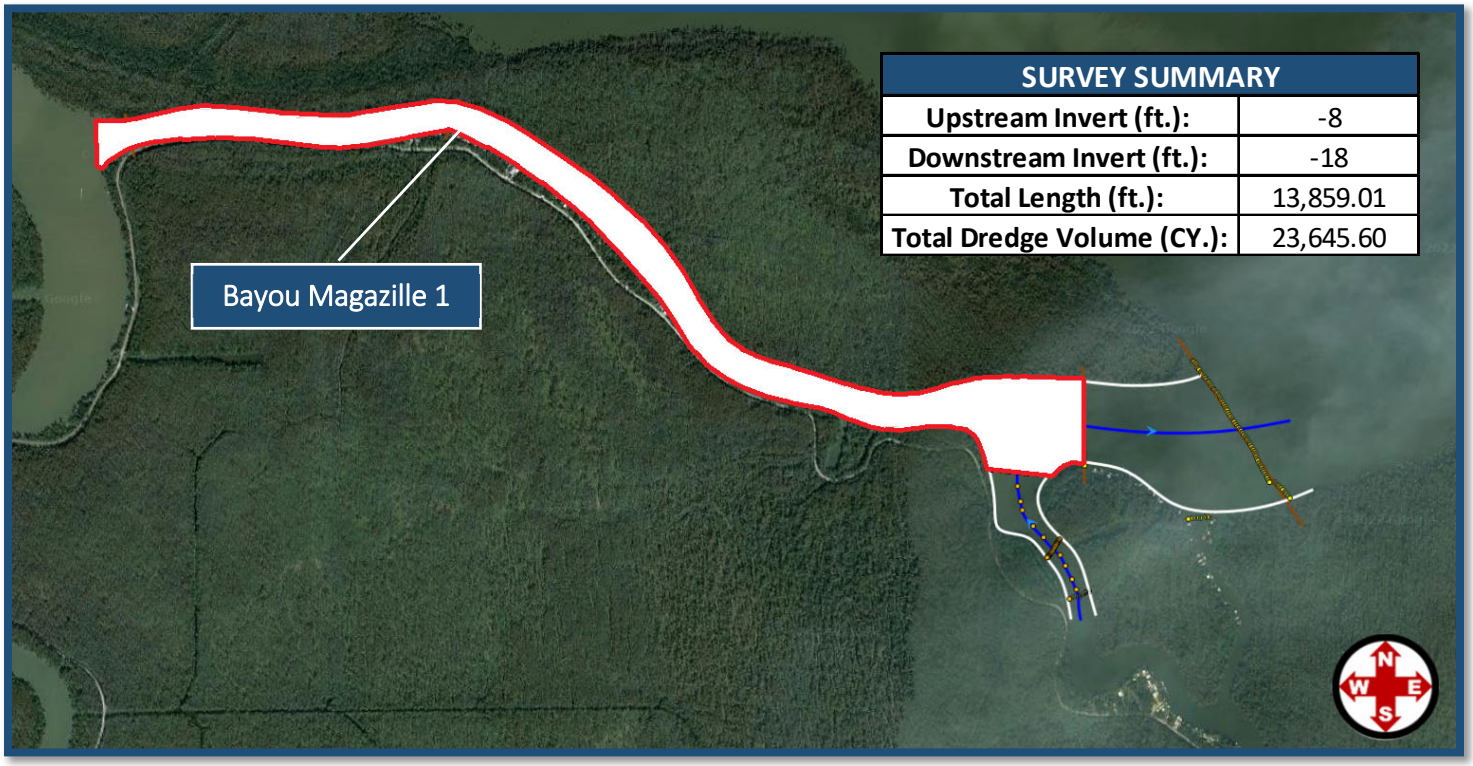
6.2.18 Williams Canal



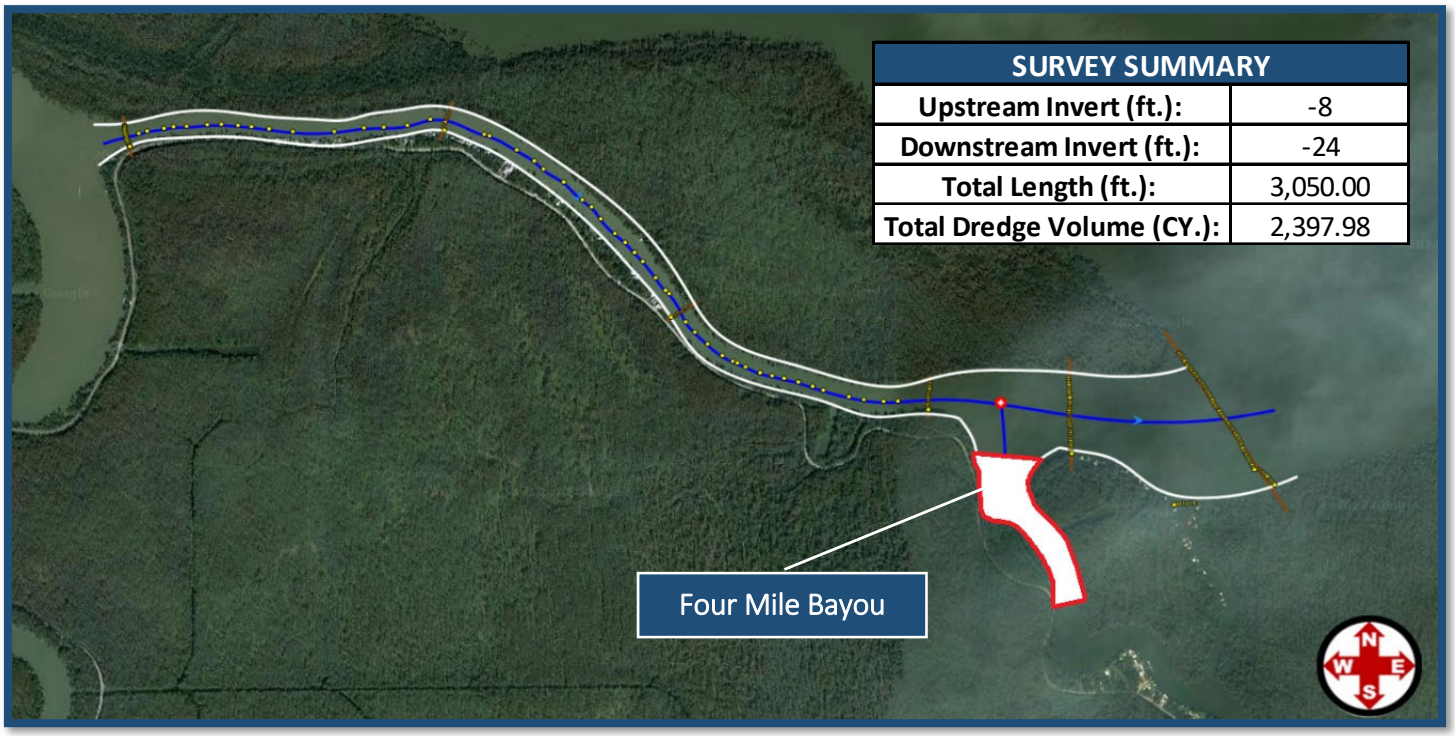
6.2.19 Bayou Magazille



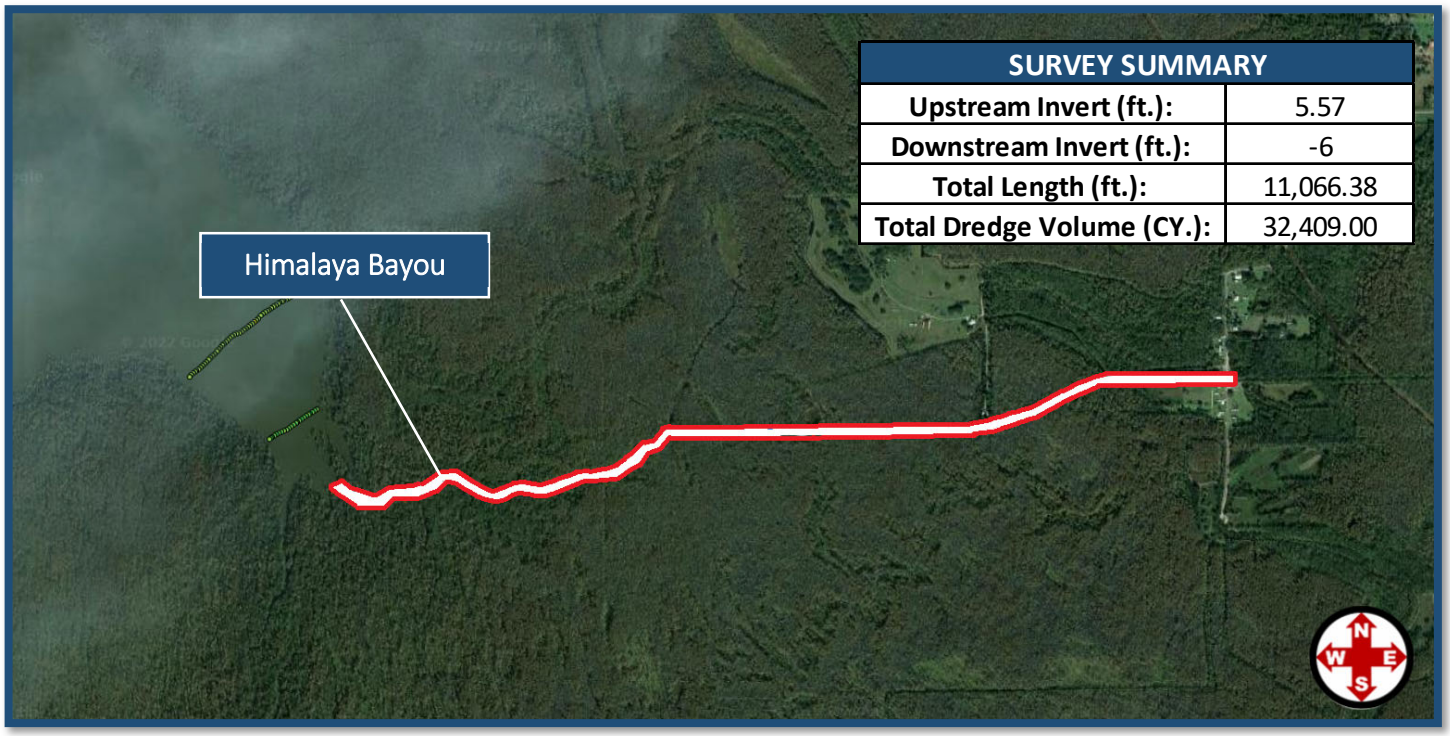
6.2.20 Bayou Magazille 1



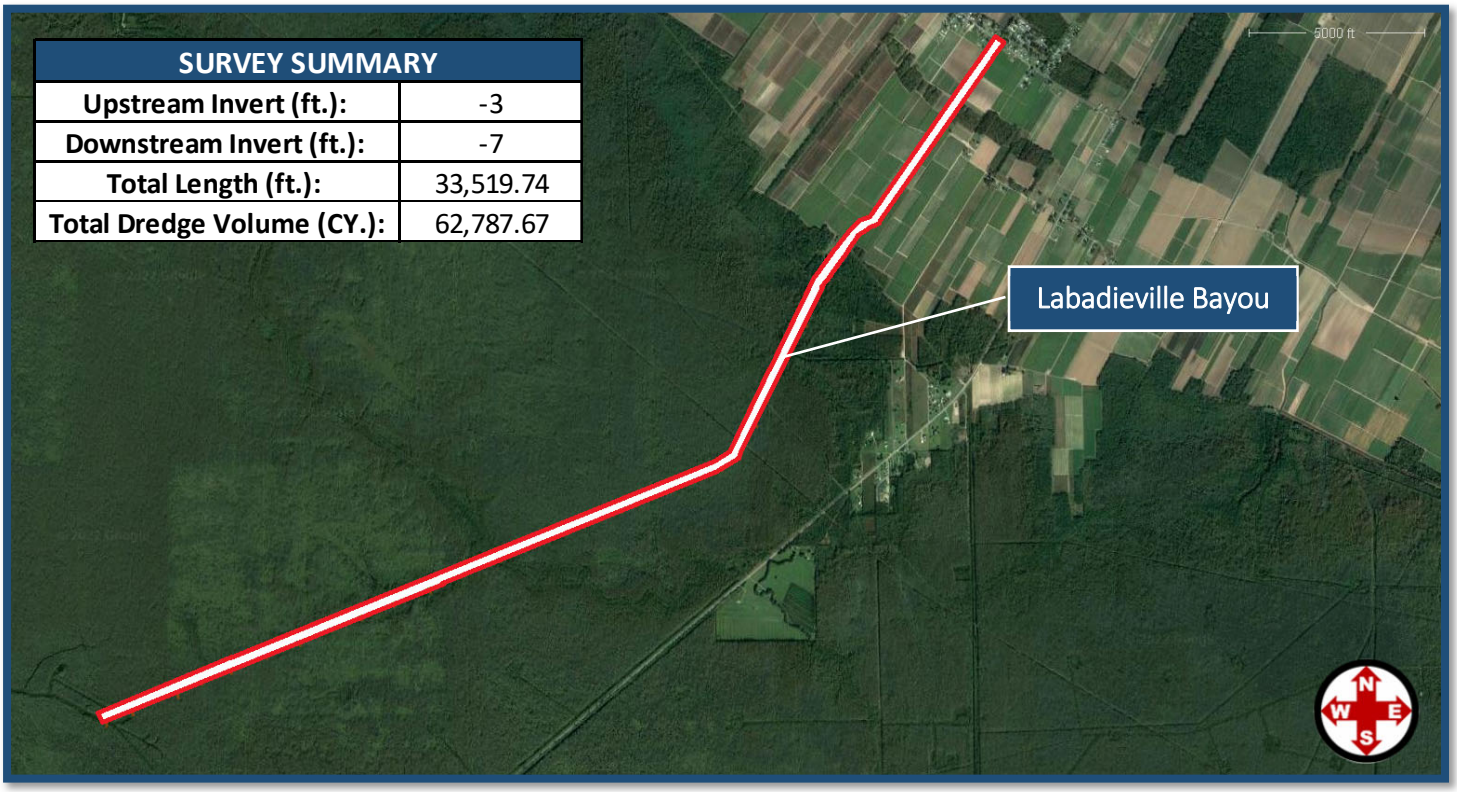
6.2.21 Four Mile Bayou



6.2.22 Himalaya Bayou



6.2.23 Labadieville Canal



The following Figure 5-1 shows an overall view of the completed surveys performed by GIS Engineering.

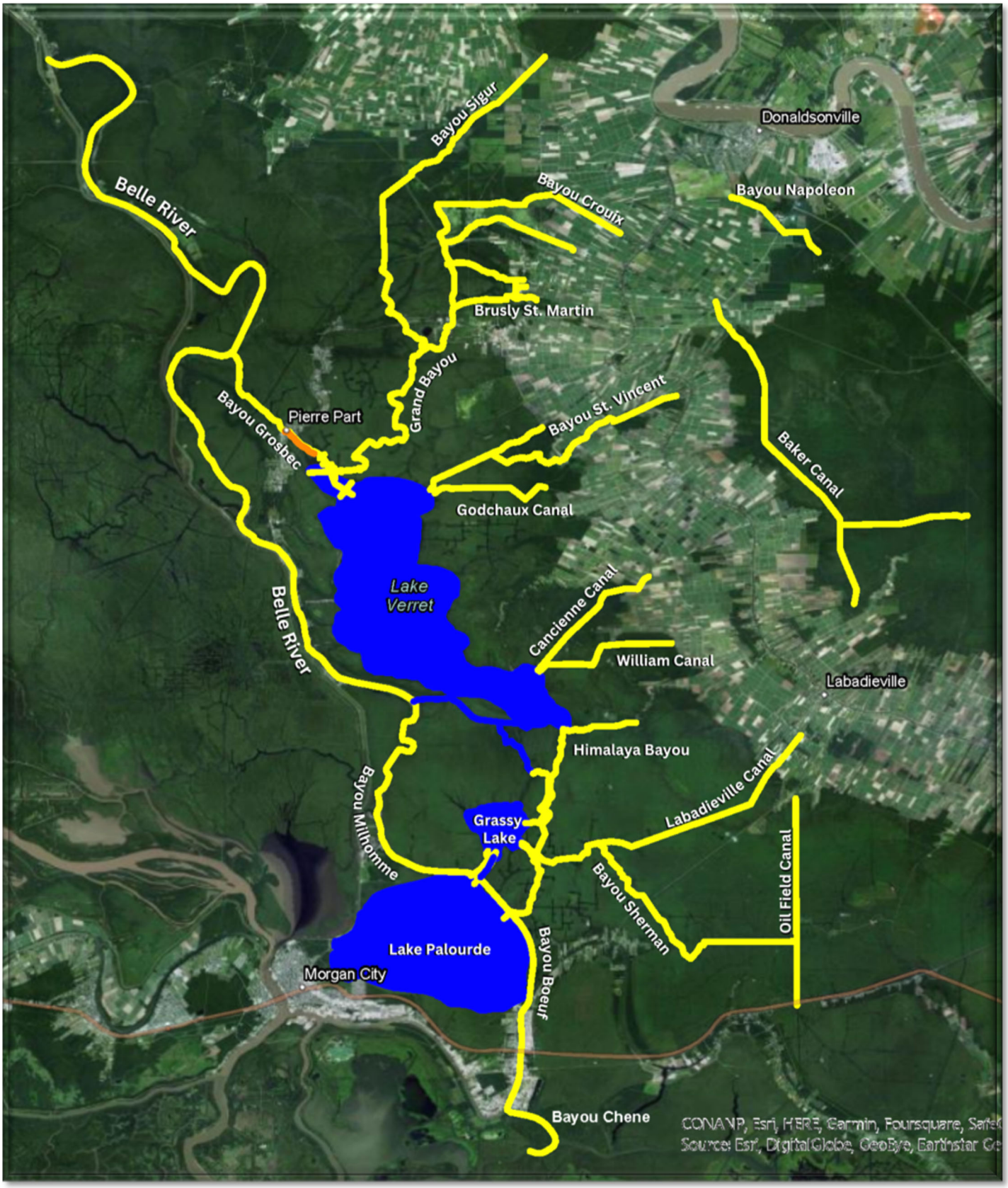


FIGURE 6-1: SURVEY SCOPE FOR ASSUMPTION DRAINAGE & FLOOD MITIGATION MASTER PLAN

7.0 HYDROLOGIC & HYDRAULIC MODELING

Hydrologic and Hydraulic models estimate the physical characteristics of a watershed to simulate channel flow and flood depths using numerical approximation methods. The process to quantify flood risk, water surface elevation, depth, velocity, and inundation extent relies on the hydrologic and hydraulic modeling software HEC-RAS version 6.3.1. The program provides a complete tool to quantify the movement of surface runoff through the Parish via overland flow, channels, streams, culverts, and bridges for steady or unsteady flow conditions. For the purpose of the DFMMP, this software will help determine flood inundation extents and hydraulic characteristics of existing and proposed modifications, and is an appropriate analysis platform for FEMA regulatory purposes, USACE project analysis and both federal and state grant application requirements. Proposed projects were evaluated on a large-scale model; therefore, smaller scale projects will require additional localized modeling to quantify benefits at the local scale.

7.1.1 Hydrologic Modeling Methodology

A temporal- and volumetric-based hydrologic methodology is used to develop hydrologic inputs for an unsteady hydraulic analysis. This involves development of synthetic rainfall hyetographs, which represent how much precipitation occurs, the duration of the precipitation, and how the precipitation is distributed for each storm. These rainfall hyetographs are routed using a rainfall-on-grid method, while the SCS Curve Number rainfall to runoff methodology simulates the rainfall/volumetric losses. Initial flow and boundary conditions are used to finetune the model to more accurately simulate real world flooding events.

