AMITE RIVER BASIN DRAINAGE &
WATER CONSERVATION DISTRICT

2025 MASTER PLAN

FIRST EDITION | MAY 13, 2025

Dewberry

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(COVER PHOTO SOURCE: ARBC)

2025 MASTER PLAN

A regional approach to sustainable management of the Amite River Basin

Disclaimer

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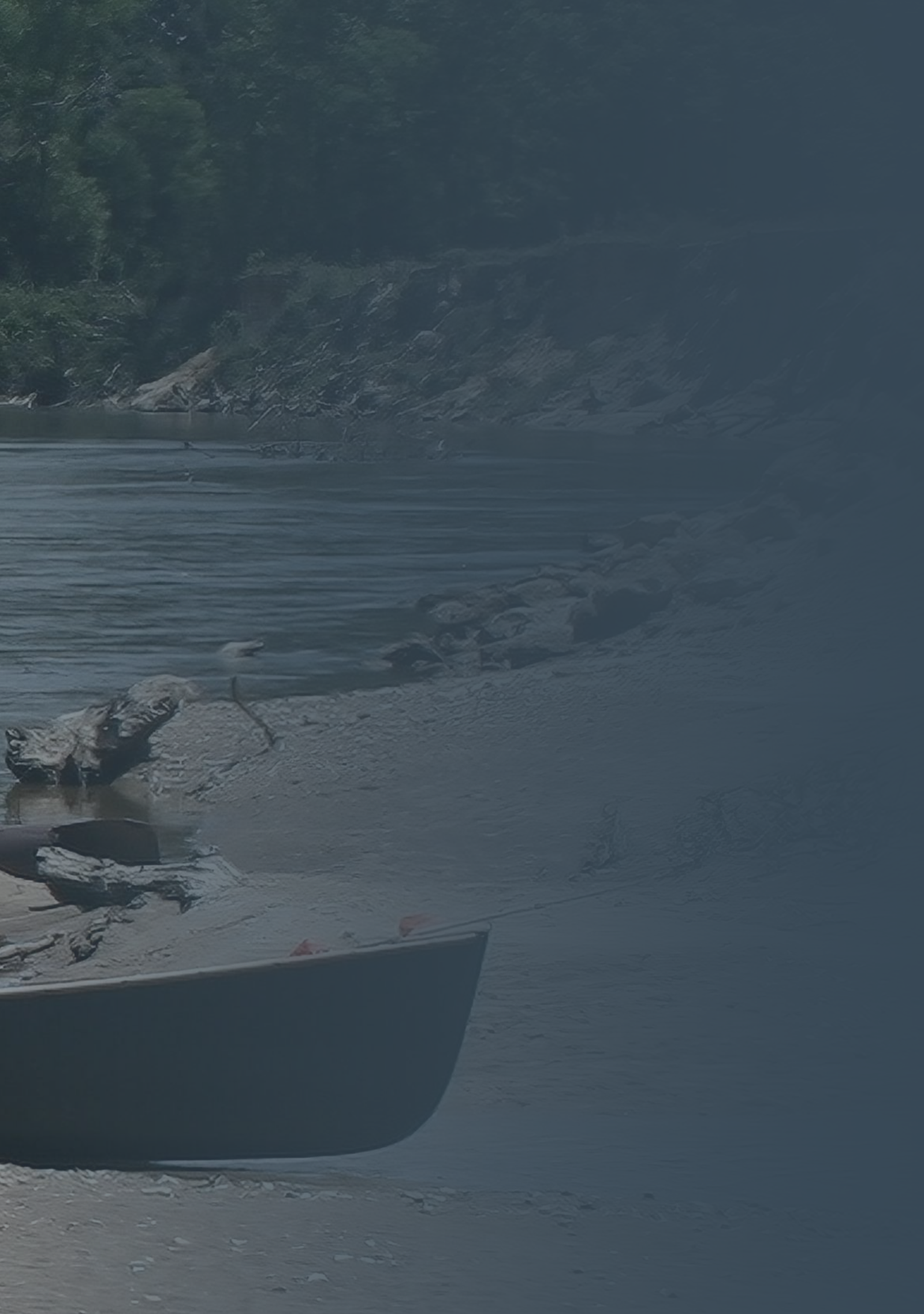

LETTER FROM OUR PRESIDENT

MAY 13, 2025

Dear Members of the Louisiana Legislature,

The Amite River Basin, which is comprised of much of the Capital Region, is home to Louisiana's most populous parish and some of the fastest growing areas in the state. It is home to Louisiana's seat of government, the state's flagship university and one of the nation's preeminent Historically Black Colleges and Universities. The Amite River Basin hosts globally significant petroleum and chemical manufacturing as well as crucial commercial fishing, forestry and ranching. It is even home to the Nobel Prize-winning Laser Interferometer Gravitational Wave Observatory that was used to prove Einstein's Theory of Relativity.

Historic natural disasters – some catastrophic – have caused tens of billions in damages in today's dollars. The growing Amite River Basin population and economy is soaring… along with growing flood risk.

This means there is increasing flood risk because there is more at risk: lives, homes, schools, businesses, communities, etc.

April 1977 - Severe flooding occurred due to heavy rainfall, impacting communities along the Amite River.

March 1983 - A prolonged period of heavy rain that led to record flooding in March 1983.

June 2001 - Torrential rains from Tropical Storm Allison caused significant flooding.

March 2016 - Just a few months before the catastrophic August 2016 flood, another major flood event occurred in the Amite River Basin, causing widespread damage.

August 2016 - This was one of the most devastating floods in Louisiana history, with more than 30 inches of rain in parts of the Amite River Basin, leading to catastrophic flooding throughout the Amite River Basin.

Decades of record events, and the flood risk continues to rise.

Recognizing the need to act, the Legislature in 2022 reconstituted the Amite River Basin Commission with a refined and focused mission to address, mitigate and reduce flood risk – and flooding specifically – in the Amite River Basin.

Under the auspices of the Amite River Basin Commission, our member parishes – Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, St. Helena and St. James – cooperate like never before. Together, we are acting in concert with a sense of urgency never before seen. And as of this writing, the Commission and Parishes are underway to design and construct several transformative projects in the Basin to reduce flood risk and increase flood protection.

The Legislature likewise charged the Amite River Basin Commission to develop a Master Plan for comprehensive drainage, flood risk reduction, and water resource management. In other words, fix the problem.

This Master Plan illustrates our vision to reduce flood risk and increase flood protection in the Basin and describe how our parishes will work together like never before to protect what matters.

Sincerely,

John J. Clark
President, Amite River Basin Commission

(PHOTO SOURCE: JOHN CLARK)

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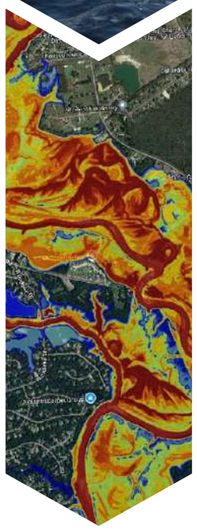
TABLE OF CONTENTS



CHAPTER 1

MASTER PLAN PROCESS/OVERVIEW

This chapter contains background information about the Amite River Basin, the Amite River Basin Drainage and Water Conservation District, and the goals and development of the 2025 First Edition Master Plan.

PHOTO SOURCE: CIVIL AIR PATROL, LA WING ON BEHALF OF THE STATE OF LOUISIANA

INTRODUCTION

Amite River Basin Drainage and Water Conservation District

Background

The Amite River Basin Drainage and Water Conservation District (ARBC) was created by Act 896 of the Louisiana Legislature in 1981 as a regional non-federal entity to aid in the coordination of major flood control efforts of the state and federal governments. ARBC was given the authority to levy a drainage tax pursuant to approval of such millage assessment by a majority of voters in the Amite River Basin Drainage and Water Conservation District. An amendment in 1982 added East Feliciana Parish to the original language and made changes to the number of board members, followed by an amendment in 1984 which extended the basin boundary to include Ascension and St. James parishes between the Mississippi River and U.S. Highway 61.

Governor Roemer established the Governor's Interagency Task Force on Flood Prevention and Mitigation in 1990 to examine and make recommendations on measures to mitigate floods within the Amite River Basin. Based on these recommendations, Governor Roemer issued an Executive Order in 1991 that established the Amite River Basin Interagency Committee (ARBIC). This was meant to use state agencies to provide the technical assistance necessary in developing and implementing flood loss reduction programs.

In 2022, House Bill 686 (HB 686) of the regular legislative session of the 2022 Louisiana State Legislature, as promulgated by Act 490, made significant changes to the makeup and governance of the ARBC. Key changes included:

- Expansion to the geographical boundaries of the district to include the entire contributing drainage area of the Amite River – adding portions of Iberville, Ascension, and St. James parishes south of U.S. Highway 61. This expansion meant the interests of seven parishes, five major rivers and streams, more than 700,000 people, and more than 2,200 square miles would now be treated as a single, unified system.
- Changes to the makeup of the ARBC Board of Commissioners, increasing the number of commissioners from 13 to 16, whereby the seven parish presidents representing the parishes in the district serve as voting members. The executive director of the Coastal Protection and Restoration Authority (CPRA), the secretary of the Department of Transportation and Development (DOTD), and the executive director of the Pontchartrain Levee District Board of Commissioners (PLD) serve as non-voting members. Each of these will serve ex officio without appointment but may have a designee serve in their place. The remaining six commission positions are served as at-large members appointed by the governor, subject to senate confirmation, and serve as voting members alongside the parish representatives. The six at-large commissioners are required to have at least seven years of professional experience in their discipline, of which at least four must be engineers, project managers, certified floodplain managers, or professionals in a drainage-related field such as geotechnical, hydrological, or environmental science.
- Changes to voting for taxes levied by the board will now be by everyone in the district, and not by individual parishes. Taxes levied by the board are no longer capped at three mills.
- Parishes, municipalities, drainage districts, levee districts, and other political subdivisions in the district are allowed to transfer or donate funds to the board, and the board is allowed to accept such funds. Additionally, HB 686 required ARBC to develop this district-wide comprehensive Master Plan to address drainage, flood control, and water resource management to oversee all projects and programs throughout the construction and management processes. This plan must be consistent with the CPRA Master Plan – currently the 4th edition, developed in 2023.

The ARBC Board of Commissioners approved this plan on May 13, 2025, and submitted to the Louisiana State Legislature. The plan is required to be reviewed, revised, and amended by the ARBC every six years.

1981

Act 896 established the original district which included portions of East Baton Rouge, St. Helena, Livingston, Ascension and St. James parishes.

1982 and 1984

Amendments to the legislation expanded the ARBC geographic boundary to include portions of East Feliciana Parish, followed by Ascension and St. James parishes between the Mississippi River and U.S. Highway 61.

1991

An Executive Order by Governor Roemer established the Amite River Basin Interagency Committee (ARBIC).

2022

The 2021 HB 686 of the regular session, as promulgated by Act 490, made significant changes to the makeup and governance of the ARBC, as well as expanding ARBC boundaries to include portions of Iberville, Ascension, and St. James parishes south of U.S. Highway 61.

2025

The Master Plan was submitted by the Board to Louisiana State Legislature.

Purpose of Plan

The purpose of the Master Plan is to lay out the road map towards managing the entire watershed as a single system with a shared common goal while placing a heavy focus and constant emphasis on plans that include project inventories, implementation plans, and strategies to maximize the use of innovative funding strategies such as public private partnerships, pursuit of grant funding, capital outlay requests, and millage initiatives to the extent necessary to timely fund and implement the board's planned projects and programs. Having a plan that is science and stakeholder driven will allow the ARBC to be more competitive in accessing state and federal funding, while increasing efficiencies consistent with the approach adopted by the state with the Coastal Master Plan.

The ARBC Master Plan is groundbreaking in developing a comprehensive, regional plan to address all areas of floodplain management and maintenance as it is the first time all seven parishes have come together under a shared goal of protection and preservation of the communities and waterways. This ensures that any projects or programs developed within the Basin will have no adverse impacts on surrounding land and residents due to strategic planning and sequencing.

The Master Plan presents an opportunity for ARBC to be an advocate for community participation in the National Flood Insurance Program (NFIP) and the Community Rating System (CRS), by strategically aligning findings and recommendations of the Master Plan with CRS activity credits. This will help communities both maintain and potentially improve their CRS class, thereby increasing the discounts on flood insurance to their constituents. Floodplain management strategies such as CRS are woven throughout this Master Plan.

FIGURE 1-1: AUGUST 2016 FLOODING IN EAST BATON ROUGE PARISH (PHOTO SOURCE: U.S. DEPARTMENT OF AGRICULTURE)

Progress on the Ground

While this Master Plan represents the first edition of a comprehensive Master Plan for the ARBC, numerous flood risk reduction and maintenance projects have already been implemented by various local, state, regional and federal agencies.

MAJOR HISTORIC FLOOD RISK REDUCTION PROJECTS INCLUDE:

- Amite River and Tributaries Improvements which was completed by the United State Army Corps of Engineers (USACE) in 1964 and included construction of the Amite River Diversion Canal which provided a more direct outlet for the Amite River into Lake Maurepas via the Blind River, and upstream channel improvements that included clearing, snagging, and dredging portions of the Amite River, lower Comite River, Blind River, and Bayou Manchac.
- Between 1953 and 1967, the state and East Baton Rouge Parish made improvements to Ward Creek, Claycut Bayou, Jack's Bayou, Bayou Duplantier, and White Bayou.

NUMEROUS PROJECTS ARE CURRENTLY UNDER CONSTRUCTION OR RECENTLY COMPLETED:

- The Comite River Diversion Canal is being constructed by USACE and will remove flood waters from the basin by diverting portions of the Comite River flood flows from northern East Baton Rouge Parish directly into the Mississippi River.
- The Laurel Ridge Levee Extension being constructed by the Pontchartrain Levee District and Ascension Parish, extends and raises the existing levee protecting over 8,000 structures in Ascension Parish during the 100-year flood. All remaining contracts on this project are expected to be awarded in 2025, and construction will continue for approximately three years.
- The East Baton Rouge Flood Risk Reduction Project aims to mitigate flooding across five sub-basins in the parish—Jones Creek, Ward Creek, Bayou Fountain, Blackwater Bayou, and Beaver Bayou—by enhancing 50 miles of channels through clearing, snagging, channel enlargement, and riprap placement. Completed sections include Lower Jones Creek, Ward Creek, and Bayou Fountain, while ongoing activities focus on utility identification, land acquisition, environmental review, mitigation acquisition, and final design adjustments. Construction contracts for the remaining project sections will be awarded as right-of-way access is obtained.
- Livingston Parish has recently completed several key projects including:
  - Clearing and snagging of 295 miles of waterways parish wide within both the Amite and Tickfaw River basins using the Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) funds following recent storms.
  - Clearing and snagging of the Amite River from the St. Helena line downstream to Port Vincent using FEMA Public Assistance Category A Debris Removal program funding.
  - Clearing of culverts and further waterway debris removal using $15M of LWI funding.
- Combined with the Comite River Diversion Canal, there is currently $1.2 billion in federally authorized flood control projects in the Amite RIver Basin.

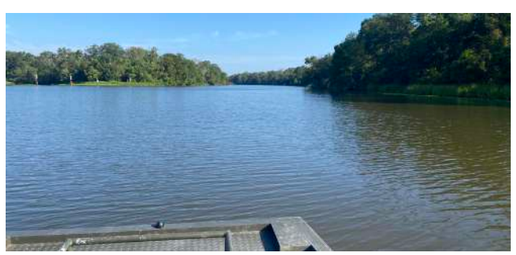


FIGURE 1-2: THE AMITE RIVER AND TRIBUTARIES IMPROVEMENTS COMPLETED IN 1964 INCLUDED CHANNEL IMPROVEMENTS AND CONSTRUCTION OF THE AMITE RIVER DIVERSION CANAL AND WEIR (PHOTO SOURCE: ARBC)

Master Planning Process

In May 2024 through a competitive qualification-based selection process, ARBC selected Dewberry in association with HNTB, ELOS, Forte & Tablada and La Terre Engineering to work with ARBC and its partners to develop the Master Plan.

Legislation requires that the ARBC Master Plan be consistent with the CPRA Master Plan. This Master Plan utilizes the same general framework which consists of five key chapters supported by several technical appendices:

1

Chapter 1 - Master Plan/Process Overview
This chapter contains background information about the Amite River Basin, the Amite River Basin Drainage and Water Conservation District, and the goals and development of the 2025 Master Plan.

2

Chapter 2 - Understand
This chapter provides context for the 2025 Master Plan, the planning process, the science, and stakeholder feedback the plan is built upon. It also includes information on what the conditions will be without the implementation of the 2025 Master Plan.

3

Chapter 3 - Predict and Evaluate
This chapter focuses on the use of predictive models in the Master Plan process, explains key assumptions in the modeling process, and presents information on risk reduction project types and how projects are evaluated and selected for the plan. It also looks into existing policies and codes implemented by communities throughout the basin and makes best practice recommendations for streamlining these policies and codes.

4

Chapter 4 - Take Action
This chapter presents the 2025 Master Plan and describes the benefits of the suite of projects and actions with regard to reducing flood risk and protecting and restoring the natural environment.

5

Chapter 5 - Master Plan Implementation
This chapter focuses on both the short- and long-term implementation of the 2025 Master Plan as a regional approach by maximizing funding opportunities and sequencing projects to ensure improved resiliency.

To develop this Master Plan, a nine-step process was implemented between May 2024 and May 2025 as summarized in Figure 1-4.

The Master Plan has been developed utilizing the latest advances in technical data collection and predictive models to provide science and engineering based information and recommendations. This was further supplemented with extensive engagement with basin residents, technical experts, and local leaders to better understand local needs and develop solutions as further discussed.

The development of this Master Plan in less than 1 year would not have been possible without the technical data and predictive models from the Louisiana Watershed Initiative (LWI) which gave the ARBC at least a 2-year head start and enabled this first edition to go far beyond what would be expected with the available time and budget. Key to this has been the leveraging of new watershed scale predictive models on a regional scale to help our communities understand the existing conditions and quantify what may be expected by the year 2050 if no action is taken. Further, these models have been the technical foundation to assessing project benefits during the formulation of this plan to ensure a no-adverse impact approach to achieving a more resilient future for the Amite River Basin residents. ARBC would like to express our sincere appreciation to the various agencies including the Office of Community Development (OCD), the Department of Transportation and Development (DOTD) and the Coastal Protection and Restoration Authority (CPRA) for their foresight and leadership through LWI.