7.1.1.1 Model Setup

Input Data

TABLE 7-1: DATASETS AND SOURCES

DATASET	SOURCE
Terrain/Topo Data	2010 USACE-MVN
	2007 USACE-MVN
	Coastal National Elevation Database (CoNED)
	USGS Topography
	LSU AgCenter
Land Cover	National Land Cover Database (NLCD)
Soil Data	State Soil Geographic (STATSGO)
Precipitation	NOAA
Crossing Data	2021 Field Survey

7.1.1.2 Topographic Data

Quality topographic data is critical in developing sound H&H models as this is the basis for defining elevations of the overland and channels throughout the watersheds. The terrain for the model was built from the datasets shown in the Table above. Using publicly available elevation datasets, the terrain for the regional area of Assumption Parish and surrounding areas was developed. The terrain was further modified using localized field survey data at locations for further model and terrain building accuracy.

7.1.1.3 Land Cover

The land based geospatial information used to develop the DFMMP is comprised of information available from the National Land Cover Database, which includes land cover and soils necessary for all hydrologic and hydraulic analysis purposes. The spatial datums utilized for the model building are:

- Horizontal Datum: NAD 1983 State Plane Louisiana South, Federal Information Processing Series (FIPS) 1702, in US ft
- *Vertical Datum: NAVD88 datum, Geoid 12B, in English units (e.g. feet), which corresponds with NAVD 88 datum, epoch 2009.55*

In addition to creating an elevation terrain based on the available terrain data sets, a land use cover was assigned to each corresponding area. USDA NLCD 2016 Land Cover raster and the 2018 USDA Soils SSURGO Raster with Hydrologic Soil Group (HSG). The NLCD land cover data set also includes percentage impervious coverage. The data sets are publicly available at the USDA geospatial data gateway. Soil and land cover information were utilized in the classification of SCS curve number and overland runoff coefficients, primarily to develop hydrologic runoff hydrographs.

7.1.1.4 2D Computational Mesh

HEC-RAS utilizes a Finite-Volume, two-dimensional computational mesh to model the project area. Using the underlying terrain and landcover data, a mesh grid is created for the model geometry. Although the grid for the 2D mesh varies in size by cell, the general average size cell utilized for the model was a 1,000 ft by 1,000 ft cell size. Cell sizes and shapes are adjusted as needed for locations that have significant terrain changes or land use cover. As an example, levees or water bodies, including bayous, generally have smaller cell sizes, and shapes are adjusted as needed to more accurately represent the areas. Figure 7-1, below shows the computational mesh created to represent Lake Verret and the smaller bayous that flow into Lake Verret. As it can be observed, the bayous have cell sizes that are significantly smaller to the average cell, to more accurately represent the terrain in the model.

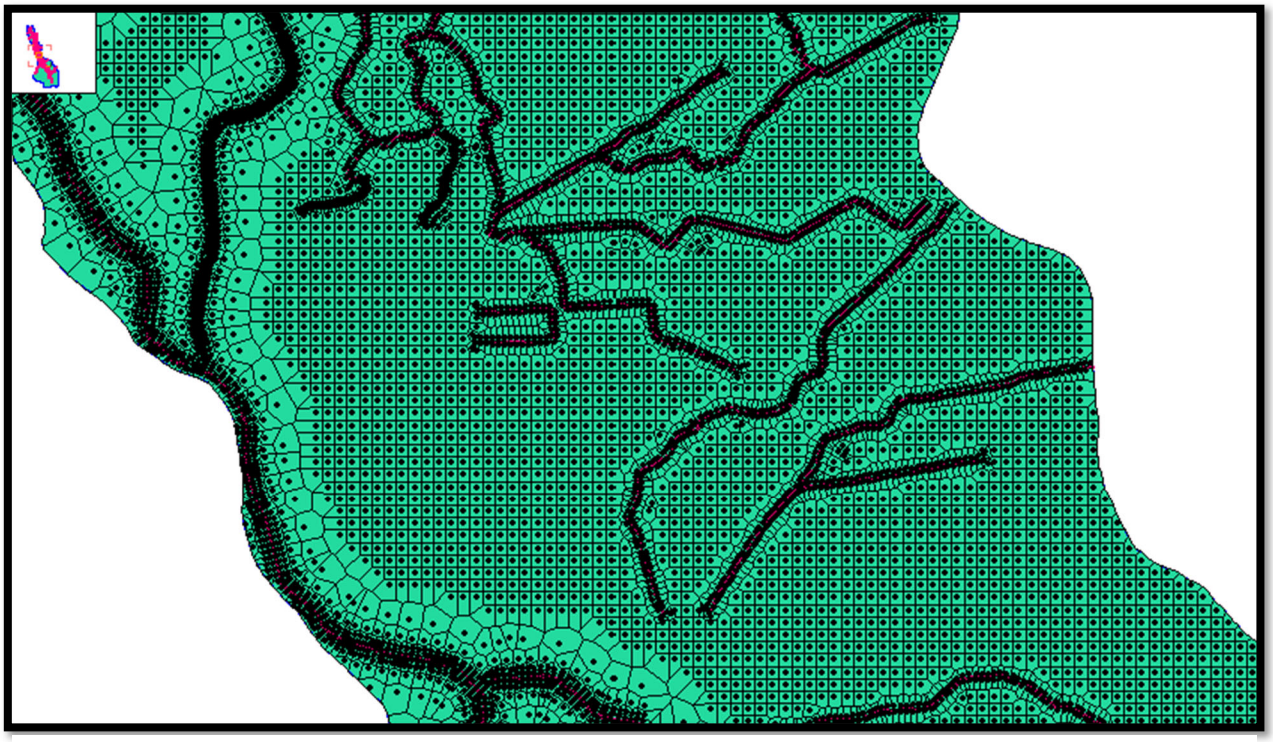


FIGURE 7-1: COMPUTATION MESH USED FOR MODEL

7.1.1.5 Precipitation

Rainfall loss methods are used to account for the infiltration, interception, evaporation, and nonpoint depressional storage of rainfall. HEC-RAS 6.3.1 accounts for rainfall losses in the 2D hydraulic model methodology. Regional and Basin Analysis: HEC-RAS version 6.0 will account for initial rainfall losses using the SCS Curve Number infiltration method. Regional percent impervious, Manning's "n", soil group, and pervious curve number layers are utilized to analyze the initial losses. Precipitation for the area can be modeled for any storm intensity desired, ranging from a 1-year storm event to a 1000-year storm event. NOAA's Precipitation Frequency Data Server (PFDS) provides estimated precipitation for specific locations. The rainfall depths are provided for a wide variety of recurrence interval and storm duration, based on frequency analyses performed – commonly known as Intensity Duration Frequency (IDF) curves.

Once rainfall depths for the desired location are observed, hyetographs representing the distribution of the precipitation intensity over time are developed. Hyetographs were developed for the model following the Soil Conservation Service (SCS), now National Resources Conservation Service (NRCS) guidelines for precipitation hyetographs. The 5-Year, 7-day hyetograph is shown as an example below in Figure 7-2.

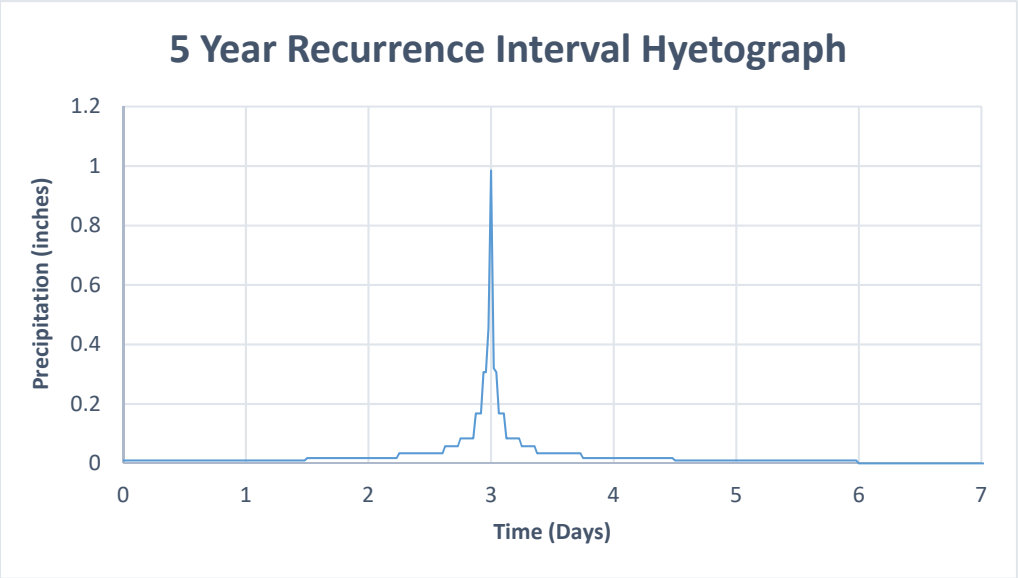


FIGURE 7-2: 5 YEAR RECURRENCE INTERVAL HYETOGRAPH

7.1.2 Hydraulic Modeling Methodology

7.1.2.1 Model Geometry

Field survey data obtained from critical conveyance channels was used to develop the geometry of the hydraulic systems. 2D connection areas were used to represent the forced movement of water from one area to another (pump stations), as well as the blockage of water from one area to another (flood control gates).

7.1.2.2 Features and Structures

Existing hydraulic structures and flood control applications were included in the model. The Bayou Chene Gate closure was included in the model, as well as existing levees that mitigate storm surge.

7.1.2.3 Boundary Conditions

Four types of boundary conditions were used in the analysis: rainfall hyetographs on 2D areas (rainfall on grid), stage hydrographs, inflow/outfall flow hydrographs, and specific rules at each 2D connection area.

- Rainfall hyetographs: rainfall-on-grid computational methodology
- Stage hydrographs: known water surface elevations at different times of the simulation based on gauges/estimated surge levels.
- Flow hydrographs: known inflow/outflow at different times of the simulation
- Rules: Used to model gates, levees or pump stations.

The conveyance of local rainfall that falls onto Assumption Parish is hydrologically affected by adjacent parishes and bodies of water. To the north, runoff flows from Iberville and Ascension into the Parish from Little Tensas Bayou, Bayou Pierre Part, and Belle River from the Northwest

and Bayou Lafourche from the Northeast. Lake Verret is the main outfall for the bayous and canals running from Pierre Part and Bayou Lafourche. Lake Verret then has to flow south through Grassy Lake and Lake Palourde where it finds its way through Bayou Chene and ultimately down the lower Atchafalaya into the Gulf of Mexico. The parish is bound on the east side by the western Mississippi River guide levee and is bound on the west side by the eastern Atchafalaya River guide levee. These geographic boundaries are included in the model using the different boundary conditions depicted above.