FIGURE 1-3: RIVERINE FLOODING IN LIVINGSTON PARISH (PHOTO SOURCE: FORTE & TABLADA)

FIGURE 1-4: MASTER PLAN DEVELOPMENT FLOW CHART

Public Engagement and Outreach

A key component of the Master Planning process included Public Engagement and Outreach. To ensure success and acceptance of the Master Plan, it must represent a number of diverse groups with varied opinions. By bringing these stakeholders together through consistent engagement and ongoing dialogue, communities can find common ground in our collective desire to increase resilience and preserve the natural resources of the Amite River Basin.

During the initiation of the Master Planning process, an Engagement and Outreach Plan was developed that outlined strategies for communication, public awareness, and stakeholder engagement through various channels, including utilizing in-person meetings, the ARBC website, social media, and email updates. A copy of this plan is included as a supplement. Outreach included fostering collaboration between the ARBC project team, ARBC Board, identified stakeholders, legislators, as well as the public throughout the development of the ARBC Master Plan. Targeted outreach was conducted with stakeholders, including local parishes, state and federal organizations, to gather existing data for use in the development of the plan, which has been further summarized in the report and a supplement.

For the purpose of public engagement and in line with the requirements of HB 686 of the 2022 regular legislative session, ARBC was organized into three regions: **North, Central and South**. Due to the disproportionately high population of the central region and on request of individual parishes, this was subdivided into the East and West Central Region. The Northern Region included East Feliciana and a portion of St. Helena parishes, the Central Western Region included East Baton Rouge Parish, the Central Eastern Region included portions of Livingston Parish within the district, and the Southern Region contained portions of Ascension, St. James, and portions of Iberville parishes within the district as illustrated in Figure 1-7. Engagement included initial public meetings in each of the regions to introduce the public and stakeholders to the Master Plan process and to encourage public participation to share their concerns and issues for consideration within the plan.

These initial meetings were conducted in September and October 2024 and consisted of an overview presentation conducted by the Master Plan team and board members followed by an open house style format allowing attendees to interactively view project specific maps and poster-boards and ask questions of the Master Plan team (see Figure 1-5 and 1-6 below). A temporary public website was developed and shared at these meetings where the public and stakeholders could provide input by identifying their areas of flooding concerns and providing details of the flooding concerns. Additionally, a weblink and QR code were provided should the public and stakeholders decide to comment later.

FIGURE 1-5: LIVINGSTON PARISH INITIAL MASTER PLAN PUBLIC MEETING (PHOTO SOURCE: ARBC)

FIGURE 1-6: EAST BATON ROUGE PARISH PUBLIC INITIAL MASTER PLAN PUBLIC MEETING (PHOTO SOURCE: ARBC)

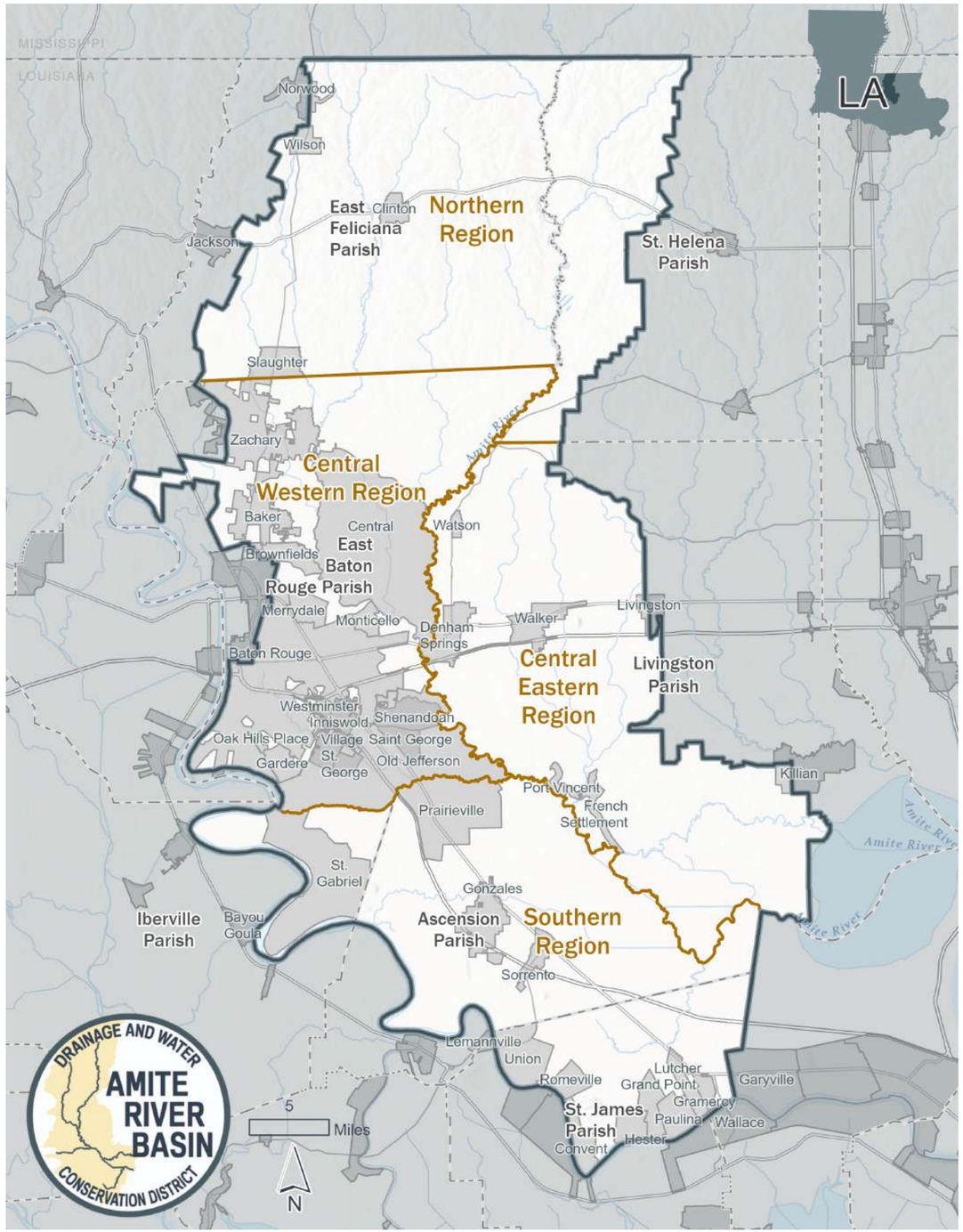


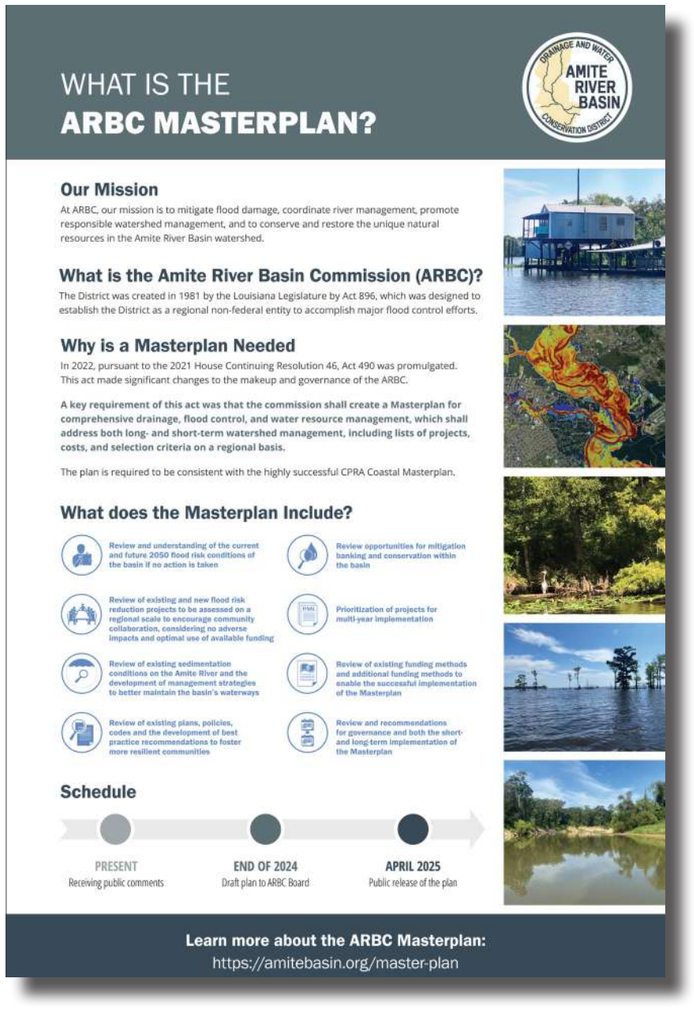
FIGURE 1-7: ARBC REGION FOR PUBLIC ENGAGEMENT AND OUTREACH (SOURCE: ARBC)

During these meetings, members of the public shared a wide array of general concerns including urbanization and its impacts on stormwater runoff, the lack of dredging and channel maintenance, and delays in the construction of the Comite River Diversion Canal. Many also shared their experiences during recent flooding events including the August 2016 and May 2021 floods. This information was recorded and used to identify areas of concern and validate predictive models.

The second round of public meetings took place in April and May of 2025 to present the final plan to the public and stakeholders and answer any questions. These meetings were held in each of the four regions following a similar format to the initial public meetings. This included a presentation summarizing the master planning process, findings, recommendations, and schedule. This was followed by an open house style format where attendees were encouraged to view location specific poster boards, engage with the team, and ask any questions they still had.

In addition to public open house meetings, coordination included frequent meetings between the Master Plan team, individual members of the ARBC board, partner agencies, communities and the ARBC Master Plan Committee with the intent to keep them up to date on project progress, gather input, answer questions, and obtain support for the plan. Throughout the duration of the Master Plan development, members of the Master Plan team attended all ARBC Board Meetings which were open to the public and provided progress updates and answered any questions the board or public has regarding development of the Master Plan.

Continued communication was conducted regarding the plan development with updates via fact sheets and notifications sent out via social media, email lists and updates to the ARBC website. The Master Plan team developed consistent messaging to engage stakeholders, legislators and the public throughout the planning process, emphasizing participation and transparency.



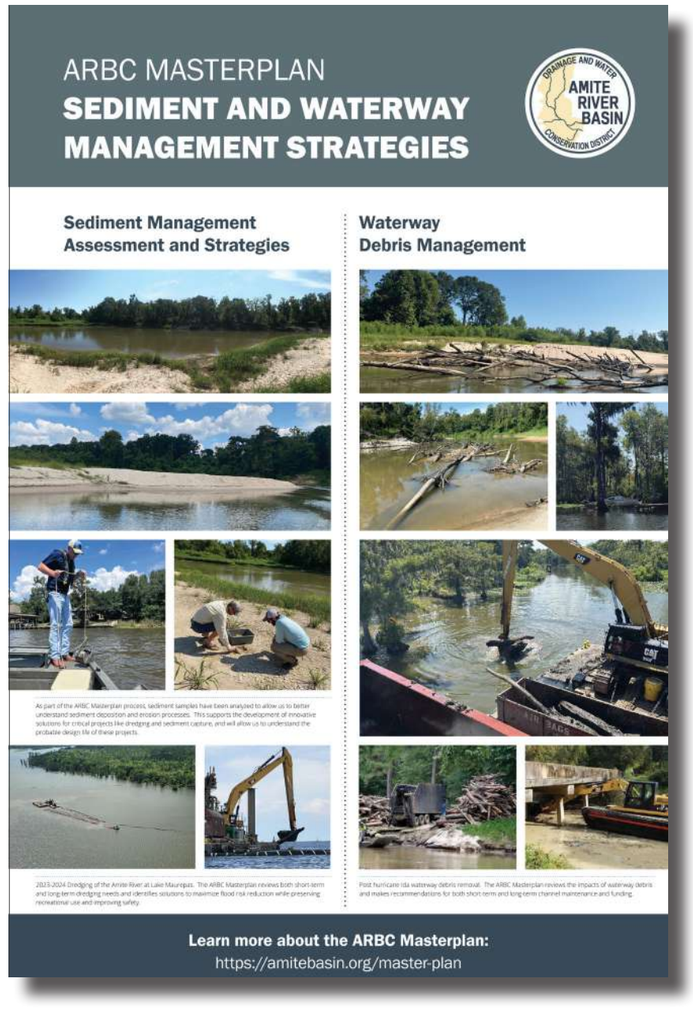


FIGURE 1-8: EXAMPLE POSTER BOARDS FROM PUBLIC OUTREACH MEETINGS (SOURCE: ARBC)

CHAPTER 2

UNDERSTAND

This chapter provides context for the 2025 Master Plan, the planning process, the science, and stakeholder feedback the plan is built upon. It also includes information on where we will be without the implementation of the 2025 Master Plan.

MASTER PLAN PROCESS/ OVERVIEW | **UNDERSTAND** | PREDICT AND EVALUATE | TAKE ACTION | MASTER PLAN IMPLEMENTATION

PHOTO SOURCE: CIVIL AIR PATROL, LA WING ON BEHALF OF THE STATE OF LOUISIANA

2.1 ARBC OVERVIEW

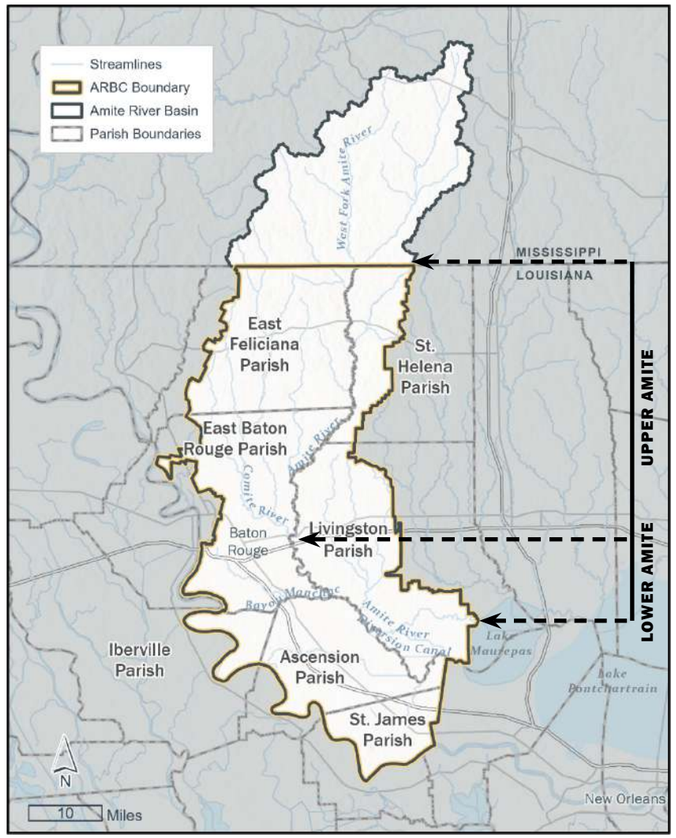


FIGURE 2-1:
THE AMITE RIVER BASIN HYDROLOGIC BOUNDARY AND ARBC GEOGRAPHIC BOUNDARY (SOURCE: ARBC)

Chapter 1 discussed recent legislation that resulted in significant changes to the makeup and governance of the ARBC. This included adding an additional 262 square miles to the ARBC boundary which included portions of Iberville, Ascension, and St. James parishes south of U.S. Highway 61, expanding the ARBC's geographic area to 1,696 square miles. Figure 2-1 illustrates the ARBC boundary, and the additional 578 square miles of the Amite River Basin located upstream in the state of Mississippi.

The divide between the Upper and Lower River is commonly considered the Comite River confluence.

Amite River Basin Overview

The Amite River drains an area of approximately 1,880 square miles with an additional 390 square miles of drainage from the Blind and New Rivers joining with the Amite River Diversion Canal just upstream of Lake Maurepas confluence, collectively known as the Amite River Basin, as illustrated in Figure 2-1. At its northernmost extent in southwest Mississippi, the Amite River comprises two forks: the East Fork River and the West Fork River. These two forks converge in southeast Louisiana approximately 0.3 miles south of the Mississippi/Louisiana state line. From this convergence, the main channel of the Amite River flows to the south for approximately 75 miles passing just east of Baton Rouge. South of Baton Rouge, the river flows to the southeast for approximately 48 miles before finally discharging into Lake Maurepas. In Louisiana, the Amite River forms the boundary between five southeastern parishes (East Feliciana, St. Helena, East Baton Rouge, Livingston, and Ascension). The primary tributary to the Amite River is the Comite River. Other significant tributaries include Beaver Creek, Darling Creek, Bayou Manchac and Ward Creek.

The Amite River Basin is a diverse watershed that presents varied flood risks due to its physiographical, topographical, geographical and land use features within the basin. In the Amite River Basin, three simplified geographic regions traverse the basin as illustrated in Figure 2-2, with each exhibiting different characteristics and flood risks. These geographic differences significantly influence the nature and severity of flooding across the basin.

The upland areas in **East Feliciana and St. Helena** are mostly characterized by Citronelle and Willis formations (Pliocene) which consist of sandstone, gravelly sandstone, and mudstone. These areas are generally less prone to flooding due to their elevated and well-drained land resulting in generally confined floodplains and high grounds that provide areas of very low flood risk.

Northern parts of **Ascension, East Baton Rouge, and Livingston parishes** are mostly characterized by the Terraces formation (Pleistocene). These surfaces are remnants of pre-existing floodplains, forming both linear trends along the major rivers in northern Louisiana and coast-parallel belts in southern Louisiana. Pleistocene terraces are usually less prone to flooding and exhibit more confined flooding than the lower Alluvium formations because they are elevated remnants of older floodplains, offering better drainage. However, extreme weather, poor drainage, or nearby water bodies can still cause localized or flash flooding in some areas.

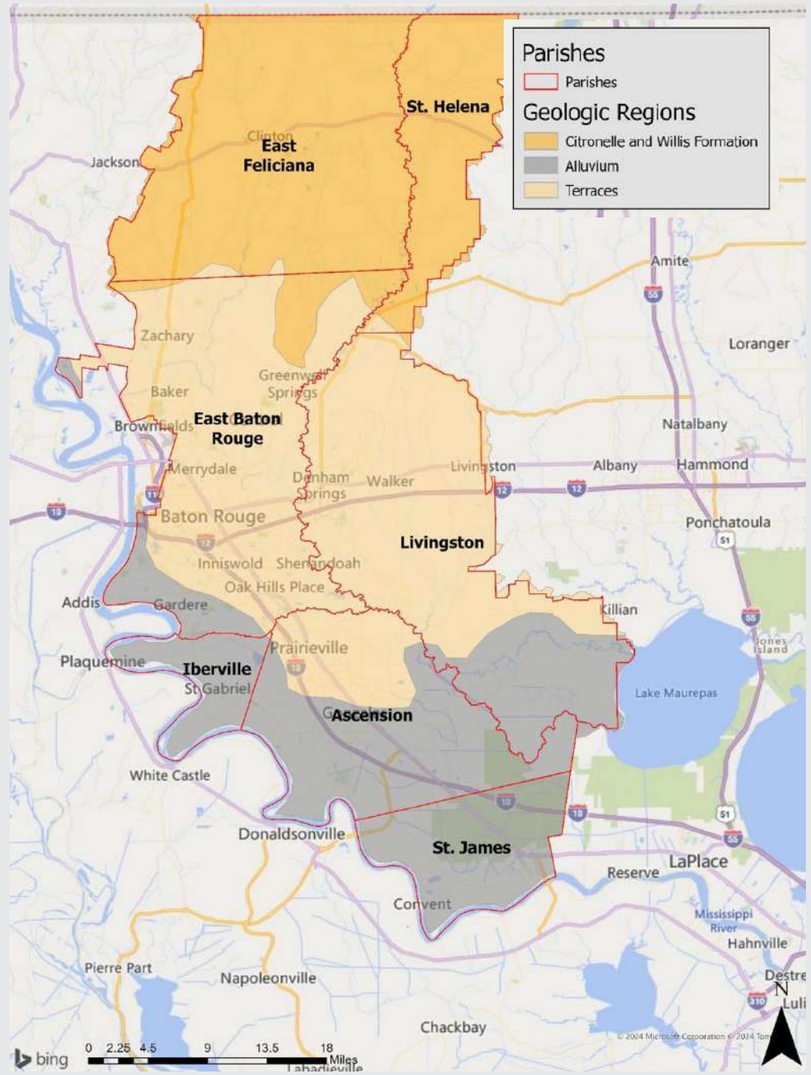


FIGURE 2-2: SIMPLIFIED GEOLOGIC REGIONS OF THE AMITE RIVER BASIN. (PHOTO SOURCE: ARBC)

The floodplains in **Ascension, East Baton Rouge, Livingston, St. James, and Iberville parishes** include the Alluvium formation (Holocene) which consists of sandy and gravelly channel sediments, overlain by sandy to muddy natural levee deposits, with organic-rich, muddy backswamp deposits filling the areas in between. These areas are more vulnerable to frequent flooding because they are found in low-lying floodplains near rivers and water bodies. Lake Maurepas is subject to tidal influences and coastal storm surge which can have an impact in the lower portion of the basin.

While much of the basin is rural, East Baton Rouge Parish has significant development, followed by Ascension and Livingston Parish, with smaller pockets of development in other parishes. A large portion of the basin's development lies within and adjacent to floodplains, intensifying flooding issues. The basin's diverse terrain and land use create varying risks, including rapid runoff in some areas, flash floods in others, and prolonged, widespread inundation in low-lying regions.

As competition for developable land increases within urbanized areas of the Amite River Basin, there will continue to be increased pressure for development of floodplains requiring resilient floodplain management.

Flooding Types

Flooding experienced within the Amite River Basin can be caused by several primary flooding types. This includes riverine driven (rainfall/headwater) flooding, wind-driven coastal and/or lake flooding, backwater flooding, and flash flooding as further discussed below. It highlights the diverse flood risks these events pose to the surrounding communities and infrastructure.

While flash flooding can occur anywhere resulting in nuisance flooding of streets and yards, different areas of the basin can be impacted by one or many of these types of flooding. These flooding types emphasize the critical necessity of implementing effective flood mitigation strategies to safeguard communities, to protect lives and property from potential devastation.

COMPOUND FLOODING

Compound flooding occurs when two or more flooding types occur simultaneously. This is often experienced in lower lying areas of the Amite River Basin where water levels in Lake Maurepas can be elevated several feet by southeasterly winds. This can be compounded by riverine driven flooding coming downstream from the upper Amite River, preventing it from freely draining into Lake Maurepas. It can also submerge the outlets to storm sewer systems along major waterways preventing them from freely draining and exacerbating the impacts of flash flooding.

Riverine Flooding

Riverine flooding occurs when intense or prolonged rainfall causes water to accumulate in small streams, rivers, or drainage areas within the watershed, generally upstream of the worst hit areas of flooding. This type of flooding often results from an influx of water that exceeds the capacity of the drainage system or the natural landscape to absorb it. When the ground is already saturated from prior precipitation, it cannot absorb additional rainfall effectively, resulting in more immediate runoff and significantly increasing the risk of flooding. In smaller areas, such as valleys and low-lying regions near tributaries, these floods can become catastrophic quickly within hours of intense rainfall. When prolonged rainfall is combined with contributing factors such as heavily urbanized areas, and low-lying topography, this type of flooding can become one of the most devastating. While all regions and parishes within the Amite River Basin are vulnerable to riverine flooding, certain areas may experience more severe impacts from other flooding types due to their natural characteristics and proximity to other hazards.

FIGURE 2-3:
RIVERINE OVERBANK FLOODING IN EAST BATON ROUGE PARISH (PHOTO SOURCE: EBR STORMWATER MASTER PLAN)

FIGURE 2-4: RIVERINE OVERBANK FLOODING IN ASCENSION PARISH (PHOTO SOURCE: FORTE & TABLADA)

Wind Driven Coastal and Lake Flooding

Wind-driven coastal or lake flooding occurs when strong winds push water onto the shore, causing water levels to rise and flood coastal or lakeside areas, such as areas surrounding Lake Maurepas as illustrated in Figures 2-5 and 2-6. This type of flooding is often associated with strong winds during high tides, hurricanes, or severe weather events. Storm surge is a primary consequence of wind-driven or lake flooding, occurring when powerful winds from storms or hurricanes force seawater onto the shore and upstream into tributaries, dramatically increasing water levels. Low-lying coastal areas, due to their naturally vulnerable topography, are particularly prone to this type of flooding. Sea level rise continues to increase flood risk associated with wind driven flooding. In these regions, where water flow converges and energy accumulates, the combined effect of surge and wave action can lead to higher water levels, increased erosion, and more extensive flooding. This amplifies the vulnerability of the most downstream locations, making them the hardest hit during such events. In the Southern Region storm surge from Lake Pontchartrain and Lake Maurepas has a direct impact, by pushing water upstream and or preventing major drainage systems from draining, which can make the area more vulnerable to additional types of flooding.

Prevailing SE winds often elevate water levels causing localized flooding without rain or storms, restricting public recreational uses even without precipitation

FIGURES 2-5 AND 2-6: WIND DRIVEN/ COASTAL FLOODING EXAMPLES (PHOTO SOURCES: SLFPA-EAST)

Backwater Flooding

Backwater flooding occurs when elevated water levels from downstream flooding sources including major rivers and lakes force flood waters to back up and inundate upstream areas as illustrated in Figures 2-7 and 2-8. Within the Amite River Basin, backwater flooding is often caused by high water levels on the Amite River, Comite Rivers or Lake Maurepas that prevent floodwaters from tributaries flowing freely. Bayou Manchac and Colyell Bay and its tributaries are good examples of flooding sources that are dominated by flooding from the Amite River more frequently than flooding driven from rainfall over their respective watersheds. The problem is compounded in areas with low-gradient slopes, where water naturally flows more slowly, increasing the risk of flooding during periods of intense rainfall. Several parishes in the Amite River Basin, including East Baton Rouge, Livingston, and Ascension, have experienced frequent floods due to this backwater effect.

FIGURE 2-7 AND 2-8: BACKWATER FLOODING FROM THE GREAT FLOOD OF 2016 (PHOTO SOURCES: CIVIL AIR PATROL, LA WING OF BEHALF OF THE STATE OF LA)

Flash Flooding

Flash flooding happens when an excess of rain collects quicker than it can be absorbed, drained, or evaporated and is often associated with nuisance flooding as illustrated in Figure 2-9. This type of flooding is typically triggered by high-intensity, short-duration rain events. It is very prominent in urban neighborhoods where there is less pervious area to absorb the water, and storm drain systems have limited capacity to convey runoff. Flash flooding usually recedes quickly after the rain event has ended. When very severe flash flooding occurs, it can lead to residents being temporarily trapped in their homes/businesses. Flash flooding can occur anywhere, not just near streams, channels and/or other bodies of water. All regions and parishes within the Amite River Basin are susceptible to flash flooding.

FIGURE 2-9 FLASH FLOODING OF STREETS IN EBR PARISH DUE TO INTENSE RAINFALL IN MAY 2021 (PHOTO SOURCE: EBR STORMWATER MASTER PLAN)

Dominant Flooding Types in the Amite River Basin

Figure 2-10 provides an overview of the dominant flooding types within the ARBC geographic boundary during the 100-year flood utilizing LWI modeling.

How is the Frequency of Floods Measured?

RECURRENCE INTERVAL	ANNUAL EXCEEDANCE PROBABILITY
2-Year	50%
5-Year	20%
10-Year	10%
25-Year	4%
50-Year	2%
100-Year	1%
200-Year	0.5%
500-Year	0.2%

A 100-year flood is a flood event that has on average a 1 in 100 chance (1% probability) of being equaled or exceeded in any given year and can be referred to as either the 100-year recurrence interval flood or the 1% annual exceedance probability flood. The 100-year flood is commonly used for regulating development within a floodplain as well as determining the need for flood insurance through the National Flood Insurance Program. Floods of both smaller and greater magnitude are measured the same way as illustrated to the right.

It is important to note that a 100-year flood does not mean that the flood only happens once every 100 years, but rather refers to a specific level of probability. For example, in 2016, portions of the Amite River Basin experienced floods exceeding a 100-year flood in both March and August.

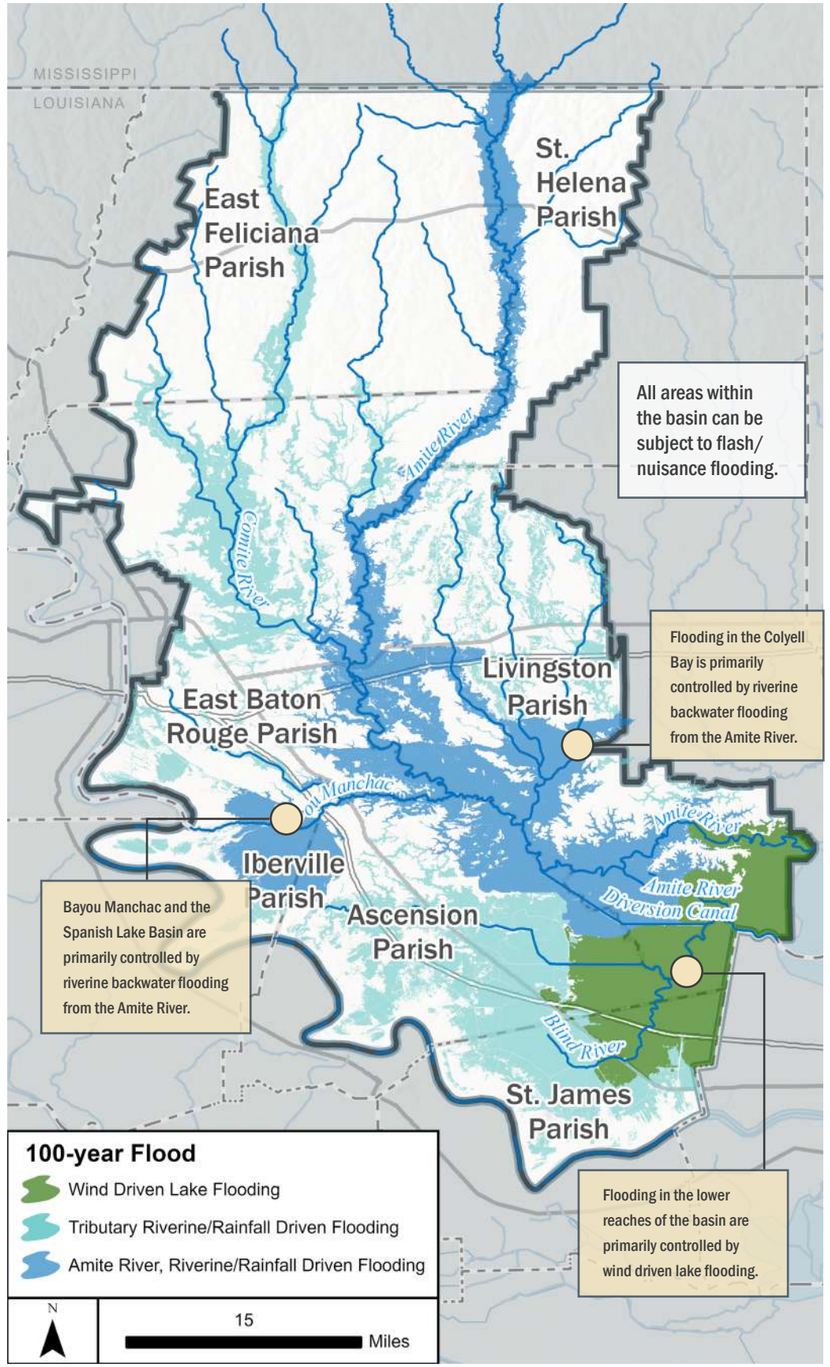


FIGURE 2-10: DOMINANT FLOODING TYPES THROUGH THE ARBC GEOGRAPHIC BOUNDARY FOR THE 100-YEAR FLOOD (SOURCE: ARBC)

Flooding Impacts

Flooding in the Amite River Basin stems from many combinations of these flooding types, which is why mitigation efforts are essential for the safety of the communities within the ARBC. The basin faces heightened vulnerability to heavy rainfall, particularly during hurricane seasons which can put strain on existing drainage systems. These impacts include property damage, erosion of coastlines, environmental disruption, economic losses, and displacement of communities. Areas within the Amite River Basin have experienced these impacts during major flooding events. Notably the August 2016 flood, which was the flood of record within many portions of the Amite River Basin, resulted in catastrophic impacts as well as the disruption to vital infrastructure. Major highways were closed including portions of Interstates 10 and 12.

Interstate 12

The Great Flood of August 2016 was a record event resulting in historic damage and losses. The 2016 Flood is often referred to as a 1000-year event. The event revealed much about the behavior of the Basin's dynamic nature, including manmade features like I-12. Designed and built to a 50-year flood standard, sections of travel lanes along I-12 were inundated, and in locations flood waters reached the median barrier, restricting northside flood waters from efficiently draining (see Figure 2-11). Flood waters that otherwise would have inundated communities south of the Interstate were instead detained on the northside for a longer period of time. Many entities, the ARBC included, are determined to mitigate flooding of this nature. Though designed for the lesser, but still devastating, 50-year flood standard, the Interstate has been subject to federal and court scrutiny in order to prevent inundation of any kind from obstructing the Interstate itself and to maximize efficient drainage. These efforts are ongoing and are monitored by the ARBC.

FIGURE 2-11: FLOODING IN THE CITY OF WALKER ADJACENT TO I-12, AUGUST 2016 (PHOTO SOURCE: CIVIL AIR PATROL ON BEHALF OF THE STATE OF LOUISIANA)

The consequences of flooding can be categorized as Primary and Secondary whereby each influence the social and economic vulnerability and overall resilience of communities within the ARBC:

1. Primary consequences, also referred to as direct consequences, are the flood losses due to contact with water. This can include loss of life and injuries, damage to infrastructure, homes, and businesses, and loss of crops.

2. Secondary consequences, also referred to as indirect consequences, occur later after the flood has passed. They may include disruption of critical services, health impacts like sickness due to mold exposure, and economic impacts like loss of business revenue, jobs, tax base, and workforce.

FIGURE 2-12: DEBRIS FROM FLOOD OF 2016 (PHOTO SOURCE: EBR STORMWATER MASTER PLAN)

FIGURE 2-13: FAMILY EVACUATING FLOOD WATERS (PHOTO SOURCE: EBR STORMWATER MASTER PLAN)

Property damage is the most common primary consequence, caused by the flood inundation of homes, businesses, and infrastructure. The photo above shows typical debris removed from flooded homes. Land loss along the coast caused by both anthropogenic and natural factors results in the loss of wildlife habitat, flood storage capacity and pollution absorbing wetlands. Secondary consequences, including health hazards emerge from contaminated floodwaters carrying waterborne diseases and hazards. Sanitation systems can become inundated with flood water, which can result in the spread of bacteria and other contaminants through the water system. Flooding impacts can also result in both direct and indirect loss of life and injury due to waterborne diseases or other health risks from contaminated floodwaters, drowning, or other incidents resulting from flood waters.

Natural and Manmade Features within the Basin

There are various natural and manmade features that have an impact on flood risk and flood risk reduction within the basin. Figure 2-16 illustrates the location of both natural and man-made key features that impact the flood risk within the basin.

Comite River Diversion Canal 1

Flooding along the Comite River generally stems from excessive upstream rainfall, leading to riverine and riverine backwater flooding of tributaries. The floods of 1983 and 2016, the two largest floods of record caused significant flooding along the Comite River.

The Comite River Diversion Canal project in East Baton Rouge Parish is currently under construction (as of April 2025). It is specifically designed to reduce the impact of urban flood risks by diverting water from the Comite River into the Mississippi River via the diversion canal. The project is located north of the City of Baker and south of the Town of Zachary in East Baton Rouge Parish. The project entails a 12-mile-long diversion channel fed by a high flow diversion structure on the Comite River, as illustrated in Figure 2-14 and 2-15. The construction of the canal is under the supervision of USACE, with bridge construction under the supervision of DOTD. The estimated completion date is undetermined at this time.

TO LEARN MORE ABOUT...