7.1.3 Model Calibration

Historical rainfall hyetographs from actual rainfall events that have occurred in the past were utilized for calibration and validation of hydrology and hydraulic models. Calibration and validation are performed by comparing modeled results to measured field values from the same storm event to verify the accuracy of the model results. In addition, stream gage stage data of historical storm events is used for calibration and validation.

For the model calibration, the 2016 flood events were modeled and used for calibration purposes. The results of the calibration model were similar to the measured field values and USGS stream gage data available. The following gauges were used for model calibration:

USGS GAGE NO.	LOCATION
295433091125700	Belle River @ Hwy 70 near Pierre Part
295520091142200	Intracoastal Waterway SW of Pierre Part
073814675	Bayou Boeuf @ Railroad Bridge at Amelia

7.1.4 Model Results

Following the calibration of the model, improvement projects were modeled to gauge the benefits of the proposed improvements. The model considered large-scale projects that would provide regional benefits. These improvements consisted primarily of the following projects:

- Bayou Sorrel Pump Station: a 3,000 cfs pump station pumping stormwater into the Atchafalaya.
- Bayou Pigeon Pump Station: a 1,000 cfs pump station
- Belle River Pump Station: a 1,000 cfs pump station
- Morganza to The Gulf (MTTG) Levee Alignment: extended MTTG from Gibson along the Intracoastal Waterway to Amelia, LA

The results from the proposed regional scale projects provided positive benefits to the region. Figure 7-3 below depicts the impacts of the proposed project for a 25-year storm event with a

100-year storm surge event. The benefits are depicted by a color scale ranging from green being a positive impact, to red being a negative impact. Positive benefits quantified are based on water surface elevation or flood reduction in feet, whereas negative benefits resulted in an increased water surface elevation. As it can be seen, with the proposed improvements constructed, over 300 square miles within the larger Terrebonne Basin could see a flood reduction from approximately 12-24 inches. It is important to note that all of the negative impacts from the proposed project result outside of the MTTG levee system. The vast majority of the positive impacts are all primarily located within Assumption Parish.

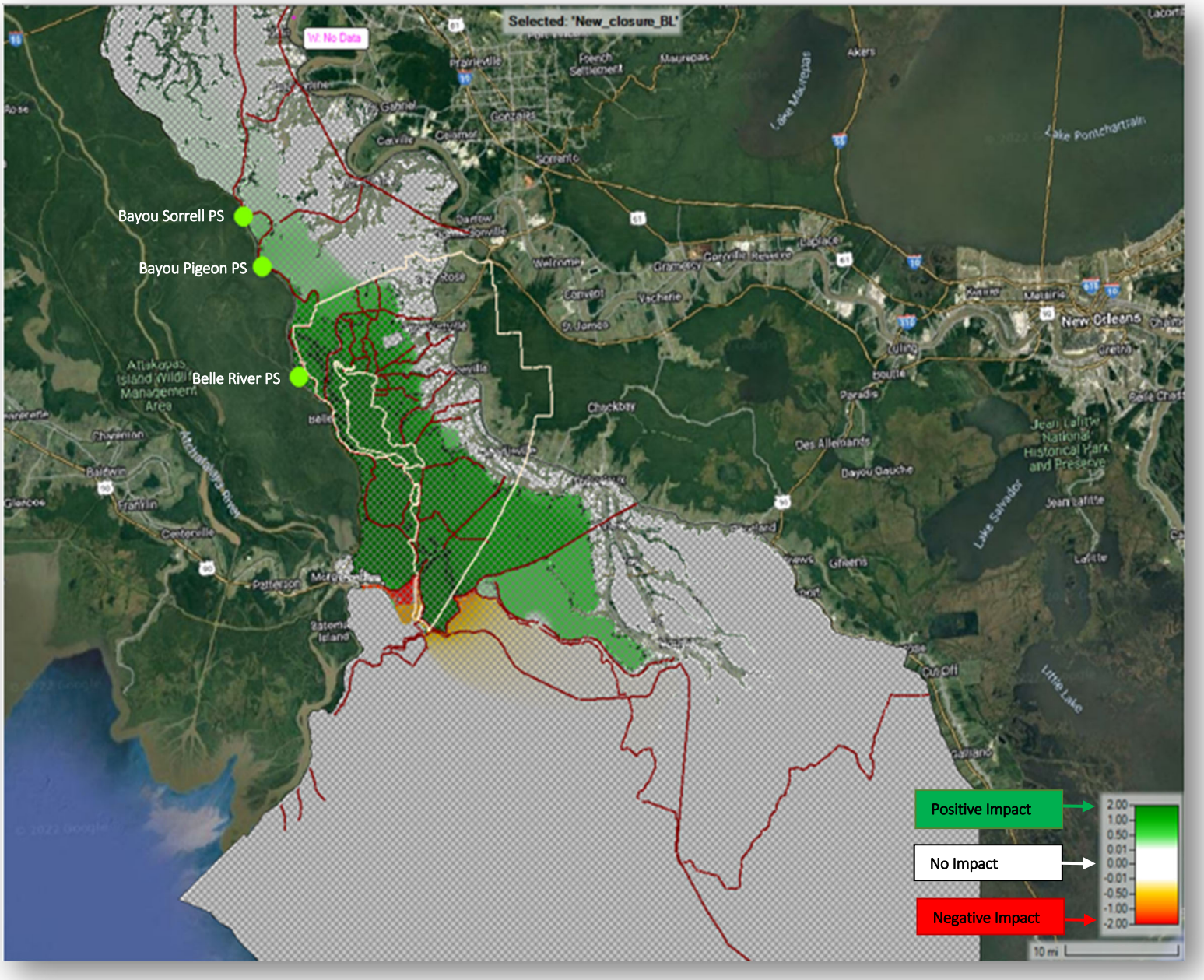


FIGURE 7-3: IMPACTS OF THE PROPOSED PROJECTS FOR A 25-YEAR STORM WITH A 100 YEAR STORM SURGE

7.2 LIST OF PROPOSED PROJECTS

This section presents the list of possible projects that GISE developed after studying the geography, drainage patterns and stakeholder input from Assumption Parish residents. The proposed projects are broken down into two main categories:

1) Local Scale Projects
2) Watershed Scale Projects

Detailed descriptions of each proposed project can be found in the project fact sheets included in Appendix E of this report. The construction cost estimates are based on survey data and past project experiences. Opinion of probable costs developed for each proposed project are included under Appendix F of this report.

7.2.1 Local Scale Projects

The Local Scale Projects, listed in Table 7-2 below, are those projects in which the project provides an immediate benefit to Assumption Parish stakeholders primarily.

TABLE 7-2 - LOCAL SCALE PROJECTS LIST

Project ID	Project Name	Approximate Location	Project Type
DREDGE-01	Bayou Napoleon Dredging Project	Bayou Napoleon	Dredging
DREDGE-02	Baker Canal Dredging Project	Baker Canal	Dredging
DREDGE-03	Labadieville Canal Dredging Project	Labadieville Canal	Dredging
DREDGE-04	Cancienne Canal Dredging Project (funding LWI - 4.2M)	Cancienne Canal	Dredging
DREDGE-05	Bayou St. Vincent Dredging Project	Bayou St. Vincent	Dredging
DREDGE-07	Himalaya Bayou Dredging Project	Himalaya Bayou	Dredging
DREDGE-08	William Canal Dredging Project	William Canal	Dredging
DREDGE-09	Pierre Part Bay Dredging Project	Pierre Part	Dredging
DREDGE-12	Godchaux Canal Dredging Project	Godchaux Canal	Dredging
DREDGE-13	Bruly St. Martin Dredging Project	Bruly St. Martin	Dredging
DREDGE-14	Marais Drainage Improvements	Marais	Dredging
LEVEE-01	Wards 7, 8, & 9 Part Levee Improvements Project	Pierre Part	Levees
LEVEE-02	Bayou L'Ourse Levee Improvements Project	Bayou L'Ourse	Levees
ROAD-01	Assumption Parish Ward 8 Road Improvements (El. 4.5)	Ward 8	Roads
ROAD-02	Assumption Parish Ward 9 Road Improvements	Ward 9	Roads
ROAD-03	LA-402 Road Improvement	Ward 6	Roads
ROAD-04	LA-398 Road Improvement	Ward 3	Roads
ROAD-05	Ward 7 Road Improvements	Ward 7	Roads
ROAD-06	Ward 5 Road Improvements	Ward 5	Roads
PUMP-02	Ring Levee Pump Stations & Lower Texas Levee	Parishwide	Pump
BANK-01	Bayou Pierre Part Bank Stabilization	Bayou Pierre Part	Bank
DETENTION-01	Plattenville Drainage Improvements	Spur 70 at LA 70	Detention