The Comite River Diversion Canal, please visit:
https://www.mvn.usace.army.mil/About/Projects/Comite-River-Diversion/ **or** http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Public_Works/Levee_Safety/Pages/ComiteRiverDiversion.aspx

OR SCAN THE QR CODE BELOW

FIGURE 2-14:
COMITE DIVERSION PROJECT SCHEMATIC MAP
(PHOTO SOURCE: USACE)

FIGURE 2-15:
COMITE DIVERSION PROJECT CANAL
SECTION UNDER CONSTRUCTION
(PHOTO SOURCE: MCKIM & CREED ENGINEERS)

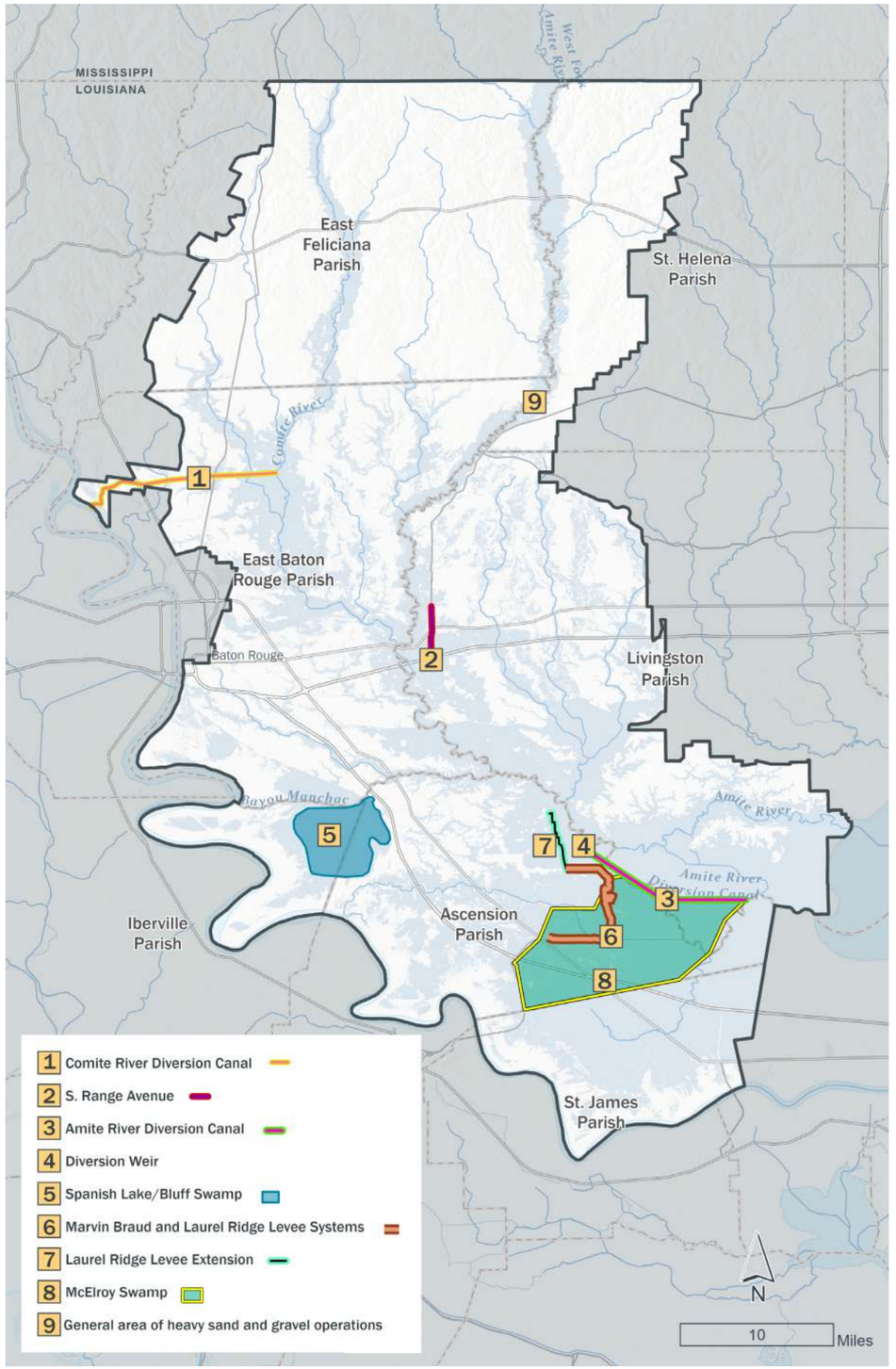


FIGURE 2-16:
LOCATIONS OF EXISTING NATURAL AND MAN-MADE FEATURES (SOURCE: ARBC)

Range Avenue 2

Range Avenue is a road that runs in the north south direction east of the Amite River, in Livingston Parish, more specifically, Denham Springs. The road runs along a natural ridge, acting as a levee to the Amite River during certain storm events as illustrated in Figure 2-17. Flooding events on the Amite River exceeding a 50-year level begin to overtop this natural barrier from the west, causing flood waters from the Amite River to flow eastward into Livingston Parish. As the area around Range Avenue begins to flood, the overflows from the Amite River enters Grays Creek, significantly increasing downstream flood discharges. As flood magnitudes on the Amite River approach the 100-year level, eastward overflows begin to overtop Juban Road and enter West Colyell Creek, increasing flooding in portions of the City of Walker and downstream areas. The overtopping of this natural ridge causes disastrous flooding and extensive damage to homes and businesses as evidenced during the 2016 flood event.

Other roads within the basin impact the flow of stormwater runoff similarly including state highways 16 (south of 190), 1032, 42 and 22.

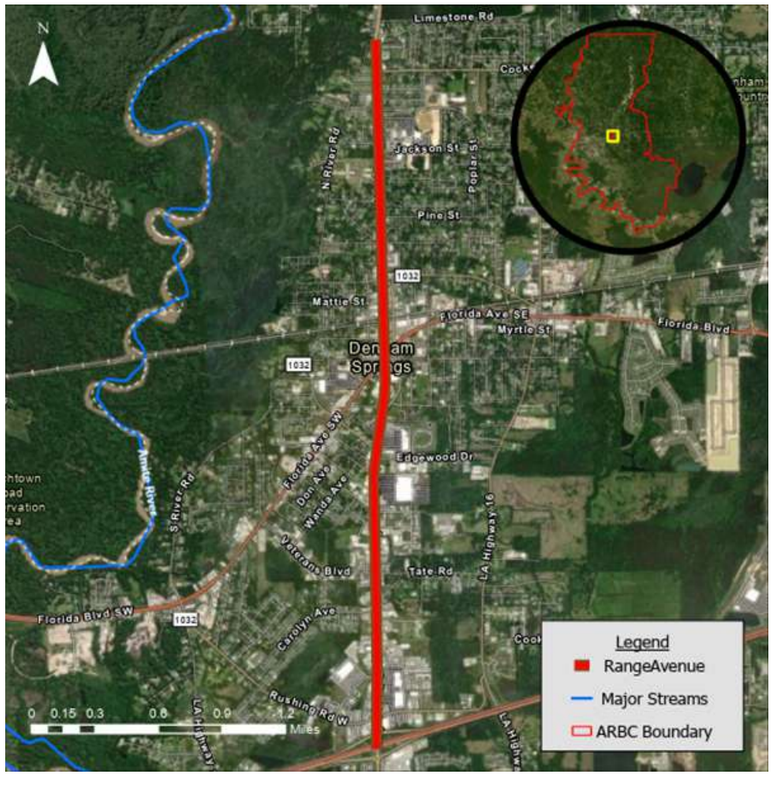


FIGURE 2-17: RANGE AVENUE RIDGE LOCATION MAP (SOURCE: ARBC)

Amite River Diversion Canal 3

The Amite River Diversion Canal Weir project, included in the Survey of Amite River and Tributaries, Louisiana, USACE, approved by Congress in 1955, stretches for 10.6 miles from just below French Settlement to its endpoint in the Blind River, about 5 miles upstream of Lake Maurepas as illustrated in Figure 2-18 and 2-19. Its purpose is to convey overflows from the Amite River Diversion Canal Weir into the Blind River, alleviating flooding on the Amite River. The construction of the canal involved excavation of the channel and constructing earthen embankments alongside the channel from the excavated material, limiting natural flows and essential sediments into the swamps.

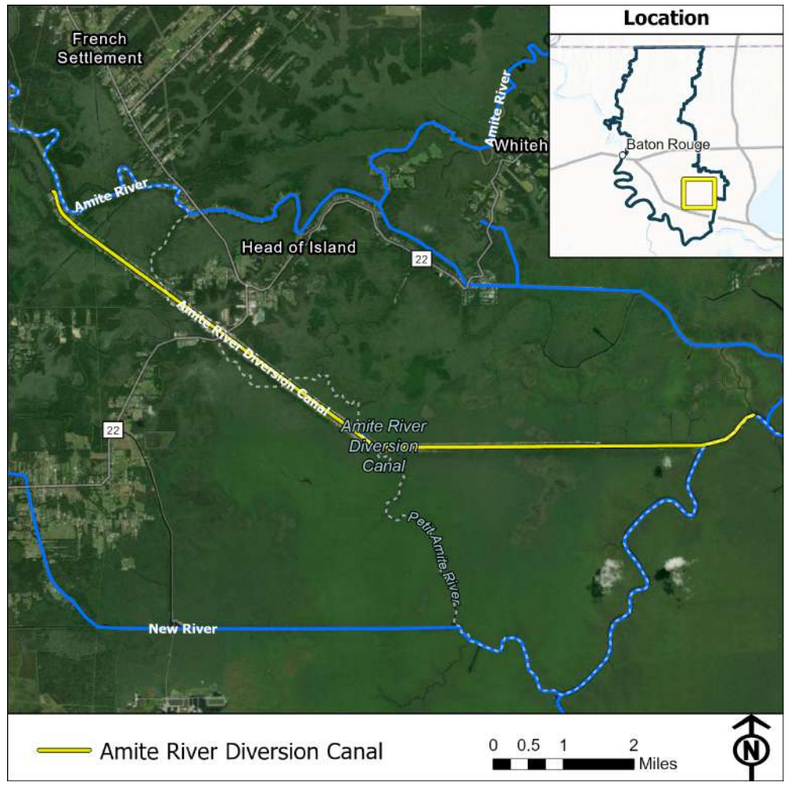


FIGURE 2-18:
AMITE RIVER DIVERSION CANAL LOCATION MAP (SOURCE: ARBC)

FIGURE 2-19:
SPLITTING OF AMITE RIVER INTO DIVERSION CANAL (PHOTO SOURCE: ARBC)

Amite River Diversion Canal Weir 4

The Amite River Diversion Canal Weir is located at the north end of the Amite River Diversion Canal and the Amite River confluence at the border of Ascension and Livingston Parishes as illustrated in Figure 2-20. The project consists of a riprap weir designed to maintain flows in the Amite River, completed by USACE in the 1960's and can be seen in Figure 2-21.

On request of Ascension Parish, a design modification was implemented to add a boat way with a 20-foot bottom width and 1 vertical to 2 horizontal side slopes with an invert elevation of -5 feet NGVD.

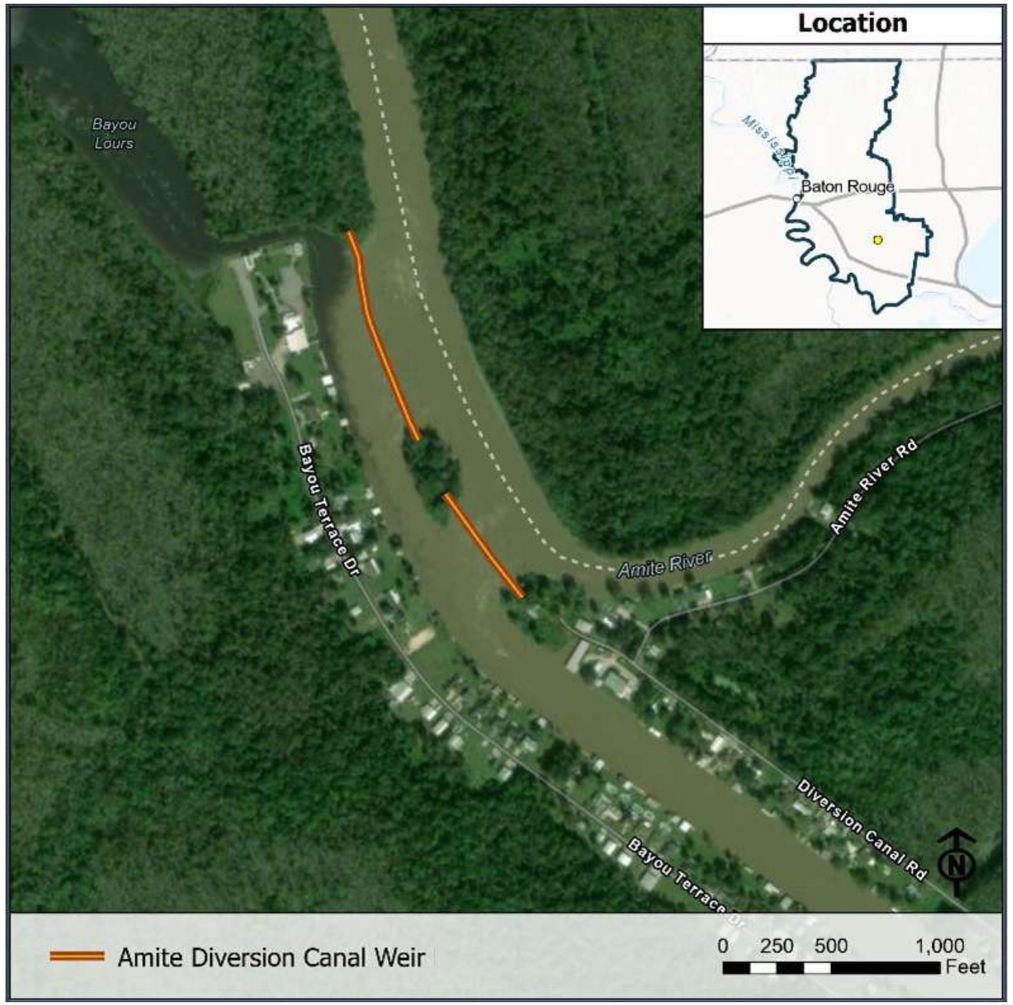


FIGURE 2-20: AMITE RIVER DIVERSION CANAL WEIR LOCATION MAP (SOURCE: ARBC)

FIGURE 2-21: AMITE RIVER DIVERSION CANAL WEIR LOOKING DOWNSTREAM FROM THE AMITE RIVER TOWARDS THE AMITE RIVER DIVERSION CANAL (PHOTO SOURCE: ARBC)

Spanish Lake/Bluff Swamp 5

The Spanish Lake/Bluff Swamp sub-basin occupies parts of Iberville and Ascension Parishes, and is surrounded by Bayou Manchac to the north, the Mississippi River to the west and south, and Interstate 10 to the east as illustrated in Figure 2-22. Within its drainage area is where the City of St. Gabriel, Carville, Sunshine, the Bluff Road community, Louisiana's largest Women's Prison, and several major petrochemical facilities are located. The sub-basin's only drainage outlets are Alligator Bayou and Frog Bayou.

Given the sub-basin's geographic location and low topography, the sub-basin acts like a giant bowl predisposed to "backwater flooding" problems coming up Bayou Manchac from the Amite River. Back in 1951, the Louisiana Department of Public Works, now DOTD constructed the Alligator Bayou and Frog Bayou Backwater Floodgates to help prevent flooding from the Amite River. However, the floodgates were not always operated properly. For decades private interest illegally assumed operation of the backwater floodgates for the purpose to artificially impound water within the sub-basin and permanently flooding the swamp. Over this time this ill action caused severe degradation to the natural ecosystem and reduced the flood storage capacity within its drainage area. In 2009 the Parishes resumed operations of the floodgates after winning multiple court battles against those private interests. Today, a natural flow has been restored between the sub-basin with Bayou Manchac, thus helping to restore the swamp ecosystem while regaining floodwater storage capacity. Most all of the sub-basin now serves as a U.S. Army Corps of Engineers approved wetland mitigation banks. Therefore, the land in the sub-basin will be restored to its natural conditions and function in perpetuity.

The Spanish Lake Ecological Education Center (SLEEC) operates as a non-profit organization focusing on restoring and preserving 4,000 acres of the surrounding forested wetland ecosystem. It functions under a federally approved wetlands restoration plan, ensuring the area's ecological health and preventing over development.

During the 2016 Flood, extreme high levels of floodwaters from Bayou Manchac overtopped the Bayou Manchac Road flooding the Spanish Lake/Bluff Swamp Sub-Basin. Several residential and major industrial structures, including the Louisiana State Women's Prison were substantially damaged. The main problem is the amount of time it took (60-days) for the drainage area and for Bayou Manchac to return back to its normal water levels, even after the Amite River had already receded back to its average low water level.

Iberville, Ascension, and East Baton Rouge Parishes depend on Bayou Manchac for drainage to the Amite River. All these parishes agree something needs to be done to help the water from Bayou Manchac drain to the Amite River. Several studies have concluded the lack of maintenance in Bayou Manchac has contributed to a clogged channel. Other studies have also concluded the mouth of Ward Creek in Bayou Manchac should be re-directed toward the Amite River rather than upstream towards Bayou Fountain, and Alligator and Frog Bayous.

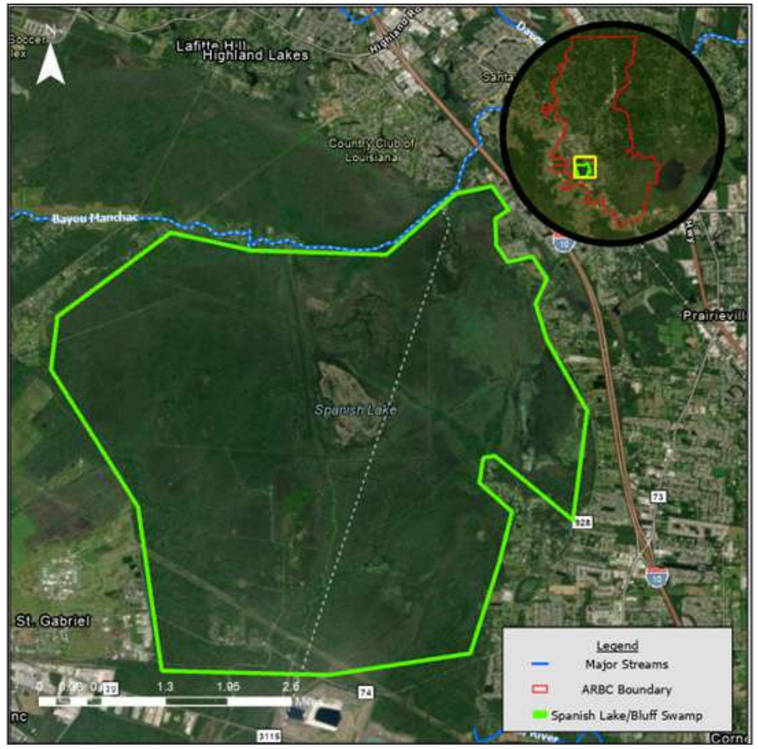


FIGURE 2-22: SPANISH LAKE/BLUFF SWAMP LOCATION MAP (SOURCE: ARBC)

Marvin Braud and Laurel Ridge Levee System 6

The Marvin Braud Levee System is a vital project for the eastern portion of Ascension Parish protecting the parish from flooding caused by the Amite River overflows, storm surge and wind driven tides as illustrated in Figure 2-23. The levee system consists of the Marvin Braud North and Marvin Braud West levees, the Laurel Ridge Levee, and the Marvin Braud Pumping Station. The Marvin Braud North Levee extends about 5 miles to the north from the Marvin Braud Pumping Station and the Marvin Braud West Levee extends about 3.3 miles to the west from the pump station. The Laurel Ridge Levee also ties into the Marvin Braud North Levee at LA Highway 22 and continues a few miles to the west. In 2016, the Amite River overtopped the existing Laurel Ridge Levee flooding the interior of the existing Marvin Braud System. The interior water then overtopped the Marvin Braud West Levee. The pump station could not keep up with draining this excess water that entered the interior.

The Levee Analysis and Mapping Procedures or LAMP Report completed by HNTB Corporation in 2017 to evaluate the existing Marvin Braud Levee system, indicated deficiencies in the levee system. The analysis showed that the system does not provide a 100-year level of protection, and therefore does not meet federal regulation 44 CFR §65.10 levee certification requirements. The pump station does not adequately tie into the adjacent levee sections and can backflow through the discharge chambers under high storm surge conditions if the respective pump does not work. The drainage structures through the levee system do not have adequate backflow protection. The report provided recommendations to upgrade the levee system to meet 100-year level of protection for FEMA certification.

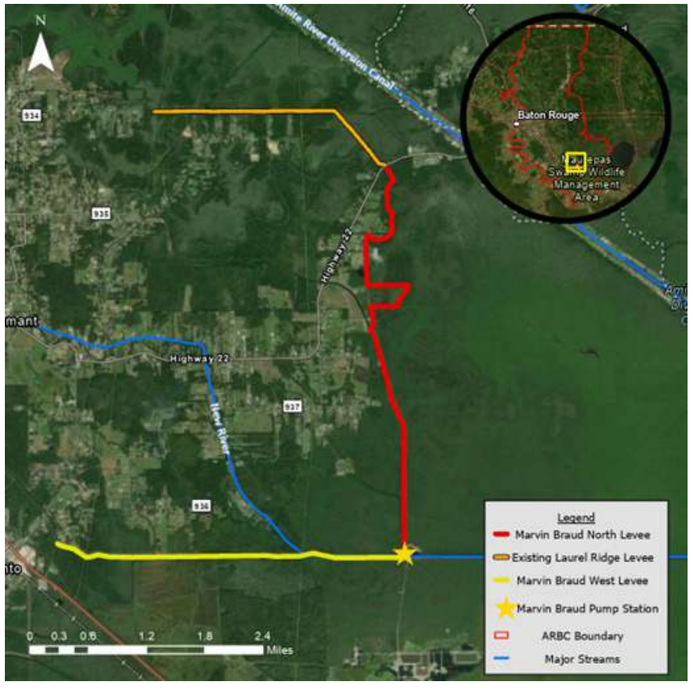


FIGURE 2-23: MARVIN BRAUD PUMP STATION AND LEVEE SYSTEM PROJECT MAP (SOURCE: ARBC)

Laurel Ridge Levee Extension 7

The Laurel Ridge Levee Extension project consists of a levee extending north from the west end of the existing Laurel Ridge Levee and terminating at the northern end of Wall Cemetery Road as illustrated in Figure 2-24. It will protect up to 8,500 structures within the Amite River floodplain in the northeast area of Ascension Parish from flooding of the Amite River. The levee will be approximately 4.5 miles long and is being constructed to an elevation ranging between elevation 13.0 - 17.0 feet and requiring approximately 500,000 cubic yards of fill. This project will also have 7 gated drainage structures. The gated drainage structures will remain in the open position to allow for natural ebb and flow of water to maintain the water elevations within the swampland that the levee passes through. The gated drainage structures will be closed ahead of the threat of high water from the Amite River. A stage frequency analysis of the Amite River at the proposed outlet structures indicates that the gates would be closed for a flood event on average once every three years. The gates will then be opened when the high water recedes, and the threat has passed.

This project is currently under construction and upon completion, Ascension Parish will be seeking levee accreditation in accordance with federal regulation 44CFR §65.10 which will recognize the flood protection benefits of the levee system and potentially remove mandatory flood insurance purchase requirements for those protected by the levee system. PLD was responsible for funding the engineering, design, and permitting phases of the project, and the East Ascension Gravity Drainage District is providing the funds for construction. The total project cost is approximately $24 million. This system, in conjunction with upgrades to the Marvin Braud Levee system, will provide flood protection to a significant portion of east Ascension Parish. This project is expected to be complete in summer of 2025.

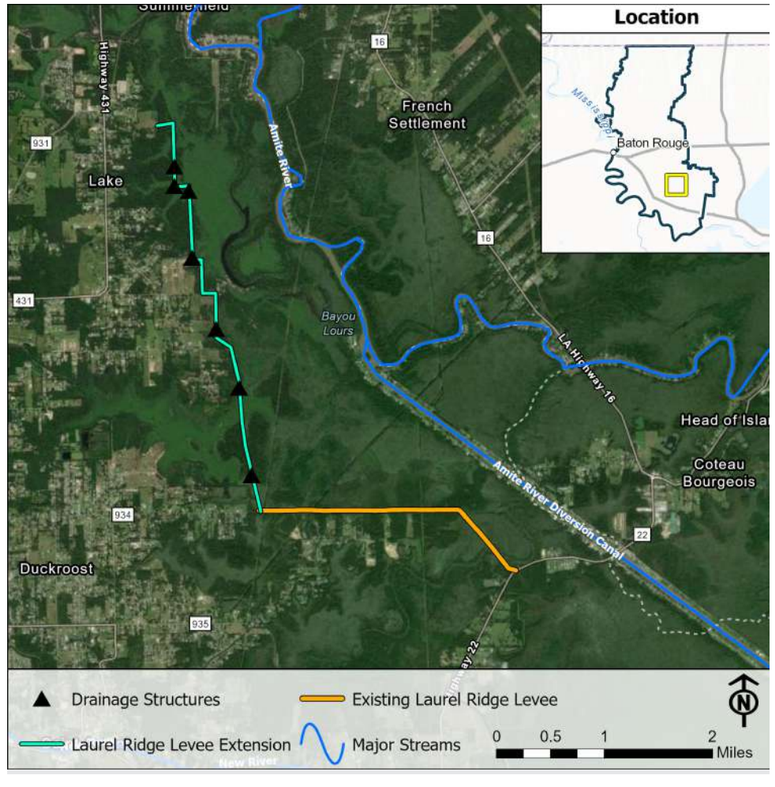


FIGURE 2-24: LAUREL RIDGE LEVEE EXTENSION PROJECT LOCATION MAP (SOURCE: ARBC)

McElroy Swamp 8

McElroy Swamp is over 10,000 acres of low-lying swamp located in the eastern portion of Ascension Parish. It is bounded by the Amite River Diversion Canal on the north, LA Highway 22 on the west, LA Highways 70 and 3125 to the south, and Blind River to the west as illustrated in Figure 2-25. The Louisiana Department of Wildlife and Fisheries (DWF) and the United Land Company own a sizable portion of the swamp. McElroy Swamp receives runoff from the west prior to draining to Lake Maurepas. It provides essential flood storage absorbing excess rainfall and reducing the speed at which water flows into rivers, streams, and other waterways. The swamp provides habitat for various animal and plant species, contributing to biodiversity of the local ecosystem. Healthy wetlands help maintain soil stability, which reduces erosion and keeps floodwaters clearer and less destructive.

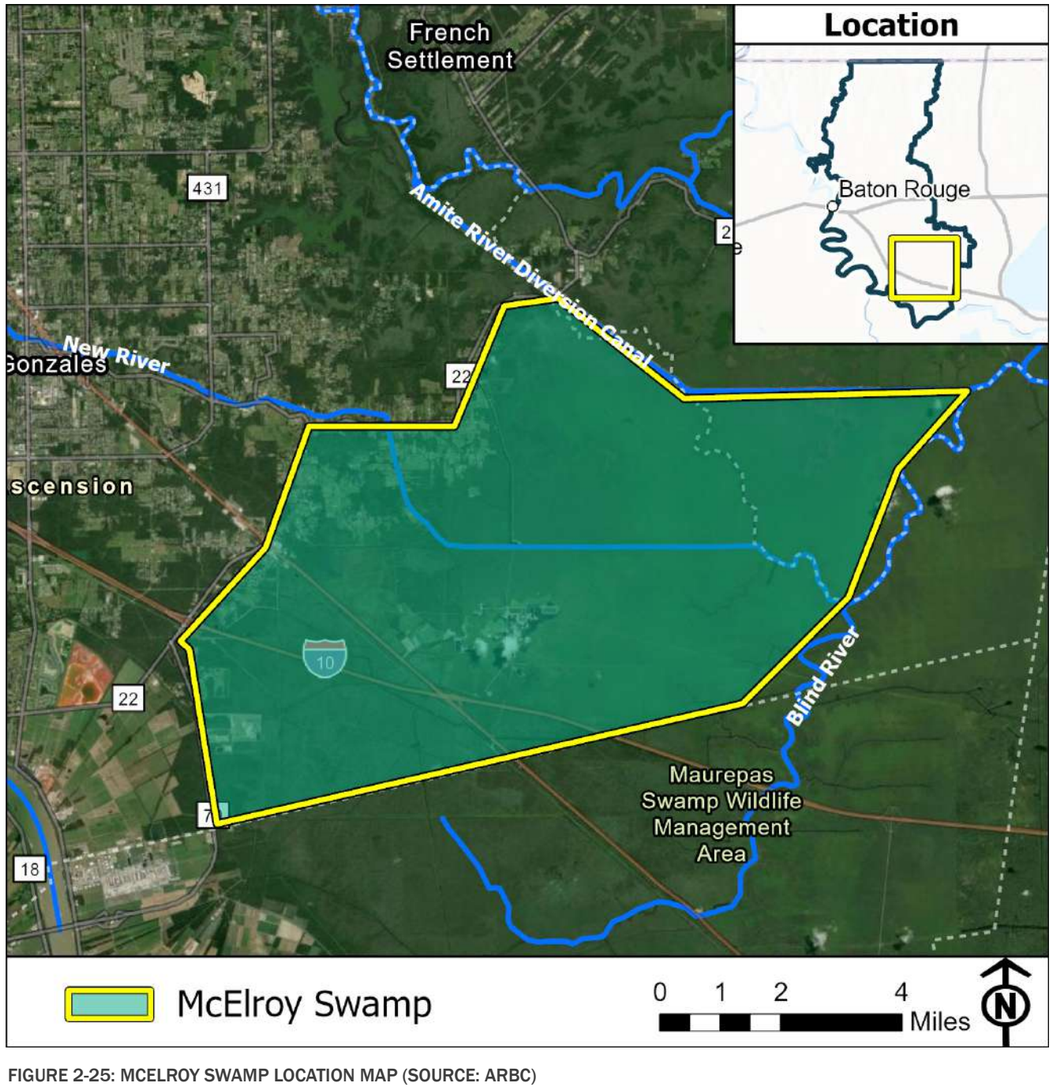


FIGURE 2-25: MCELROY SWAMP LOCATION MAP (SOURCE: ARBC)

Sand and Gravel Operations 9

Gravel pits are located throughout the upper Amite River Basin. The formation of these gravel pits is a result of both active and historic sand and gravel mining operations. Extensive changes to both the river channel and overbank areas in the vicinity of these gravel pits is clearly visible in historic aerial imagery and terrain data as characterized by the vast areas of unvegetated sand and gravel, widening of channels (see Figure 2-26), reductions in historic sinuosity, erosion, aggradation, and degradation.

When the river overflows its banks, it fills pits with water and sediment, slowing down the sediment load. However, the lighter surface water speeds up, creating 'hungry water', which erodes banks, causing more sediment to enter the river and flow downstream.

The March 1992 final report of the Governor's Interagency Task Force on Flood Prevention and Mitigation's Amite River Sand and Gravel Committee reviewed the suspected influences of sand and gravel mine operations on flooding and water quality within the Amite River Watershed and recommended that action be taken towards implementing regulations to control adverse impacts identified, and to provide for appropriate reclamation of lands disturbed through mine operations.

Many of the sand and gravel operations are located within a FEMA Zone AE with regulatory floodway, falling under the requirements of 44CFR §60.3(d).

FIGURE 2-26: AMITE RIVER CHANNEL IN THE VICINITY OF SAND AND GRAVEL MINING OPERATIONS (PHOTO SOURCE: ARBC)

Parish Hazard Mitigation Plans, State Plans, and Federal Plans

There are several federal, state, local and regional plans that inform the strategies, projects, and policies throughout the ARBC. This section aims to provide an overview of each to help align activities. The following plans are summarized in this section:

- State and Local Hazard Mitigation Plans
- Louisiana Coastal Mater Plan
- USACE Feasibility Studies
- U.S. Department of Housing and Urban Development (HUD) CDBG-Mitigation Action Plan
- LWI Regional Watershed Plans

The importance of hazard mitigation planning has become increasingly evident as communities face a growing array of natural and man-made hazard threats. Hazard mitigation plans identify current and projected vulnerabilities and risks, as well as prioritized strategies to enhance the resilience of an area.

Hazard Mitigation Plans

Hazard mitigation plans are mandated by the Disaster Mitigation Act of 2000. States and local jurisdictions must have a current approved and adopted hazard mitigation plan in place to be eligible for FEMA hazard mitigation funds. This includes non-disaster and post-disaster funds like Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), the Hazard Mitigation Grant Program (HMGP), and the Public Assistance Grant Program (PA) among others.

The 2019 Louisiana Hazard Mitigation Plan, prepared by the Louisiana Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) with the support from the LSU Department of Geography and Anthropology and the Department of Construction Management, shows the exposure Louisiana faces to all hazards, including various types of flooding (coastal, riverine, stormwater), due to its unique geographic and environmental characteristics. The Louisiana Hazard Mitigation Plan outlines several strategies to reduce flood vulnerabilities. This includes hazard mitigation activities such as structural defenses, nature-based solutions, policies, and public education. Notably, these strategies typically apply to state-owned and managed properties and regulations, rather than local jurisdictions. Further, the identified activities serve as a comprehensive list of needs, though not all will be implemented. By assigning a priority to each activity it allows the state to focus its efforts, while also maintaining eligibility to receive FEMA mitigation funds for identified activities.

Similar to the state plan, local parish plans identify all hazards possible in the parish, as well as prioritize strategies to reduce that risk. Flooding is addressed extensively in each plan as shown in Table 2.1.

In order to maintain eligibility for funding, parishes must maintain a hazard mitigation plan that is reviewed and approved by the state and FEMA every five years. Following approval, it must be adopted by the governing authority. In addition, per Section L of RS 38:3306, the board should participate and assist in development of parish hazard mitigation plans. Each parish within the district was to submit an initial hazard mitigation plan by January 1, 2023, and they will submit subsequent five-year plan updates thereafter. The statute states that parishes must collaborate with the board to incorporate flood control, drainage, and water resource management into their plans. Additionally, the board will assist in ensuring participation in FEMA's Community Rating System (CRS) or similar programs to reduce flood risks and insurance premiums, while prioritizing flood risk reduction policies. Altogether, these state and parish strategies aim to protect Louisiana's residents, property, and natural environment from the ongoing threat of flooding.

TABLE 2-1: PARISH MITIGATION PLANS

PARISH	FLOOD DAMAGES	PROPOSED MITIGATION GOALS
Ascension (2020 Hazard Mitigation Plan)	Recurrent flooding from the Amite River and local waterways is affecting both urban and rural areas. Damages to transportation, residential, and industrial sectors.	Strong emphasis on floodplain management, levee maintenance, and improved drainage. Ongoing mitigation through retrofitting critical facilities and elevating structures.
East Baton Rouge (2023 Hazard Mitigation Plan)	Major flooding risks, particularly from tropical cyclones and river flooding. Considerable damage to residential areas, infrastructure, and critical services.	Extensive flood mitigation strategies including levees, pumping stations, and drainage improvements. Participation in NFIP and CRS. Enhanced emergency response plans and public engagement initiatives.
East Feliciana (2017 Hazard Mitigation Plan)	Flooding primarily affects rural areas with damage to agricultural land and homes. Flash floods during intense storms also pose risks.	Local efforts focus on maintaining natural floodplains, increasing public awareness, and improving drainage systems to reduce the impact of flooding on agricultural lands.
Iberville (2016 Hazard Mitigation Plan)	Frequent flooding is caused by backwater flooding and riverine flooding. Unique challenges include industrial vulnerabilities due to the parish's role in the industrial corridor and a high concentration of repetitive loss properties along LA Highway 75. Infrastructure and agricultural lands are heavily impacted, with flooding affecting both urban and rural zones.	Strengthening stormwater management and drainage systems to address backwater flooding, targeting repetitive loss properties for elevation or acquisition, and collaborating with industrial facilities to mitigate risks. Enhanced public education on flood risks, proactive participation in the NFIP, and improved emergency response coordination are key initiatives.
Livingston (2021 Hazard Mitigation Plan)	Severe flooding during tropical storms and heavy rains, with damages to homes, schools, and road infrastructure. Also affected by riverine flooding and backwater.	Enhancing floodplain management through improved zoning and land-use practices, strengthening critical facilities, and upgrading drainage systems. Public education campaigns about flood risks and emergency response.
St. Helena (2021 Hazard Mitigation Plan)	Flooding impacts are less severe but still damaging to homes and small businesses due to poor drainage and heavy rains.	Maintaining and improving drainage infrastructure, public education programs, and improving response coordination with local agencies. Participation in NFIP and encouraging homeowners to elevate properties.
St. James (2021 Hazard Mitigation Plan)	Primarily at risk from storm surges and riverine flooding due to its proximity to water bodies. This has led to extensive agricultural and infrastructure losses.	Use of levees and elevation of structures in flood-prone areas. Strict enforcement of building codes, and involvement in CRS to improve flood insurance options.

TO LEARN MORE ABOUT...

the Louisiana State Hazard Mitigation Plan, please visit:
https://gohsep.la.gov/divisions/hazard-mitigation-assistance/state-hazard-mitigation-plan/

OR SCAN THE FOLLOWING QR CODE

USACE Feasibility Studies

USACE has undertaken multiple flood control projects in the Amite River and its tributaries in Louisiana, dating back to the 1950s. The original Amite River & Tributaries Project, Louisiana, approved by Congress in 1955, aimed to reduce flooding in the region by improving the channels of the Amite, Comite, and Blind Rivers, as well as Bayou Manchac. Key improvements included construction of a diversion weir and canal designed to alleviate flooding by diverting a portion of the Amite River's flow to the Blind River.