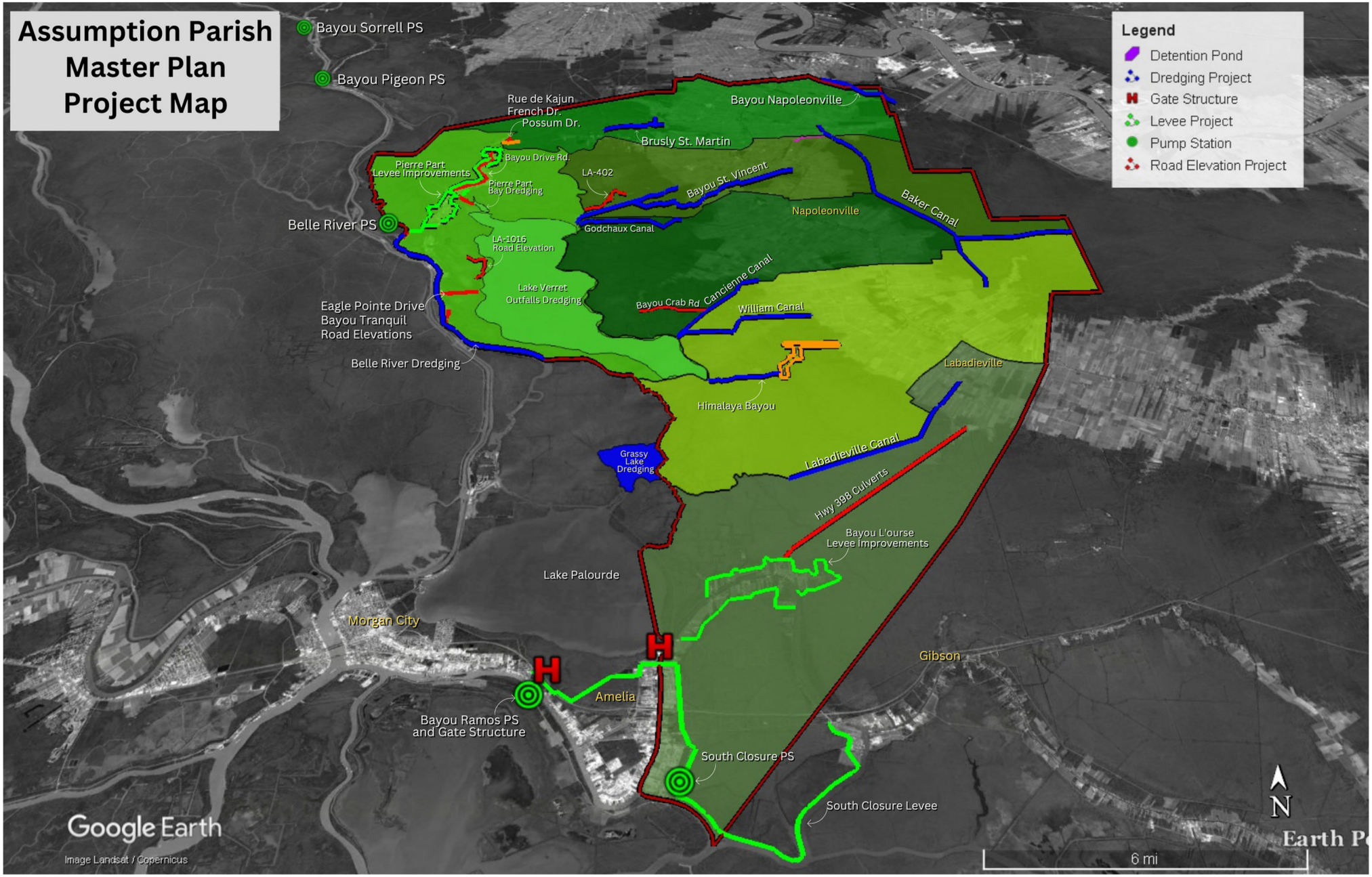


FIGURE 7-4: ASSUMPTION PARISH MASTER PLAN PROJECT MAP

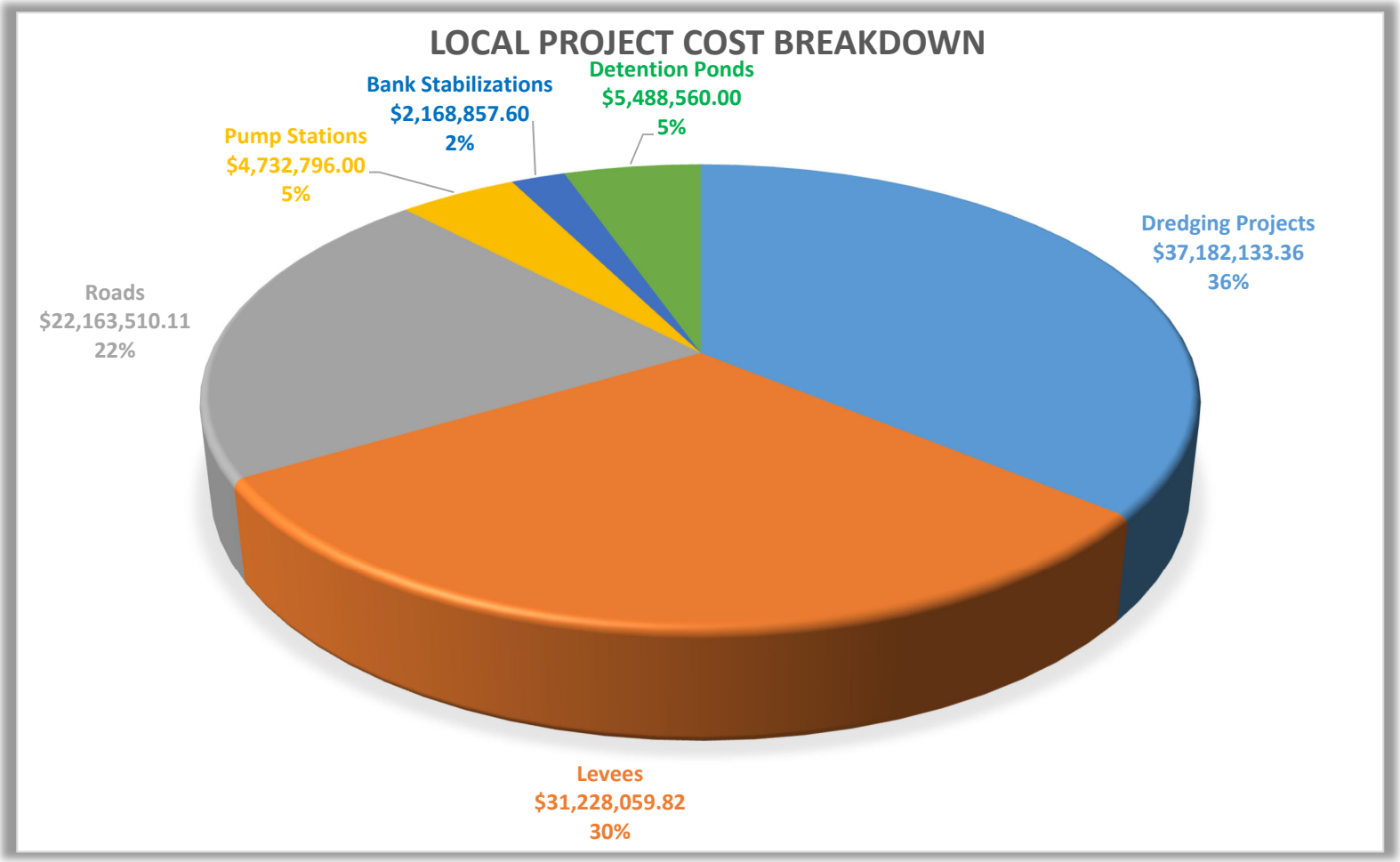


FIGURE 7-5: LOCAL PROJECT BREAKDOWN

The inclusion of retention ponds within an existing bayou is an efficient way to increase storm water drainage capacity during high storm events. In addition to providing added storage capacity, retention ponds are very effective in retaining suspended solids for incoming high sediment transport conveyance channels.

7.2.2 Watershed Scale Projects

The Watershed Scale Projects, listed in Table 7-3 below, are those projects in which the benefits of the project can be shared with stakeholders outside of Assumption Parish, and which would require full watershed basin modeling efforts.

TABLE 7-3 - WATERSHED SCALE PROJECTS LIST

Project Name	Approximate Location	Project Type
Grassy Lake Dredging Project	Grassy Lake	Dredging
Belle River Dredging Project	Belle River	Dredging
Belle River Pump Station Project	Belle River	Pump Station
Lake Verret Outlets Dredging Project	Lake Verret	Dredging
Bayou Sorrel Pump Station Project	Iberville	Pump Station
Amelia Levee, Barge Gates, and Pump Stations	Amelia	Levee