The Amite River & Tributaries Comprehensive Study East of the Mississippi River, Louisiana, initiated in 1967, led to several recommendations to improve flood control in the region. One, the Comite River Diversion Canal, was authorized in 1999. This diversion canal will redirect floodwaters from the Comite River to the Mississippi River to protect urban areas from flooding within the Comite and Amite Rivers basin. Federal funding for the project was delayed until the Bipartisan Budget Act of 2018 (BBA18) after the 2016 floods which emphasized the region's vulnerability to flooding. This project is currently under construction utilizing both federal and state funding.

TO LEARN MORE ABOUT...

the Amite River and Tributaries Feasibility Study, please visit:
https://www.mvn.usace.army.mil/Amite-River-and-Tributaries/

OR SCAN THE QR CODE BELOW

Another initiative was the East Baton Rouge Flood Risk Reduction Project (Figure 2-27). The 1995 Amite River and Tributaries Feasibility Report outlined possible strategies to alleviate flood damage in East Baton Rouge Parish by focusing on headwater and backwater flooding from streams including Beaver Bayou, Blackwater Bayou, Jones Creek, Claycut Bayou, Ward Creek, Bayou Fountain, and Bayou Manchac. It was authorized in 2007 but like the Comite project, construction was delayed due to funding issues but is now proceeding with federal backing from BBA18.

TO LEARN MORE ABOUT...

the East Baton Rouge Flood Risk Reduction Project, please visit:
https://www.mvn.usace.army.mil/About/Projects/East-Baton-Rouge/

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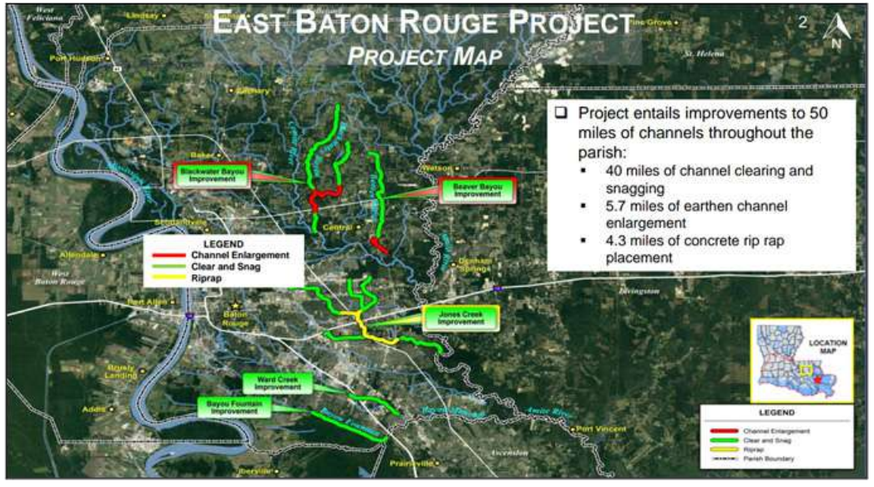

FIGURE 2-27: EAST BATON ROUGE FLOOD RISK REDUCTION PROJECT MAP (SOURCE USACE)

The Darlington Reservoir project, another project initially proposed in the 1960s and rejected in the 1990s due to a poor cost-benefit ratio, was revisited following the 2016 floods. A new 2019 Amite River and Tributaries East of the Mississippi River, LA Feasibility study, funded by BBA18, focused on managing flood risks within the Amite River Basin through combining infrastructure upgrades with non-infrastructural initiatives. The recommendation was the Darlington Reservoir as a viable solution for flood control in the lower Amite River Basin. The proposed Dry Darlington Dam would be an earth embankment structure with a clay core, covering 205 acres and creating a 12,600-acre flood pool. Nonstructural measures would address flood risks, including acquisitions, relocations, and floodproofing, while an Emergency Action Plan and flood warning system would be implemented for downstream communities. This draft document and proposed plan were sent off for public comments, which resulted in the December 2023 Amite River and Tributaries East of the Mississippi River, LA Supplemental Second Draft Integrated Feasibility Report with Environmental Assessment.

The 2023 study expanded on the 2019 report by incorporating updated data, prioritizing flood prevention efforts in regions with high social vulnerabilities to maximize benefits for vulnerable communities, considering climate change and the potential effects on rising sea levels and further assessing the effectiveness of flood risk management strategies. This report was updated to include the public's comments received from the 2019 report. The recommendation for this report is a Nonstructural Plan that includes elevation of thousands of structures in the floodplain and floodproofing hundreds of structures. This plan considers Other Social Effects (OSE) which provides benefits to vulnerable and disadvantaged communities. The public comment period is over, but the final report has not been released.

Louisiana Coastal Master Plan

The 2023 Louisiana Coastal Master Plan, developed by the Coastal Protection and Restoration Authority (CPRA), serves as a foundational model for the ARBC Master Plan development. This comprehensive 50-year, $50 billion initiative tackles coastal erosion, land loss, and flood risk through a structured approach that emphasizes both restoration and risk reduction for coastal Louisiana. The ARBC Master Plan mirrors this strategic format, focusing on providing flood risk reduction and protection and enhancement of natural resources within the Amite River Basin. The plan follows a technical approach through science and data with collaboration with stakeholders and the public.

TO LEARN MORE ABOUT...

the 2023 Coastal Master Plan, please visit:
https://coastal.la.gov/our-plan/2023-coastal-master-plan/

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HUD CDBG-MIT Action Plan

The 2020 U.S. Housing and Urban Development Community Development Block Grant Mitigation (CDBG-MIT) Action Plan produced by the Office of Community Development of the State of Louisiana specifically addresses the Amite River Basin by funding projects aimed at reducing flood risks and enhancing community resilience. Notably, the activities identified in the Action Plan have secured a total of $1.2 billion in funding and will be implemented (assuming compliance and feasibility). The plan will be implemented with the help of the State Division of Administrations (DOA) Office of Community Development (OCD), through the Louisiana Watershed Initiative. Through targeted investments in infrastructure improvements, such as upgrading drainage systems and reinforcing flood control structures, the plan seeks to mitigate the impact of severe weather events and chronic flooding in this vulnerable area. By aligning with broader regional strategies and incorporating input from local stakeholders, the CDBG-MIT Action Plan ensures that the ARBC receives the necessary resources to protect both its natural ecosystems and human populations from future flood-related disasters.

TO LEARN MORE ABOUT...

the 2020 CDBG-MIT Action Plan, please visit:
https://watershed.la.gov/action-plan

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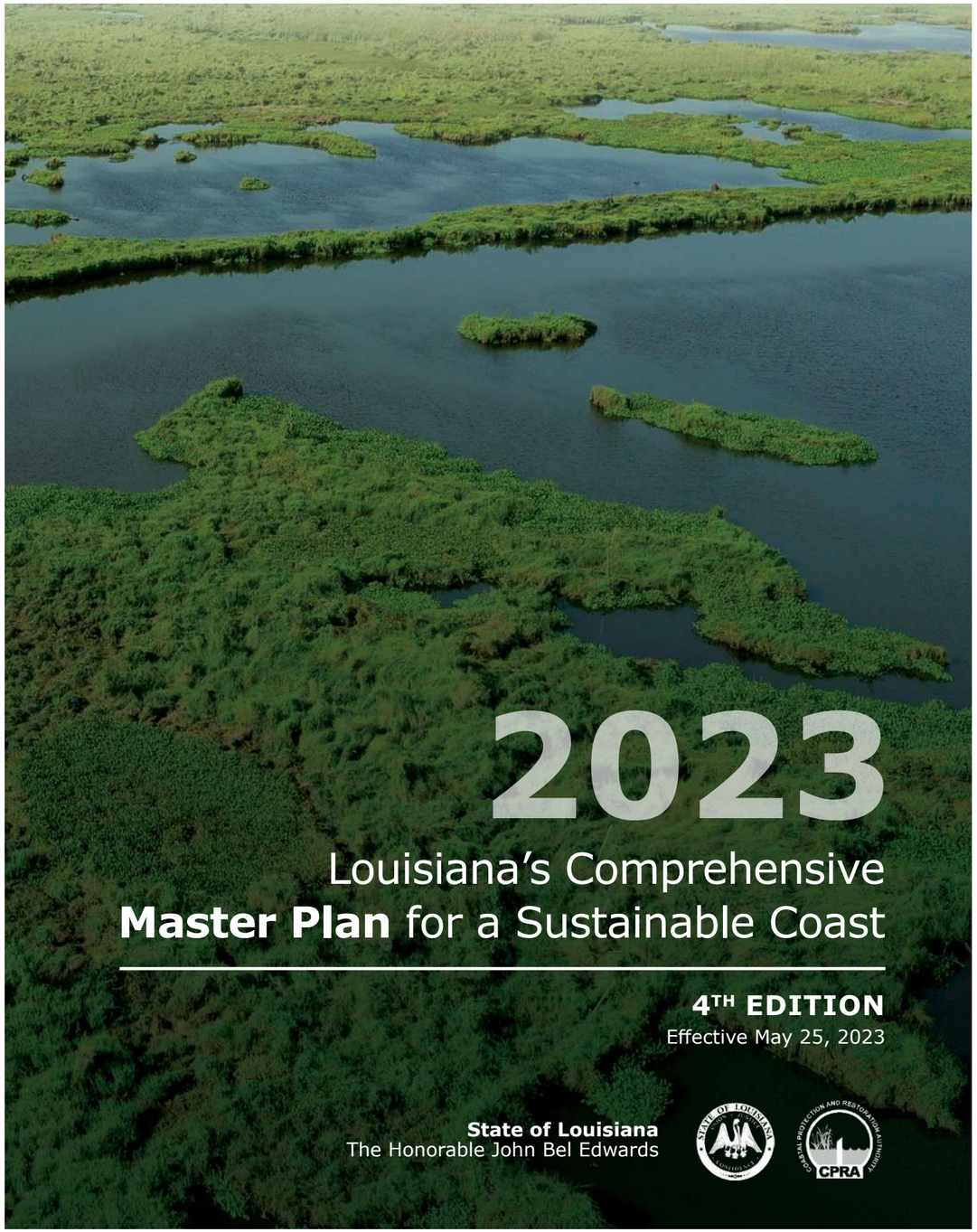


FIGURE 2-28: THE LOUISIANA COASTAL MASTER PLAN, DEVELOPED BY THE COASTAL PROTECTION AND RESTORATION AUTHORITY (CPRA), SERVES AS A FOUNDATIONAL MODEL FOR THE ARBC MASTER PLAN DEVELOPMENT (SOURCE: CPRA)

Conservation

Spanning southeastern Louisiana and parts of Mississippi, this watershed encompasses various wetland types, including swamps, marshes, and bayous, each playing a vital role in maintaining the environmental balance of the area.

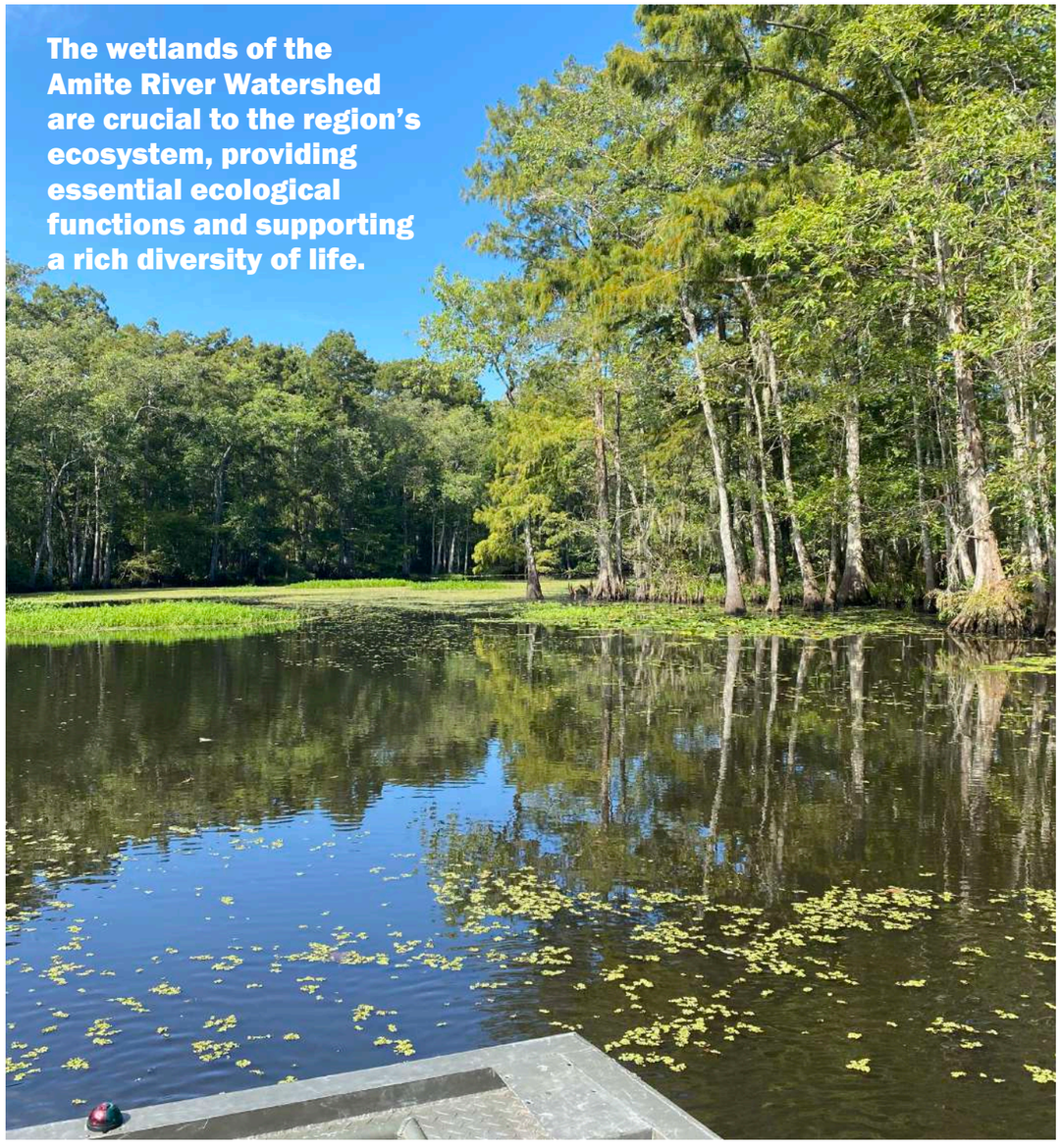


FIGURE 2-29: LOWER AMITE RIVER WETLANDS (PHOTO SOURCE: ARBC)

Swamps are common in the lower reaches of the watershed, particularly near the Blind River and Lake Maurepas. Characterized by slow-moving or standing water, they are dominated by cypress and tupelo trees. Swamps provide vital habitats for a range of wildlife, including fish, amphibians, birds, and mammals, while also playing key roles in water filtration and flood regulation. Uniquely the Spanish Lake Sub-basin, due to its very low elevations above mean sea level (0 – 5'), whether resulting from natural geology, hydrocarbon extraction, or both, and given its hydraulic connection leading to coastal waters acts like a "fringe swamp".

Marshes, located in floodplains and along riverbanks, consist of herbaceous plants like cattails, bulrushes, and sedges. They are essential for supporting migratory birds and other waterfowl, serving as natural buffers that filter out nutrients and pollutants from runoff before it reaches larger water bodies.

Bottomland Hardwood (BLH) forests as described above dominate the elevational upper reaches of the basin and the floodplain.

FIGURE 2-30: MARSH LOCATED ALONG AMITE RIVERBANK (PHOTO SOURCE: ARBC)

Bayous are slow-moving, shallow waterways that traverse the watershed, crucial for maintaining its hydrological system. They facilitate water flow and provide habitats for diverse aquatic species. The surrounding vegetation, including aquatic plants and riparian trees, create important breeding grounds for fish and feeding areas for various bird species.

To preserve the ecological functions and resilience of these wetlands, conservation and restoration initiatives are essential. These efforts may include establishing protected areas, implementing best management practices to reduce pollution, and restoring degraded wetlands. Engaging local communities and stakeholders in these initiatives is vital for ensuring the long-term health and sustainability of the wetlands.

The USACE plays a pivotal role in wetland conservation, focusing on protecting existing areas, restoring degraded habitats, and creating new wetlands. These efforts align with regulatory mandates such as the National Environmental Policy Act (NEPA) of 1970 and the Coastal Zone Management Act (CZMA) of 1972, which emphasize environmentally responsible development practices.

FIGURE 2-31: MARSH ALONG THE EDGE OF WATERWAYS PROVIDE IMPORTANT HABITAT FOR DIVERSE SPECIES (PHOTO SOURCE: ARBC)

Species of Concern

A recent regulatory analysis identified, using the USFWS IPAC (Information for Planning and Consultation) tool, several fauna species of conservation concern within the region were listed. This list highlights the need for comprehensive conservation strategies that encompass both fauna and flora to maintain the ecological balance of the area. While no specific flora are listed as endangered at state or federal levels within the watershed, several fauna species within the region are categorized as threatened or endangered by the United States Fish and Wildlife Service (USFWS) (these species are depicted on Table 2-2 below).

TABLE 2-2: SPECIES OF CONCERN

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	PARISH
Alligator Snapping Turtle	Macrochelys temminckii	Proposed Threatened	St. Helena, East Feliciana, East Baton Rouge, Livingston, Ascension, Iberville, St. James
Eastern Spotted Skunk	Spilogale putorius	Proposed Threatened	Livingston, Ascension
Gopher Tortoise	Gopherus polyphemus	Threatened	St. Helena, Livingston
Gulf Sturgeon	Acipenser oxyrhynchus desotoi	Threatened	St. Helena, East Feliciana, East Baton Rouge, Livingston, Ascension, Iberville, St. James
Inflated Heelsplitter	Potamilus inflatus	Threatened	East Baton Rouge, Livingston, Ascension
Long-tailed Weasel	Mustela frenata	Proposed Threatened	East Baton Rouge, Livingston, St. James
Monarch Butterfly	Danaus plexippus	Candidate	St. Helena, East Feliciana, East Baton Rouge, Livingston, Ascension, Iberville, St. James
Northern Long-Eared Bat	Myotis septentrionalis	Threatened	St. Helena, East Feliciana, East Baton Rouge
Pallid Sturgeon	Scaphirhynchus albus	Endangered	East Feliciana, East Baton Rouge, Ascension, Iberville, St. James
Red-cockaded Woodpecker	Picoides borealis	Endangered	St. Helena, East Feliciana, East Baton Rouge, Livingston, Ascension
Tricolored Bat	Perimyotis subflavus	Proposed Endangered	St. Helena, East Feliciana, East Baton Rouge, Livingston, Ascension, Iberville, St. James
West Indian Manatee	Trichechus manatus	Threatened	East Baton Rouge, Livingston, Ascension, Iberville, St. James

Over one-third of federally listed rare and endangered species rely on wetlands, which are also vital for flood control, water purification, and as crucial stopover sites for migratory birds. In the region, twelve fauna species have been identified with varying levels of concern. Although no flora is officially listed as endangered, several species hold state rankings indicating vulnerability or potential local extinction, emphasizing the importance of addressing both fauna and flora in conservation efforts.

The challenges faced by federally protected species are multifaceted and interconnected, significantly affecting their survival. These stressors can be categorized into three broad areas:

Environmental Changes

Human Activities

Ecological Imbalances

Habitat loss and degradation due to urban expansion, deforestation, and agricultural development result in the destruction of natural habitats. Climate change further exacerbates these issues by altering habitats and food sources. Rising temperatures, shifting precipitation patterns, and extreme weather events can render habitats unsuitable, disrupting migration patterns and breeding cycles.

Non-native and invasive species present a serious threat to the ecology of the Amite River Basin. These species include Cutgrass, Salvinia, Hydrilla, Apple Snail, Python Snake, Asian Carp, Cichlid fish, Whistling Ducks, and Zebra mussel.

Section 2.3 investigated the potential impact of climate change on the Amite River Basin to help understand where we will be in the year 2050. 2050 projections considered precipitation variability, urbanization and sea level rise projections from various sources to help us understand the hydrologic impacts and assess the potential consequences.

Unsustainable practices such as overexploitation through hunting, fishing, and poaching threaten many endangered species. Illegal wildlife trade intensifies these threats. The introduction of invasive species disrupts native ecosystems, often out-competing local species for resources and introducing diseases. Additionally, land use changes, like deforestation and urbanization, critically impact endangered species by altering or destroying their habitats. Infrastructure development can fragment habitats, isolating populations and reducing genetic diversity.

Disruptions in food chains, including the loss of keystone species or changes in predator-prey dynamics can lead to cascading effects on ecosystems. Endangered species are particularly vulnerable to diseases and parasites, with smaller, stressed populations being more susceptible to emerging health threats. Therefore, it is imperative that habitats with the potential for these protected species be conserved in perpetuity.

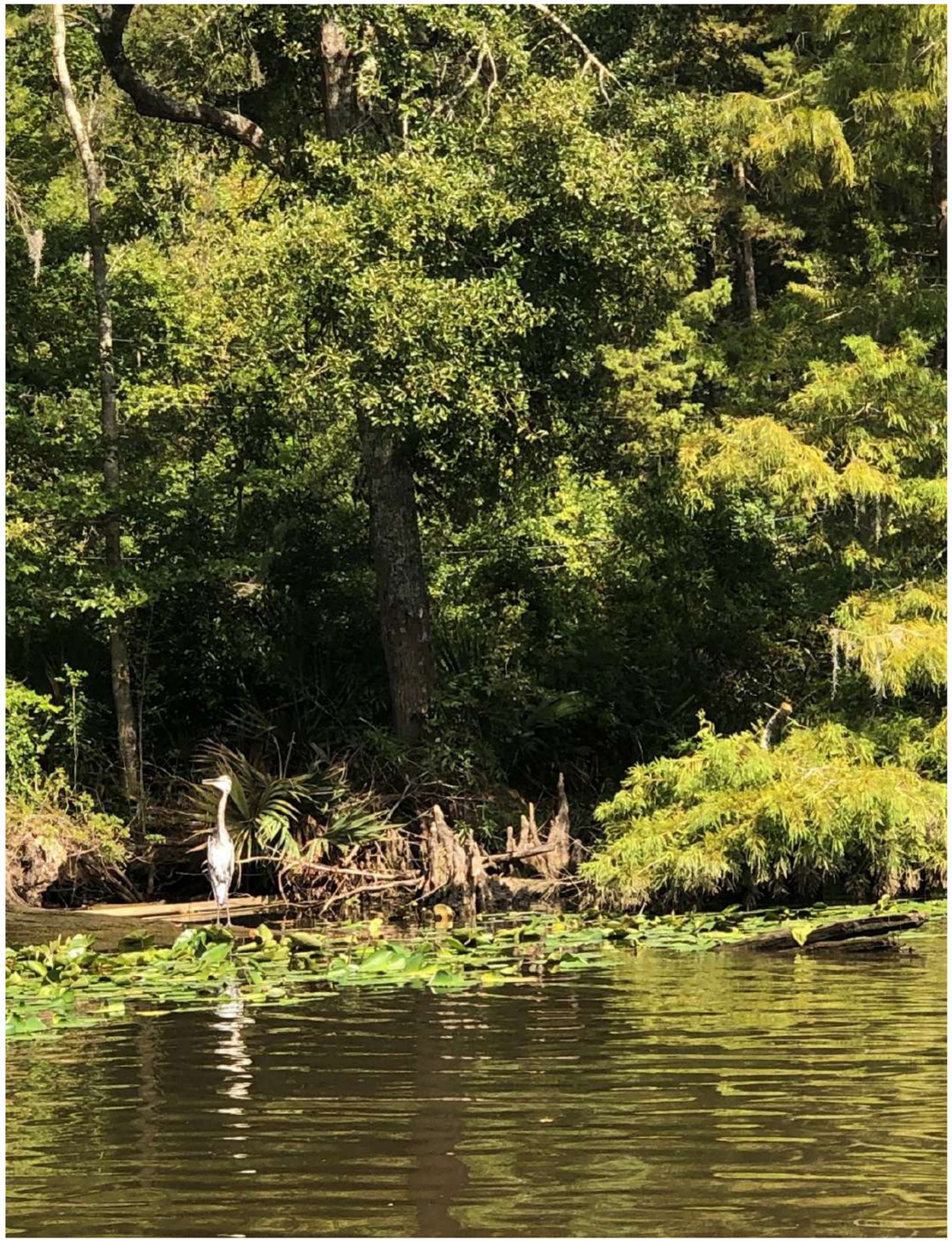


FIGURE 2-32: WILDLIFE SEEN ALONG THE LOWER AMITE RIVER (PHOTO SOURCE: ARBC)

Restoration Projects

Within this Master Plan, many projects can be classified as restoration projects, either as the primary or residual benefits of these projects.

RESTORATION PROJECTS

These are intricately planned and executed with the primary goal of preserving and revitalizing wetlands. The focus is on maintaining current wetland extents or restoring them to their original condition, thus avoiding further degradation. Such initiatives are vital for safeguarding regional biodiversity, improving water quality, and reinforcing natural defenses against floods and erosion.

NON-RESTORATION PROJECTS

These initiatives do not involve active habitat construction for wetland enhancement or maintenance. Instead, they focus on broader aspects of environmental stewardship and infrastructure development, including river maintenance programs and waterway cleanliness initiatives

The ARBC currently oversees numerous projects at various stages of development, from conceptualization to active implementation. These efforts reflect the commission's commitment to promoting sustainable development practices and maintaining strong environmental stewardship throughout the Amite River Basin. By proactively managing and strategically investing in these projects, the ARBC aims to ensure a balanced approach that integrates economic growth with environmental conservation for the benefit of current and future generations.

The ARBC is committed to promoting environmental stewardship through its diverse restoration and non-restoration projects. By focusing on wetland preservation and revitalization, the ARBC will safeguard biodiversity, improve water quality, and enhance flood defenses, while non-restoration initiatives support broader environmental and multi-use management. Its ongoing commitment to sustainable practices is reflected in the strategic investment in projects at various implementation stages, balancing economic growth with conservation efforts for the benefit of current and future generations. Overall, the ARBC's proactive approach underscores its mission to maintain the ecological integrity of the Amite River Basin.

Sand and Gravel Mining Along the Amite River

Sand and gravel mining along the Amite River has historically been significant due to the growing demand for these materials in construction and infrastructure projects. Flowing through southeastern Louisiana, the Amite River provides a vital source of aggregates essential for applications like concrete production, construction, and road building. The mining process involves extracting sand and gravel from backwater areas, riverbanks and riverbeds, both yield economic benefits and environmental challenges. Throughout much of history, mining has had little to no regulation implemented on the creation or operation of a mine. Once a mining job is complete, dependent on what was mined, a sand or gravel pit remains in its place. Very few of the pits that exist across the basin went through USACE permitting, any floodplain review, or any real design review prior to construction. Impacts from mining on the River were largely discounted, as there were too many areas along the river supporting similar resource extraction. Today, abandoned pits litter the flood plain from approximately Interstate (I)-12 and going upstream. Loss of riparian areas, wetlands, floodplains, and native habitats are the legacy of the gravel and sand mining industry on the river. Today, in order to address these issues, regulatory frameworks often mandate permits and hydrologic or environmental assessments be conducted prior to mining operations. Implementing sustainable practices such as restricting extraction areas and conducting post-mining restoration is crucial for minimizing environmental impacts and preserving the health of the river ecosystem (LDEQ 2007).

Within in the region, approximately 22 abandoned sand and gravel pits are spread across three parishes: East Baton Rouge, Livingston, and East Feliciana. The state of these sites varies considerably, reflecting different timelines of abandonment. Four pits are located along the lower Comite River, while one is situated southeast of Clinton, away from major waterways, and the remainder are along the upper Amite River, as depicted in Figure 2-33.

Some abandoned pits have been left unrestored and unstabilized, resulting in bare earth and flooded areas with significant amounts of sand and gravel piled across the site, which pose challenges for rehabilitation due to their instability. Idled sites can take several years before a natural succession of vegetation starts, beginning with grasses and shrubs taking root that help stabilize the loose sediment. Ground impacts from mining still persist despite vegetative re-establishment.

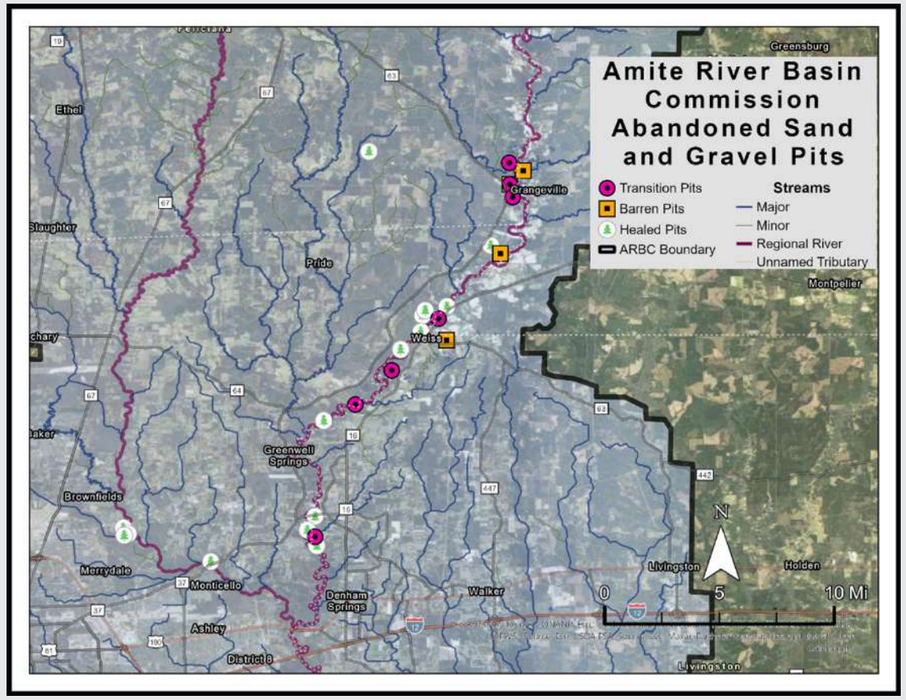


FIGURE 2-33: MAP DEPICTING THE APPROXIMATE LOCATIONS AND TYPES OF ABANDONED SAND AND GRAVEL PITS WITHIN THE ARBC (SOURCE: ARBC)

A few sites have shown significant progress toward natural revegetation. Often, even in a degraded condition, the new vegetation does create new habitats for local wildlife. The varied conditions of these abandoned pits provide the potential for targeted rehabilitation efforts tailored to each site's specific characteristics and environmental context. The goal in restoring abandoned gravel mines is to maximize flood water storage first, providing an off-line system for flood water storage within the historic flood plain of the Amite River while helping to stabilize loose sediment, reduce in stream aggradation, and sustain downstream sediment removal projects. The degree to which it benefits the river is a direct function of the number of acre feet that can be earmarked for flood storage. While improving flood storage capacity in the system, habitat and ecological goals would be achieved at the same time. Additionally, the potential for recreational opportunities could be maximized with appropriate design consideration.

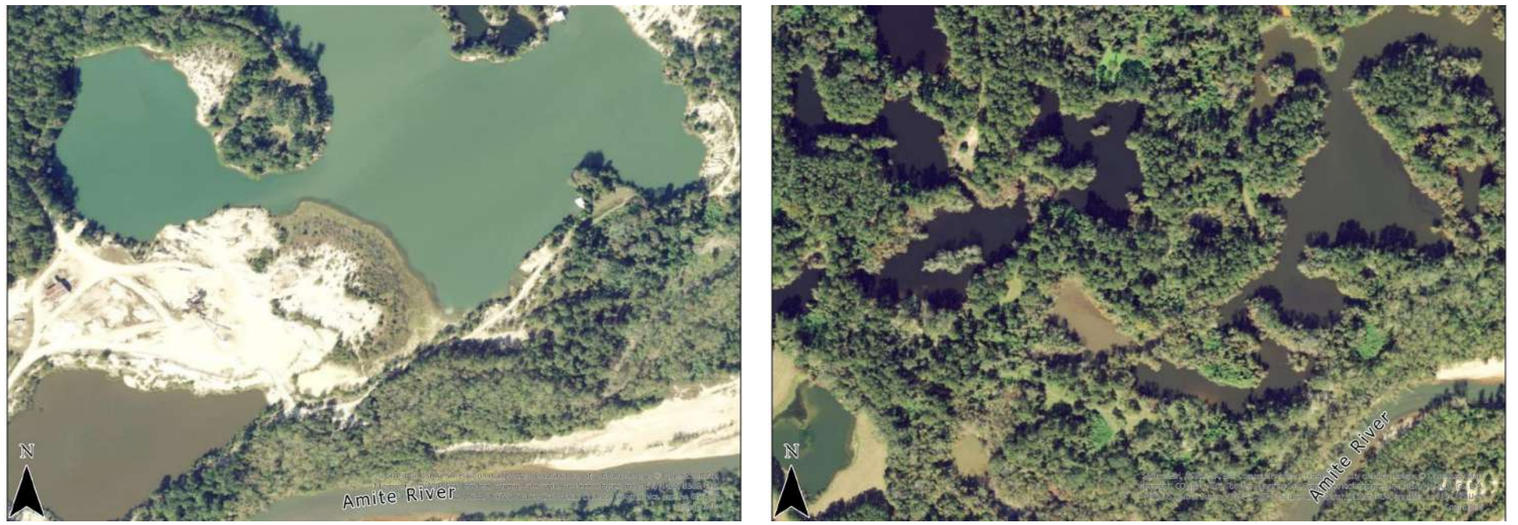


FIGURE 2-34: ABANDONED GRAVEL PITS (PHOTO SOURCE: GOOGLE EARTH)

Selection and Implementation of Abandoned Gravel Pits Reclamation

Reclaiming abandoned gravel pits aims to restore the Amite River floodplain sites to a more natural state, offering flood water management potential, ecological, recreational, and economic benefits. The reclamation process might involve several key steps:

1 Assessment and Planning

Evaluate the basin for un-utilized gravel mines, focusing on those with significant potential for floodplain benefit. For each potential site, an assessment should be made regarding the facilities overall environmental impact and existing conditions, including residual chemical presence, surface elevations of the site, and whether any old or hazardous equipment remains on-site. This phase helps determine the best reclamation strategies based on the conditions at the particular site, and ARBC goals and objectives. This portion of the effort will seek to narrow down the alternatives to those that present demonstrable flood benefits, and the potential for robust habitat improvement on the site. A general assessment of the physical work required to re-mediate the site might also be done at this time.

2 Soil and Water Management

Stabilizing soils and managing surface drainage are critical to preventing erosion and restoring the hydrology on these sites. An individual assessment will need to be made for potential engineering challenges involved in re-connecting the site to the river. Engineering challenges that may be encountered are surface regrading, construction of berms, slope regrading, and creating water retention areas.

3 Habitat Restoration

Once the site has been determined as suitable for habitat restoration, an assessment of historical vegetation and hydrologic connectivity will be needed to determine how best to plan restoration efforts while working cohesively with the planned hydrology of the site. Planting native vegetation promotes biodiversity and stabilizes soils. Restoring natural habitats supports essential ecosystems for wildlife, including various avian species, amphibians, and insects. Creating natural habitats within the river system serves to provide a “sponge and filter” effect, by removing some sediments and chemicals from storm water as it flows through, therefore, providing a water quality benefit to the river system.

4 Creation of Water Bodies

Some pits are characterized by the remaining excavation void from which sand and gravel were mined. Acres of impounded surface water provide flexibility to hydrology engineers to design flood flow and storage features. Many can be transformed into persistent low water storage ponds or wetlands, enhancing local biodiversity, improving water quality, and offering recreational activities like fishing, kayaking, or birdwatching.

5 Community Involvement

Engaging local communities in the reclamation process ensures that projects meet their needs and encourages stewardship. It also demonstrates ARBC’s interest in multi-use conservation and flood control, and shows transparency when stakeholders are involved. Community input can assist in making informed decisions on recreational amenities and educational opportunities.

6 Monitoring and Maintenance

Regular assessments post-reclamation will be essential to ensure the success of restored areas. Monitoring can help identify issues such as invasive species or unforeseen erosion, allowing for timely intervention.

7 Economic Opportunities

By restoring these pits to their natural habitats (wetlands and/or uplands) and ponds, these areas may be able to provide an economic opportunity to the ARBC by allowing for the potential of various conservation or recreational uses such as parks, wildlife reserves, nature trails as well as opportunities for mitigation banking.

Carbon Credits

Wetland carbon credits in southeast Louisiana offer a significant opportunity for environmental conservation and economic gain. These credits are created through the restoration and preservation of wetlands, which play a vital role in carbon sequestration by absorbing carbon dioxide from the atmosphere and storing it in plant biomass and soil. In a region where wetlands are essential for biodiversity, flood protection, and water quality, enhancing these ecosystems can boost their carbon storage capabilities.