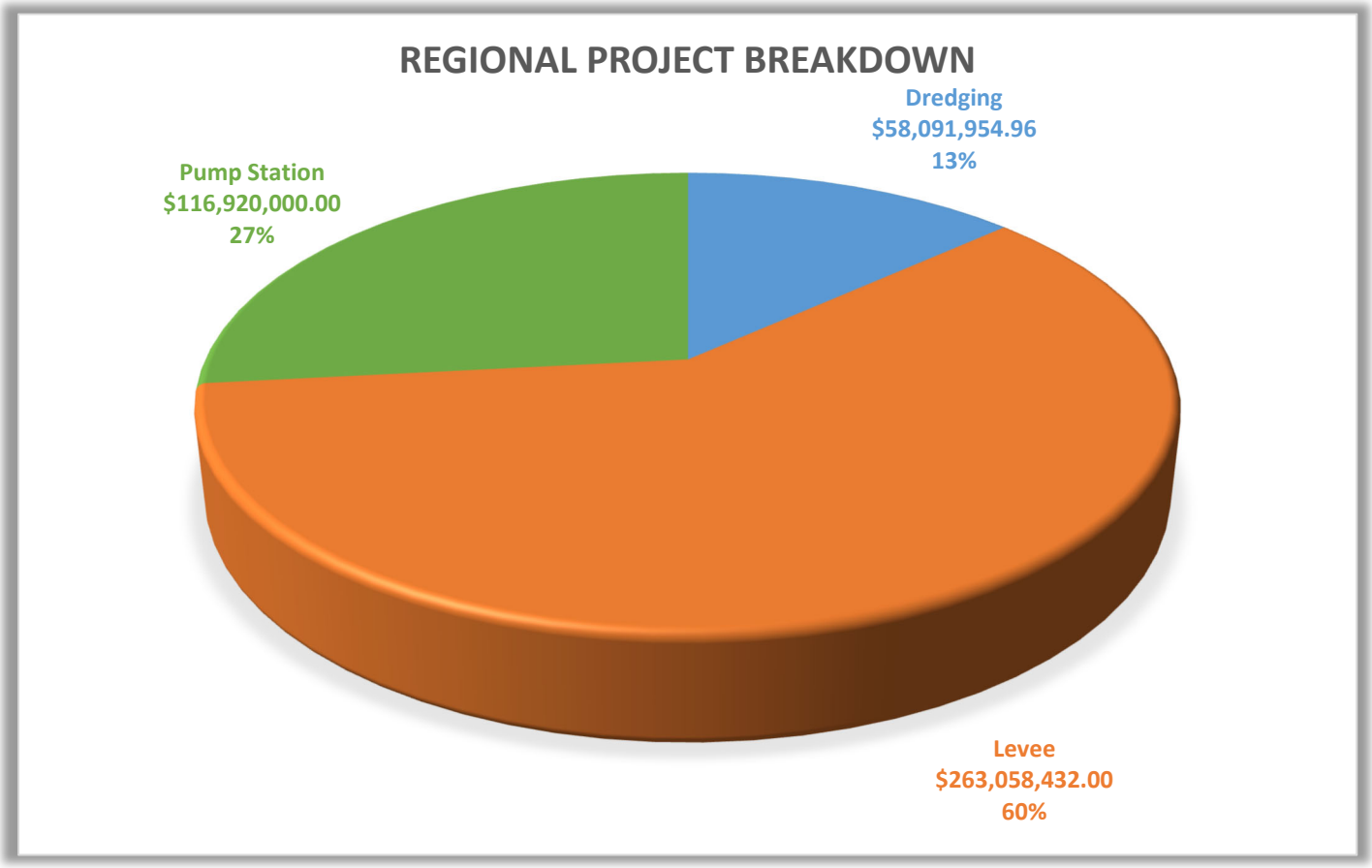


FIGURE 7-6: REGIONAL PROJECT BREAKDOWN

7.3 OPERATIONS & MAINTENANCE

In order for the existing drainage system proposed projects to work efficiently and maximize its capacity, it is important to have an Operations & Maintenance (O&M) plan executed at a parish-wide level. Since the majority of conveyance channels within the parish drain agricultural lands, the sediment transport rate of these channels is high. With high sediment transport and low flows, sediment will settle over time and throughout the channel, reduce the flow cross-sectional area and diminish the drainage capacity. In addition, the Peruvian Water Grass invasive species has been identified in different conveyance channels and swamps throughout Assumption Parish. This invasive species further deteriorates the existing bayous, by occupying volume that would otherwise be available for storage or even higher conveyance capacities.

As part of the DFMMP Phase II, a general O&M plan has been developed in order to provide general maintenance dredging guidance for the existing and future conveyance channels. The O&M plan also includes general maintenance guidance for existing and proposed pump stations, as well as upkeep to existing and proposed levees. Specific and more detailed O&M plans for each project will be developed in the Engineering and Design for each specific project as they are funded. In each Operations and Maintenance Manual will include details and scheduled routine maintenance throughout Assumption Parish in order to maintain and uphold the DFMMP. The maintenance of existing and future drainage systems is essential to the overall drainage system and should be given a high priority within the DFMMP.

7.3.1 Components of the General Operations and Maintenance Plan

7.3.1.1 General Drainage Maintenance

Drainage facilities should be maintained as nearly as possible to the condition and at the capacity for which they were originally designed. The entire drainage system should be generally inspected at least twice a year or otherwise based on past experience and professional judgement. Additional inspections may be required during heavy storms and periods of high runoff in order to determine the effectiveness of the system.

Open ditches should be routinely checked and maintained as close as possible to the grade, depth, and cross section to which they were constructed. Remove vegetation only when flow is blocked is blocked using best management practices that minimize erosion and sediment escape to water bodies. Special care should be taken when chemicals are used for brush or grass control in open ditches. Herbicides must be used according to product application instructions to avoid and minimize water contamination or environmental damage.

Culverts should generally be inspected twice a year to ensure they are clean and in good operating condition. Culverts may be inspected more or less based on past history. Badly worn or broken culverts should be repaired, replaced, or rehabilitated to minimize future damage. Culverts with 50 % or more constriction should be flushed or otherwise cleaned to restore the culvert's original

capacity. Culverts should be checked for scour around the inlet and outlet. Scoured areas should be repaired with rip-rap or some other protection if necessary.

7.3.1.2 Levee Maintenance

All flood control levees must be properly maintained to provide the protection for which they are designed. As the public sponsor, Assumption Parish, is responsible for ensuring that all flood control structures are properly maintained and will protect life and property. Even if agreements are made with local landowners, the parish is ultimately responsible for all flood control structures. Local plans and budgets need to be structured so that the maintenance of each structure is carried out on a regular basis.

FIGURE 7-7: SLOPE FAILURE OF LEVEE

A large part of maintaining levees is inspection.

The following recommendations are from the United State Army Corp of Engineer's Owner's Manual intended for public sponsors of non-federal constructed levees. Parish maintenance team should be made aware of the following unacceptable conditions that can be found when inspecting levees. The following sections will outline the areas that are need to be maintained in order to ensure proper working levees.

FIGURE 7-8: EROSION ON LEVEE DUE TO RAIN RUN-OFF

EROSION

Routine inspection for visible signs of erosion should be a part of the levee maintenance program.

Some examples of unacceptable signs of erosion can be seen in Figures 7-7 & 7-8.

ENCROACHMENTS

Routine inspections for any encroachments should be made, and any new encroachments should be reported to appropriate authorities. Encroachments that are unacceptable are excavations, structures or any other obstructions within the project easement. Any type of fencing that prohibits access along the crown of the levee is also prohibited.

Some examples of unacceptable encroachments are illustrated below.

FIGURE 7-10: UNACCEPTABLE LEVEE ENCROACHMENT BY HOMEOWNER

FIGURE 7-9: UTILITY POLES INSTALLED WITHIN LEVEE EASEMENT(UNACCEPTABLE)

DEBRIS BUILD UP

Any accumulations of drift, grass clippings, and other objectionable materials deposited on the riverward side of any Flood Control Structure or along the crown and side slopes of a levee must be removed and disposed of at suitable locations outside of the floodway.

ANIMAL NUISSANCE

Inspections to detect the presence of burrowing animal activity are generally most effective immediately after the levee has been mowed. Animal burrows that are identified should be thoroughly excavated and inspected, backfilled with compacted soil that is similar to material 11 of the levee, and reseeded. This will avoid the possibility of water piping through unfilled portions of the burrows during a flood.

VEGETATION

Maintaining good grass or sod cover is one of the most effective and economical means of protecting flood control levees against erosion caused by rain runoff, channel flows.

Periodic mowing is essential to maintaining a god ground cover. Levees should be mowed regularly in order to control weeds and to prevent the growth of brush and saplings. Long grass also inhibits visual inspections and can hide serious concerns.

7.3.1.3 Pump Stations

Pump stations should be inspected at least annually following manufacturers' recommendations for inspection and maintenance.

Electrical components should be maintained and tested regularly to ensure functionality and proper insulation. A logbook for each pump station should be maintained with type of testing performed, maintenance performed, date performed and number of hours.

7.3.2 Best Management Practices (BMP)

Different Best Management Practices (BMP) will be detailed in order to minimize the maintenance required. Since the land use within Assumption Parish varies, the BMP may be land use specific. Table 7-4 below shows some of the BMP that GIS recommends be included as part of the O&M plan.

TABLE 7-4 - BEST MANAGEMENT PRACTICES (BMP)

Best Management Practice (BMP)	Land Use Type
Parish Wide Standard Plans & Details	All
Parish Wide Permit System	All
Existing Drainage System GIS Database	All
Conservation Tillage	Agricultural
Erosion and Sediment Control	Agricultural & Construction

7.3.3 FEMA Community Rating System

The Community Rating System (CRS) is a voluntary program that a community can participate in to reduce flood insurance premiums through NFIP. The program allows communities to fulfill various tasks and activities that promote public safety, reduce damages to property, and allow for better management of flooding. There are nineteen activities in total that fall into four main categories: public engagement, mapping and regulations, flood damage reduction, and flood preparedness. There is also an option to earn extra credit for extending the activities beyond the SFHAs.

The purpose of this section is to identify how to enroll in the Community Rating System and what activities Assumption Parish can implement to earn points in the system and reduce their community's flood insurance premiums.

In 1968 the United States Congress passed the National Flood Insurance Act to respond to frequent flooding throughout the country. This law created a voluntary program called NFIP to give residents in communities the ability to buy flood insurance. SFHAs and FIRMs were then developed based on how prone an area is to flood to identify areas that have a high, medium, and low risk or flooding. Those living in high risk areas, which is defined as a location within the 100-year storm event must have flood insurance, but coverage is optional for owners residing in medium to low risk areas. NFIP aims to provide affordable flood insurances rates to those communities participating in the program and offers incentives to communities to take proactive steps to reduce or mitigate flooding. These activities, with varying amount of points that can be earned, can reduce their insurance up to 45% depending on how many points a community earns when audited. Table 7-4 shows the levels of classes and the credit points awarded to communities. A community receives a CRS classification based upon the total credit for its activities. There are 10 CRS classes. Class 1 requires the most credit points and gives the greatest premium reduction.

TABLE 7-5: COMMUNITY RATING SYSTEM CLASSES

CRS CLASSES, CREDIT POINTS, & PREMIUM DISCOUNTS			
CRS CLASS	CREDIT POINTS (cT)	PREMIUM REDUCTION	
		In SFHA	Outside SFHA
1	4,500+	45%	10%
2	4,000 - 4,499	40%	10%
3	3,500 - 3,999	35%	10%
4	3,000 - 3,499	30%	10%
5	2,500 - 2,999	25%	10%
6	2,000 - 2,499	20%	10%
7	1,500 - 1,999	15%	5%
8	1,000 - 1,499	10%	5%
9	500 - 999	5%	5%
10	0 - 499	0%	0%

SFHA: Zones A, AE, A1-A30, V, V1-V-30, AO and AH
Outside the SFHA: Zones X, B, C, A99, AR and D. Preferred Risk Policies are not eligible for CRS premium discounts because they already have premiums lower than other policies. Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage.
Some minus-rated policies may not be eligible for CRS premium discounts. Premium discounts are subject to change.

Assumption Parish officials should thoroughly review the NFIP Community System Coordinator's Manual (2017), but the following sections will highlight important features of the program.

PROGRAM ENROLLMENT

Any community in full compliance with the rules and regulations of the National Flood Insurance Program (NFIP) may apply and enroll in the Community Rating System program. In order for Assumption Parish to enroll in the program, a Letter of Interest showing that activities worth at least 500 credit points are being implemented. The letter, along with supporting documentation, would be submitted to the ISO/CRS Specialist for the state. The Regional Office of the Federal Emergency Management Agency (FEMA) must approve the submittal to ensure that the community is in full compliance with the minimum floodplain management criteria of the NFIP. Upon receiving FEMA approval, a community verification visit is scheduled by the ISO/CRS Specialist. At this verification visit, the ISO/CRS Specialist reviews all of the community's activities that may deserve credit, even those not in the community's submittal.

All CRS credit is verified according to the credit criteria in the Coordinator's Manual in effect at the time of the visit. After the verification visit, ISO submits its findings to FEMA. FEMA sets the CRS credit to be granted and notifies the parish, the state, insurance companies, and other appropriate parties. The classification is effective on either May 1 or October 1, whichever comes first, after the community's activities are verified. Each year the community must recertify that it is

continuing to perform the activities for which it is receiving CRS credit. Recertification is an annual activity that includes progress reports for certain activities.

A week-long CRS course for local officials is offered free at FEMA's Emergency Management Institute and has been field deployed to many states. The ISO/CRS Specialist, NFIP State Coordinator, and FEMA Regional Office have more information on this course, state workshops, and other CRS training opportunities.

PARISH RESPONSIBILITIES

Once the parish receives its initial classification in the CRS, credited activities must be maintained to keep its classification. Specific responsibilities include:

- Designating a community CRS Coordinator.
- Cooperating with CRS Specialist for verification procedures.
- Recertifying each year.
- Informing FEMA and its CRS Specialist of any additional activities being implemented
- Retaining elevation certificates, past FIRMs, and any previous Flood Insurance Studies for as long as the parish is enrolled in the CRS.
- Ensuring that flood protection projects and drainage system maintenance activities are complaint with federal environmental and historic preservation requirements.

CRS ACTIVITIES

The 19 activities and their credit points are shown in Table 7-5. Each activity has one or more elements. Elements are the basic credit level for the CRS. The maximum credit points for each activity are shown in the second column. The maximum credit can be earned when all elements within an activity are being implemented and all credit criteria are met. In some activities, maximum credit cannot be provided unless credit has been earned in other activities. For example, additional credit is provided in some activities if the community has adopted a Program for Public Information under Activity 330 (Outreach Projects).

TABLE 7-6: CRS ACTIVITY POINTS

CREDIT POINTS AWARDED FOR CRS ACTIVITIES	
Activity	Maximum Possible Points
300 Public Information Activities	
310 Elevation Certificates	116
320 Map Information Service	90
330 Outreach Projects	350
340 Hazard Disclosure	80
350 Flood Protection Information	125
360 Flood Protection Assistance	110
370 Flood Insurance Promotion	110
400 Mapping & Regulations	
410 Flood Hazard Mitigation	802
420 Open Space Preservation	2,020
430 Higher Regulatory Standards	2,042
440 Flood Data Maintenance	222
450 Stormwater Management	755
500 Flood Damage Reduction Activities	
510 Floodplain Mgmt. Planning	622
520 Acquisition & Relocation	2,250
530 Flood Protection	1,600
540 Drainage System Maintenance	570
600 Warning and Response	
610 Flood Warning and Response	395
620 Levees	235
630 Dams	160

While Parish officials should review all activities identified in the NFIP Community System Coordinator's Manual (2017) and take measures to achieve the highest possible rating in any given category, there appears to be one specific activity the Parish should target for improvement - Activity 540, Drainage System Maintenance. The maximum possible rating for this activity is 470 as shown in Table 7-5.

The purpose of this activity is to keep the streams and channels free of debris to allow the water in the channel to move freely downstream and maintain storage capacity by performing routine inspections. When water can move freely in the channel, it decreases the opportunity for water to overflow the banks and flood. Through natural and human processes, stream channels can lose their ability to hold water by sedimentation, growth of vegetation, dumping, and general debris. To receive a maximum rating for this activity, the community will need to demonstrate maintenance of their drainage system by having written maintenance procedures and records,

annual inspection of the channel systems, inspections after a flood event to address residents' concerns, and debris removed. While the activity targets areas of the stream in developed regions, if the conveyance of an undeveloped area causes blockages, that area will need to be kept clear and maintained. In addition, locations that have a drainage area of 40 acres or more or locations with repetitive losses must be addressed in the inspection and maintenance plan. To successfully maximize points for Activity 540, the community must meet certain criteria set forth in the NFIP Community Rating System Coordinator's Manual including:

Drainage System Inspections: Receiving credit for this activity will depend on the annual inspection of the conveyance
system and the proper documentation to show routine inspections took place and when complaints were received. Credit can be adjusted if an inspection could not take place due to unforeseen circumstances such as no legal access due to private property or budget reasons. The procedure for inspecting the stream channels must contain:

1. Who is responsible for the maintenance program;
2. An inventory system, including ownership;
3. A map of the drainage system;
4. Procedures for inspection including when and how inspections are conducted;
5. Procedures for debris removal;
6. Any records kept that document inspections and debris removal

Inspections and Maintenance: Inspections can be completed by the community, a non-federal agency, private property owners, or a state or local official. So long as an inventory of the system, written procedures, and inspection records are up to date, credit can be earned.

Environmental Compliance: To receive credit, the community must also comply with the current federal environmental and historic preservation laws and executive orders. To show proof of compliance, the CC-540EHP, Certification of Compliance with Environmental and Historic Preservation Requirements for Drainage System Maintenance must be completed.

Special Restrictions: In some cases, to begin maintenance work, a state or federal permit must be obtained. This may apply if there are natural or protected areas. These restrictions will need to be mentioned within the standard maintenance procedures set by the community.

8.0 FUNDING SOURCES

The following section generally discusses possible funding sources for Phase II of the DFMMP and the related projects. Funding sources can range from grants, capital outlay funds, and to loans in some cases. All of the funding sources have different requirements and require different applications, and at times may require local matching funds.

8.1 LOUISIANA WATERSHED INITIATIVE (LWI)

The federal government has announced that Louisiana will receive a grant of $1.2 billion to mitigate flood risk statewide. As of September 17, 2020, the U.S. Department of Housing and Urban Development has signed the grant agreement with the State of Louisiana to start the line of credit for $1.2 billion and start the funding.

8.1.1 Program Requirements

This program provides funding and support to local and regional agencies to implement flood risk reduction projects and programs with demonstrable outcomes that improve community flood resilience. Funding is implemented in three distinct rounds, designed to encourage regional collaboration and prioritization of projects, allowing consideration of a broad array of impactful mitigation activities. Types of eligible projects are listed below:

- Restoration, enhancement or preservation of floodplains and wetlands
- Flood mitigation of critical infrastructure and stormwater management projects
- Buyout or elevation projects for flood-prone residential areas
- Voluntary relocation projects to move residents out of high flood risk areas
- Acquisition of floodplain easements in flood abatement areas or developments in repetitive loss areas
- Major capital projects that improve flood resilience or provide regional stormwater detention
- Implementation of resilient development standards and floodplain management regulations
- Housing developments using resilient construction practices
- Projects developed through LWI's watershed modeling, statewide planning and regional planning efforts

8.2 ATCHAFALAYA BASIN PROGRAM FUNDS – CPRA – STATEWIDE MASTER PLAN

Act 570 of the 2018 Regular Session, enacting La. R.S. 49:214.8.1, et seq., transferred the responsibilities of the Atchafalaya Basin Research and Promotion Board and the Atchafalaya Basin Program from the Department of Natural Resources to the Coastal Protection and Restoration Authority. The Atchafalaya Basin Program (R.S. 49:214.8.1 et seq.) is placed within the Coastal Protection and Restoration Authority, which shall perform and exercise the powers, duties, functions, and responsibilities of the Program as provided by law. The annual basin plan shall be included in the Annual Plan: Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana produced each year by the Coastal Protection and Restoration Authority.

8.2.1 Program Requirements

CPRA will accept proposals from various sources including academia, parish governments, elected officials, agencies, non-governmental organizations, landowners, businesses, industry, and the general public. Project nominations should include an explanation of the project need, how it addresses that need, the project location, and the specific features of the project.

Projects will be screened on the basis of (1) consistency with Coastal Master Plan objectives and principles; (2) geographic areas with issues of water quality, sedimentation and public access; (3) non-duplication of submissions previously turned down, unless justifiable in light of changing conditions, and (4) adequate information with sufficient detail for thorough evaluation. Note that detailed cost and land area estimates are not required for each project type.

8.3 FEMA'S BUILDING RESILIENT INFRASTRUCTURE AND COMMUNITIES (BRIC)

BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program, with the purpose of supporting states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.

The BRIC program aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. FEMA anticipates BRIC funding projects that demonstrate innovative approaches to partnerships, such as shared funding mechanisms, and/or project design.

The fiscal year 2022 (FY 2022) application period for the Hazard Mitigation Assistance (HMA) Notices of Funding Opportunities (NOFOs) for the Flood Mitigation Assistance (FMA) grant program and the new Building Resilient Infrastructure and Communities (BRIC) grant programs will open on Sept. 30, 2022, and close at 3 p.m. Eastern Time on Jan. 27, 2023.

- State/Territory Allocation: $33.6 million, up to $600,000 per Applicant.
- National Competition for Mitigation Projects - $446.4 million allotted for this tier.
- Tribal Set-Aside - $20 million for all federally recognized tribal governments.

8.3.1 Applicant Eligibility Requirements

- Applicants may include states, the District of Columbia, U.S. territories, and Tribal governments (federally recognized). Federally recognized tribal governments are those under the Federally Recognized Indian Tribe List Act of 1994.
- Each state, the District of Columbia, territory, and Tribal government (federally recognized) shall designate one agency to serve as the Applicant for BRIC funding. Each Applicant's designated agency may submit only one BRIC grant application to FEMA. An application can be made up of an unlimited number of sub applications.
- Applicants must have a FEMA-approved State or Tribal Hazard Mitigation Plan by the application deadline and at the time of obligation of grant funds.
- State or territory: Must have received a major disaster declaration under the Stafford Act in the 7 years prior to the annual grant application period start date. Currently, all states, the District of Columbia, U.S. territories, and Tribal governments (federally recognized) meet this requirement.
- Tribal government (federally recognized): Must have received a major disaster declaration under the Stafford Act in the 7 years prior to the annual grant application period start date or be entirely or partially located in a state that received a major disaster declaration in the 7 years prior to the annual grant application period start date. Currently, all states, the District of Columbia, U.S. territories, and Tribal governments (federally recognized) meet this requirement.

8.3.2 Sub-Applicant Eligibility Requirements

- Local governments, including cities, townships, counties, special district governments, state agencies, and Tribal governments (including federally recognized tribes who choose to apply as sub applicants) are considered sub applicants and must submit sub applications to their state/territory/tribal applicant agency.
- Sub applicants must have a FEMA-approved Local or Tribal Hazard Mitigation Plan by the application deadline and at the time of obligation of grant funds for mitigation projects and C&CB activities (with the exception of mitigation planning).
- Tribal governments (federally recognized) and non-federally recognized tribes can choose to apply as a sub applicant to an eligible state or territory.
- If a tribe requests to apply through the state, the state must have received a major disaster declaration under the Stafford Act in the 7 years prior to the annual grant application period start date

8.4 COMMUNITY DEVELOPMENT BLOCK GRANT MITIGATION

The Community Development Block Grant Mitigation (CDBG-MIT) Program is a unique and significant opportunity for eligible grantees to use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce

future losses. Congress appropriated $12 billion in CDBG funds in February 2018 specifically for mitigation activities for qualifying disasters in 2015, 2016, and 2017, and HUD was able to allocate an additional $3.9 billion, bringing the amount available for mitigation to nearly $16 billion.

The program defines mitigation as activities that:

- Increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship by lessening the impact of future disasters.

8.4.1 Program Requirements & Application Process

Grantees must submit a CDBG-MIT Action Plan that must include a risk-based Mitigation Needs Assessment that identifies and analyzes all significant current and future disaster risks which provides a substantive basis for the activities proposed.

The mitigation needs assessment requires grantees to collaborate with a variety of stakeholders that currently administer the FEMA's Hazard Mitigation Grant Program (HMGP) funds. This collaboration is essential as it helps ensure the goals of CDBG-MIT funding.

Grantees are required to use the most recent risk assessment from their state, local, or Indian tribal governments Hazard Mitigation Plans (HMP). The HMP is used as a starting place for outlining current risks within the HUD-identified "most impacted and distressed" areas.

8.5 STATEWIDE FLOOD CONTROL PROGRAM – DOTD

The Statewide Flood Control Program is designed to help solve flood problems through an active, innovative approach. This Program uses state funds allocated each year by the Legislature to assist in the construction of flood control infrastructure. Eligible projects for consideration must reduce existing flood damages. Potential projects include measures to reduce or eliminate the incidence of flooding or damages in specific area; for example, channel modifications; levee, canal, and spillway construction; storm water detention; flood proofing of structure; regulation of floodplains; relocation assistance; or other structural or non-structural measures.

The Statewide Flood Control Program was created by the Legislature in 1982. The purpose of the program is to bring about flood damage reduction by providing long term solutions for areas that are experiencing structural damages or agricultural losses. This is a cost sharing program which requires a 10% local match based on construction cost. Legislation provides that local project sponsors who represent a population of less than 50,000 may request engineering services from DOTD for participation in the program.

Local governing bodies at the parish or municipal level must initiate funding requests by submitting an application. Applications are reviewed, evaluated and ranked in priority order. This is

accomplished by the Flood Control Project Evaluation Committee consisting of DOTD (as lead agency), the Louisiana Geological Survey and the Division of Administration.

In order to assure a consistency in addressing flooding problems, program rules provide for a statewide distribution of the funding. Funds are allocated 55% to rural areas of the state and 45% to urban areas. The funding distribution formula assures that large metropolitan areas, smaller communities, and more rural agricultural areas do not compete against each other for available funds. The formula assures a statewide allocation of funds.

For a project to be eligible for consideration, its primary goal must be the reduction of existing flood damages. Eligible projects include measures to reduce or eliminate the incidence of flooding or damages in specific areas; for example, channel modifications; levee, canal and spillway construction; storm water detention; flood proofing of structures; regulation of floodplains; relocation assistance; or other structural or non-structural measures. Ineligible projects include those which: (1) do not reduce existing flood damages; (2) encourage additional development of flood prone areas; (3) increase the likelihood of upstream or downstream flood problems; (4) have a total cost of less than $100,000.

The application is a two-step process consisting of:

- Pre-Application submittal by May 1st of each year
- If pre-application is approved, a full application must be submitted by October 1st within four years of the pre-application approval

8.6 CAPITAL OUTLAY

Louisiana's Capital Outlay Program is a source of funding that Assumption Parish can seek to utilize to fund the drainage needs of the parish. The program is statewide and is administered through the Division of Administration's Office of Facility Planning & Control. The Facility Planning & Control reviews all capital outlay project requests along with the Office of Planning and Budget. These agencies then make their recommendations to the Governor, who originates the Capital Outlay Bill that makes its way through the legislative process for approval. Project Requests must be submitted by November 1 each year.

8.7 GULF OF MEXICO ENERGY SECURITY ACT (GOMESA)

The Gulf of Mexico Energy Security Act (GOMESA) of 2006 created a revenue-sharing model for oil and gas gulf states. Under this act, Alabama, Louisiana, Mississippi, and Texas receive a portion of the revenue generated from oil and gas production offshore in the Gulf of Mexico. The act also directs a portion of revenue to the Land and Water Conservation Fund.

The GOMESA funds are intended to be used for coastal conservations, restoration, and hurricane protection. The Office of Natural Resources Revenue distributes GOMESA revenue to both state and local governments for each of the four GOMESA states.

In the state of Louisiana, the process to apply for funding through this program is managed by CPRA, who will determine prioritization and eligibility of infrastructure projects to be granted funds through this program.

8.7.1 Program Requirements & Application Process

All requests for funding of any eligible infrastructure projects under GOMESA will be made pursuant to La. R.S. 49:214.6.6 and the CPRA's GOMESA Infrastructure Funding Program. Eligible projects may be considered for up to ten percent (10%) of the federal revenues the State receives in each year under GOMESA.

Requests for funding of any eligible infrastructure project under GOMESA shall be made by formal, written application to the CPRA Board. Applications may be submitted by any political subdivision of the state within the Coastal Zone. Eligible submitting entities shall be responsible for the preparation of applications for their respective projects.

Proposals for GOMESA funding should be no more than five (5) pages in length (i.e., a 4-page description and a one-page map). Information to be provided in the application shall include but not be limited to the following:

- Description of the infrastructure impacted by coastal wetlands loss and demonstration of need for the project and benefits of the project, including a description of how the project can support large-scale restoration or protection projects and how the project itself will be designed to maximize resilience against future environmental conditions;
- A description, map, and shapefiles of the proposed project area and features, including the geographical area affected and land ownership information;
- A Preliminary Design Document and Engineers Estimate of Probable Construction Cost, including a description of the status of any necessary environmental permits; Description of project area including the geographical area affected and land ownership information;
- Description of how the project is consistent with the priorities, objectives and principles of the master plan and how the project will address mitigation issues;
- Description of the project's beneficial economic impact to the State; and
- The acknowledgment of the eligible submitting entity that they will be required to perform any necessary operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) and also monitoring for the proposed project.

CPRA will evaluate, prioritize, and rank submitted applications based on the following criteria:

- The project's consistency with the priorities, objectives and principles of the master plan;

- The critical public purpose of the project;
- The project's contribution to community resiliency (evacuation routes, connection to local businesses, contribution to regional commerce, etc.) and/or to state, regional and national energy security;
- Resilience against future environmental conditions;
- The community's investment in the project;
- The project's beneficial economic impact to the State; and
- Opportunities to leverage funding for the project from sources other than those discussed herein;
- Letters of support for the project from landowners whose cooperation is necessary for the implementation of the project. Letters of support can be attached to the application as an appendix to the official application.

8.7.2 Deadlines

Proposals may be submitted via mail or email, but must be received by CPRA Board before close of business on or before November 1st of each year for consideration of funding in the following fiscal year. Submissions should be sent via email to: coastal@la.gov, or via regular mail to: CPRA, Attn: Chuck Perrodin, P.O. Box 44027, Baton Rouge, LA 70804-4027.

9.0 PATH FORWARD

With a formal Flood & Drainage Mitigation Master Plan in place, Assumption Parish now has a prioritized path forward to improving the resilience of the parish and the quality of life for the residents that live and make a living in Assumption Parish.

In order for the existing drainage system & proposed projects to work efficiently and maximize its capacity, it is important to have an Operations & Maintenance (O&M) plan executed at a parish-wide level. Implementation of general guidance based on USACE for flood control structures inclusive of non-federal levees, pump stations is crucial.

While Assumption Parish Master Plan proves the needs for a regional approach to adequately address their flood and drainage issues, the local projects listed in this master plan and strategic funding will help residents see a more immediate benefit with localized rain and flooding events.

The regional projects listed in this Master plan will be instrumental in protecting not only the residents of Assumption Parish, but for the entire Terrebonne Basin which consists of more than 154,000 structures.

Next steps for Assumption Parish would be to procure Professional Services for selected projects, in order to begin the Engineering and Design phase of the priority projects.

10.0 REFERENCES

What is the Barataria-Terrebonne National Estuary Program? Barataria-Terrebonne National Estuary Program Website. https://btnep.org/about-btnep/what-is-btnep/

Bayou Chene Flood Protection Structure. St. Mary Levee District Website. https://smld.org/bayou-chene/

Priority Restoration Projects, Increase Atchafalaya Flow into Terrebonne Marshes. Restore the Mississippi River Delta Website. https://mississippiriverdelta.org/project/increase-atchafalaya-flow-terrebonne-marshes/

Types of Grants. FEMA Website. https://www.fema.gov/grants

How revenue works, Gulf of Mexico Energy Security Act (GOMESA). U.S. Department of the Interior, Natural Resources Revenue Data Website. https://revenuedata.doi.gov/how-revenue-works/gomesa/

Atchafalaya Basin Program. Coastal Protection and Restoration Authority Website. https://coastal.la.gov/atchafalaya-basin-program/

Louisiana Flood Maps Portal. LSU Ag Center Website. https://www.lsuagcenter.com/topics/family_home/home/design_construction/laws%20licenses%20permits/getting%20a%20permit/your%20flood%20zone/flood_maps

FEMA Community Rating System Coordinator's Manual

https://www.fema.gov/sites/default/files/documents/fema_community-rating-system_coordinators-manual_2017.pdf

Census.gov

https://www.census.gov/quickfacts/fact/table/assumptionparishlouisiana/PST045221

EPA EJ Screening Tool for Disadvantaged Communities

https://www.epa.gov/ejscreen