Landowners and conservationists can engage in carbon credit programs by adopting practices that restore or maintain wetland areas, generating credits that can be sold to companies seeking to offset their emissions. The process typically involves several steps: assessing the wetland's potential for carbon storage and planning restoration activities, implementing strategies like replanting native vegetation and improving water management, and conducting regular verification and monitoring to ensure that carbon sequestration goals are met. Once verified, these credits can be sold in voluntary or compliance carbon markets, providing financial incentives for landowners and conservation efforts.

While challenges exist, such as ensuring the long-term viability of restored wetlands and navigating the complexities of carbon markets and regulations, the potential for generating revenue while contributing to climate change mitigation makes wetland carbon credits an appealing option in southeast Louisiana. This region faces significant environmental threats from land loss and climate change, making such initiatives crucial.

Revenue from wetland carbon credits can be a valuable resource for landowners, conservation organizations, and local governments. Key factors influencing revenue include the growing market demand for carbon credits as companies aim to meet sustainability goals, the variability in credit pricing based on market conditions (with 2023 prices ranging from $40 to $60 per metric ton of CO2 equivalent), and the availability of restoration grants from various organizations.

Landowners who implement sustainable practices can enhance their wetland's ecological health, leading to increased carbon storage and higher credit generation over time. Engaging in long-term carbon credit agreements can also provide stable revenue, requiring landowners to maintain the ecological integrity of restored wetlands for a specified period.

However, challenges such as regulatory complexity, verification costs, and market fluctuations can impact revenue generation. Despite these hurdles, the potential revenue from wetland carbon credits could support local economies and contribute to climate resilience, making it a potentially profitable pursuit for those involved in conservation and land management.

Other Land Uses

Whether transforming land into camping facilities, sports venues, hunting leases, eco-tourism destinations, or agricultural leases, the process begins with a thorough assessment of the land's natural features—such as scenic views, water bodies, wildlife habitats, and soil quality. For camping, the first step is to identify the types of experiences to offer, like primitive camping or glamping, while for sports facilities, evaluating terrain and accessibility is key to determining suitable sports activities, such as disc golf or running and bike trails. In the case of hunting leases, understanding wildlife habitats and local regulations ensures compliance and enhances the hunting experience. Eco-tourism development focuses on showcasing the ecological value of the land through activities like hiking and birdwatching, while agricultural leases involve assessing the land's suitability for crops or livestock to support local food production. Each conversion process not only aims to generate income but also contributes to the sustainability and enjoyment of Louisiana's rich natural environment.

The Recreation and Park Commission for the Parish of East Baton Rouge (BREC) Black Water Conservation Area, once a gravel pit but after the restoration efforts of the US Army Corps, LDEQ 319 Program, and the ARBC, has transformed into an ecological asset that preserves diverse habitats, promotes biodiversity, improves water quality, and provides floodplain storage. This conservation area now features walking trails, observation points, and educational programs that encourage visitors to engage with nature and learn about the local ecosystems. The restoration of this site highlights BREC's commitment to environmental stewardship and offers an opportunity for both nature enthusiasts and the flora and fauna that now thrive in this reclaimed habitat.

https://www.brec.org/facility/BlackwaterConservationArea

FLOOD STORAGE

Abandoned gravel pits can be effectively re-purposed for flood storage, offering numerous benefits. The depressions created by gravel extraction naturally form basins that can temporarily hold excess water during flood events. This approach is cost-effective, as utilizing existing pits avoids the need for constructing new flood storage facilities, given that the excavation work is already complete. Additionally, these pits can be designed with vegetation and sediment traps to filter pollutants, thereby improving water quality before it reenters local waterways. Re-purposed gravel pits also support diverse ecosystems, providing vital habitats for fish, birds, and other wildlife. Furthermore, these areas can offer recreational opportunities, such as fishing, hiking, and birdwatching, benefiting local communities. By increasing local flood storage capacity, abandoned gravel pits can help mitigate the severity of downstream flooding, protecting infrastructure and communities. Overall, this sustainable approach enhances both environmental health and community resilience.

CAMPING

Familiarization with local regulations, zoning laws, and health and safety standards that pertain to campgrounds, including obtaining necessary permits for construction, sanitation, and environmental protection, ensuring facilities comply with state and local requirements are essential in creating a campground.

After understanding the regulations, the next step is focusing on developing infrastructure. Essential features include designated camping sites, access roads, restrooms, showers, and recreational areas. Adding amenities like fire pits, picnic tables, and communal spaces can enhance the camping experience and attract more visitors. Landscaping and maintaining natural features will create an inviting atmosphere that appeals to potential campers. Incorporating hiking trails would enhance the overall visitor experience by providing easy access to nature and promoting outdoor activities. These trails can connect various campground amenities, such as picnic areas and restrooms, while also offering scenic routes that showcase the natural beauty of the surroundings. By integrating well-planned hiking paths, campgrounds can encourage exploration, foster a sense of adventure, and create a more immersive outdoor environment for all guests.

In addition to the construction of a campground, marketing camping facilities is crucial for attracting visitors and generating revenue. Utilize social media, local tourism websites, and partnerships with outdoor organizations to promote the campground. Highlight unique aspects of the property, such as proximity to hiking trails, fishing spots, or wildlife viewing opportunities.

By successfully converting land into camping facilities, a sustainable income stream can be achieved while promoting outdoor recreation and an appreciation of Louisiana's natural beauty, benefiting both visitors and the local community.

FIGURE 2-35: HIKING TRAILS CAN ENCOURAGE EXPLORATION AND EASY ACCESS TO PARK AMENITIES (PHOTO SOURCE: COMITE RIVER CONSERVATION AREA | BREC.ORG)

ECO-TOURISM

Developing infrastructure is the key element. Creating trails for outdoor activities and adding amenities like restrooms, picnic areas, and information kiosks will enhance the visitor experience. It's important that this infrastructure is environmentally friendly and harmonizes with the natural surroundings, reflecting the eco-tourism ethos.

Enhancing wildlife habitat is essential for attracting visitors interested in nature. Implementing conservation practices, such as planting native species and managing water resources, will protect and improve the ecological health of your land. These efforts not only enrich the visitor experience but also promote biodiversity.

Educational programs, such as guided tours, workshops, and interpretive programs play a significant role in eco-tourism and can add value to the experience. Collaborating with local experts or organizations can enhance the quality and credibility of these offerings, making them more appealing.

In terms of revenue potential, eco-tourism can be a profitable venture. Charging admission fees for activities, offering guided tours, and hosting workshops can create diverse income streams. Additionally, partnerships with local businesses for accommodations or dining can further enhance revenue opportunities.

SPORTS FACILITIES

As with any construction, permits are required for constructing sports facilities and ensure compliance with any safety and environmental standards. This groundwork will help streamline the development process and avoid potential legal issues.

Once the regulatory hurdles are navigated, the focus will then be on developing the necessary infrastructure. This may include building fields, courts, or tracks, along with essential amenities such as restrooms, parking areas, and seating. High-quality facilities not only attract more users but can also serve as venues for hosting tournaments and events, which can significantly increase revenue.

HUNTING AND FISHING LEASES

Develop access points and amenities by creating clear trails and facilities such as blinds or campsites, as good infrastructure can make the property more appealing to potential hunters. Set the lease terms by determining the structure, including pricing, duration, and specific rules for hunters; consider options like daily, seasonal, or annual leases based on goals. Marketing the lease effectively includes, promoting it through local advertisements, social media, or hunting lease websites, emphasizing the features of your property, the types of game available, and any amenities offered.

Before finalizing a lease, screen potential hunters to ensure they understand and respect your land and wildlife conservation practices. Draft a comprehensive lease agreement that outlines all terms, including payment, rules, liability waivers, and expectations for land use.

Once the lease is active, manage and monitor the land by maintaining communication with lessees, regularly assessing the condition of the property, and ensuring compliance with lease terms. By following these steps, you can successfully convert your land into hunting leases, creating a source of income while promoting wildlife conservation in Louisiana.

Overall, the ARBC could potentially earn anywhere from a few hundred to several thousand dollars per season, depending on the factors mentioned above. With effective management and marketing, hunting leases can become a sustainable venture.

FIGURE 2-36:
RESTORED SAND AND GRAVEL PITS AT THE BREC BLACKWATER CONSERVATION AREA (PHOTO SOURCE: BLACKWATER CONSERVATION AREA | BREC.ORG)

SILVICULTURE LEASES

Converting the lands to agriculture, primarily timber is another possibility. Although it would not necessarily promote wildlife and environmental conservation, it would provide potential revenue through the use of leases. Developing the necessary infrastructure to support activities will be very important, such as irrigation systems and pump houses. Suitable infrastructure enhances the usability of land but also makes it more attractive to potential lessees.

Setting clear lease terms is important for establishing expectations. This includes, but is not limited to determining the lease structure, including pricing, duration, and responsibilities for land maintenance and improvements.

2.2 LOUISIANA WATERSHED INITIATIVE OVERVIEW

The widespread disaster caused by the August 2016 floods revealed how susceptible Louisiana's landscape is to flooding. Due to the 28 declared flood- and hurricane-related disasters the state has experienced over the past two decades, the state has received almost $20 billion in Community Development Block Grant Disaster Recovery funds (CBGD-DR). State and local leaders realized it was time to reevaluate our approach to flood mitigation. In 2018, the state launched the Louisiana Watershed Initiative (LWI), introducing a new watershed-based approach to reducing flood risk in Louisiana, guided by the following principles:

- Using scientific tools and data
- Enabling transparent, objective decision-making
- Maximizing the natural function of floodplains
- Establishing regional, watershed-based management of flood risk

In 2016, historic flooding throughout Louisiana exposed deficiencies in the state's approach to floodplain management at all levels of government, prompting a reassessment of how Louisiana prepares for increasing flood events. Building on an early investigation into innovative solutions, LWI was launched via an executive order. Governed by the Council on Watershed Management, LWI works to reform the state's approach to flood mitigation. LWI hosted dozens of meetings and events to gather input from experts on addressing water management challenges, including representatives from all 64 parishes, state agencies, neighboring states, and international authorities on water management.

Following the launch of LWI, the federal government announced Louisiana will receive a $1.2 billion flood mitigation grant—providing an unprecedented opportunity to enhance and expedite LWI efforts. Guided by a federally approved Action Plan, the funds will support statewide planning, watershed modeling, data collection, and projects that reduce flood risk.

LWI is pursuing a holistic approach to watershed management, one that goes beyond conventional mitigation measures and incorporates nature-based solutions. LWI is also developing computer models to better understand flood risk and help select projects best suited for investment in each watershed region. By investing in efforts that build statewide flood defense, Louisiana will better safeguard our communities and culture for generations to come, as well as provide an example for other states facing similar flood risk challenges.

The Council on Watershed Management approved the creation of eight provisional watershed regions in 2019. Initially the ARBC was included as part of the LWI Region 7, but after much debate and the relentless efforts of the ARBC, House Resolution 181 of the 2022 regular session, the Amite River Basin became recognized as LWI Region 9 as illustrated in Figure 2-37, with the ARBC serving as the LWI Region 9 Watershed Coordinator.

TO LEARN MORE ABOUT...

LWI, please visit:
https://watershed.la.gov/

OR SCAN THE QR CODE BELOW

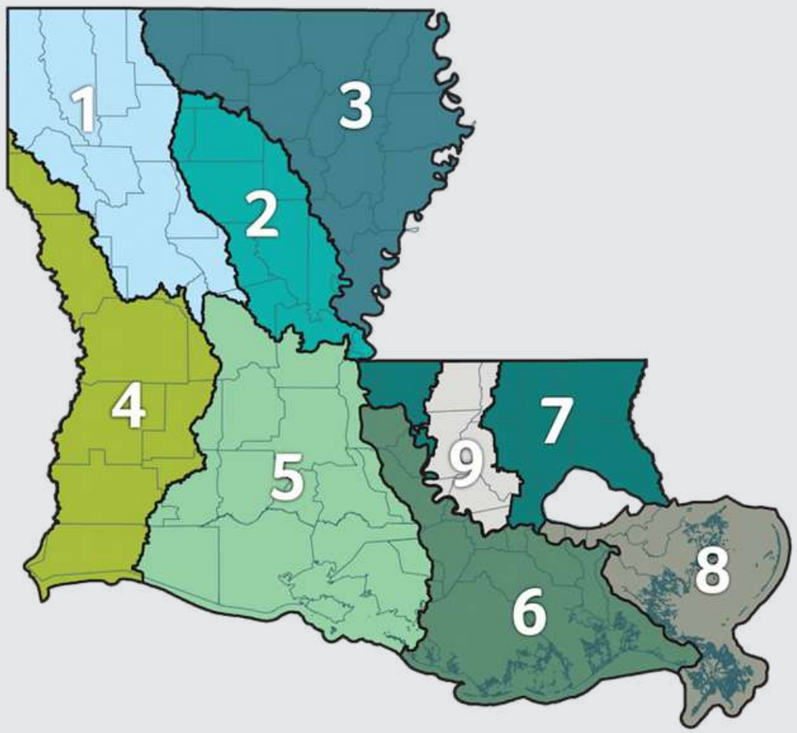


FIGURE 2-37: FORMERLY PART OF REGION 7, THE AMITE RIVER BASIN BECOME LWI WATERSHED REGION 9 IN 2022. AS ITS OWN INDEPENDENT REGION, ARBC IS THE COORDINATING AGENCY FOR LWI FLOOD RISK REDUCTION EFFORTS AMONG PARISHES AND DISTRIBUTION OF PROJECT FUNDS (SOURCE: LWI)

Louisiana's Regional Capacity Building Grant Program is designed to help the state's nine provisional watershed regions build staff capacity for regional watershed management, as well as provide technical assistance to municipal partners throughout each region. The goal of the program is to support strong and effective governance for each watershed region and ensure each region operates in a way that maximizes flood risk reduction efforts and project funds as they become available. Through the Regional Capacity Building Grant Program, each region is developing a Regional Watershed Management Plan.

In the summer of 2024, LWI released a 4-phase framework outlining the development process for regional watershed plans. Each phase of the plan development, referenced as Plan 1.0 through 4.0 incrementally developed and refined the structure of the plan which contained 8 chapters as illustrated in Figure 2-38.

Unique to the Amite River Basin, as LWI watershed region 9 was, the legislative requirement for ARBC to develop this comprehensive Master Plan to address drainage, flood control, and water resource management, through Act 490 of the 2022 Regular Session, to oversee all projects and programs throughout the construction and management processes. Additionally, this plan was required to be consistent with the CPRA Master Plan.

Since the mission of the ARBC and comprehensive Master Plan was broader than the requirements of the LWI watershed plans and was on an earlier schedule than the LWI plan, the ARBC and the Master Plan team worked closely with LWI staff to ensure that both the ARBC and LWI plans aligned and met the goals of both parties. Several meetings were facilitated between the parties to review the outlines of each plan and to map LWI watershed plan sections to the ARBC Master Plan sections. Through this process, it was determined that while organized differently, the ARBC Master Plan generally aligns with the LWI Watershed Plan requirements. Table 2-3 cross references sections of this Master Plan to the LWI Watershed Plan requirements as a quick reference for those more familiar with the LWI plan structure.

LWI dedicates a substantial portion of the $1.2 billion fund in Louisiana to those areas considered most highly impacted and distressed, which includes Region 9.

FIGURE 2-38: **EIGHT CHAPTERS OF THE REGIONAL WATERSHED PLANS PRESENTED BY LWI**

TABLE 2-3
MAPPING OF LWI WATERSHED PLAN SECTIONS TO THE ARBC MASTER PLAN

The ARBC Master Plan aligns with the LWI guidance for the region 9 watershed implementation plan

LWI WATERSHED PLAN REQUIREMENTS			ARBC MASTER PLAN	
LWI PLAN SECTION	**LWI PLAN CHAPTER NAME**	**LWI PLAN SECTION DESCRIPTION**	**CORRESPONDING ARBC MASTER PLAN SECTION**	**CORRESPONDING ARBC MASTER PLAN SECTION DESCRIPTION**
1	Introduction	Introduction	1	Introduction
2	Executive Summary	Executive Summary	Exec. Summary	Executive Summary
3	Louisiana Watershed Initiative	Description of LWI Mission and Structure	2.2	LWI Overview
		State and Regional Planning Timelines	2.2	LWI Overview
4	Watershed Region Context	Regional Mission and Vision	5.1	Implementing the plan
		Regional Strategic Functions	5.1	Implementing the plan
		Regional Organizational Structure	1.2/2.2	Introduction/LWI Overview
		Municipal Profiles	2.5	Plan and Code Assessment
		Flood Risk Profile	3.1	Flood Risk Assessment
		Stakeholder Map	1, 2	Introduction, Understand
5	Watershed Region Planning and Policy Overview	Inventory of Existing Plans, Policies, and Authorities	1, 2	LWI Overview, Current Conditions Plan & Code Assessment
		Identification of Gaps	2.1	ARBC Overview
6	Description of Planning Process	Lessons Learned	5	Implementing the plan
7	Regional Watershed Action Plan	List of Evaluated and Prioritized Actions	3	Predict and Evaluate
		Funding Strategy	2.8	Funding Scenarios
		Goals Calendar	5.4	Master Plan Updates
		Schedule of Updates/Future Planning Efforts	5.4	Master Plan Updates
8	Appendices: Tools & Methodologies	Tools	3	Predict and Evaluate
		Funding and Implementation Resources Map	2.8, 4.1	Funding Scenarios
		Prioritization Framework	5.1	Implementing the plan
		MUSM Plan	5.3	Preserving the investment through asset management
		Methodologies	1	Introduction
		Communications Plan	Appendix	Stakeholder Engagement Plan
		How Models were Used for Prioritization	3.1	Risk Modeling and Project Identification
		Work to Date	2.1	Current Conditions, including Flood Risk Profile

2.3 CURRENT CONDITIONS

This section highlights both the natural and manmade features of the Amite River Basin and the associated flood risks. By exploring the existing infrastructure conditions, we can uncover insights into vulnerabilities and potential consequences. Floods are the main natural threat in the Amite River Basin that present considerable risks not just to physical structures, but also to the economic stability and social well-being of the region and communities within it.

Amite River Morphology and Sediment

Geologic Regions

As the Amite River flows south from Mississippi to Lake Maurepas, it flows over three simplified geologic regions: Citronelle Formation (Pliocene), Terraces (Pleistocene), and Alluvium (Holocene).

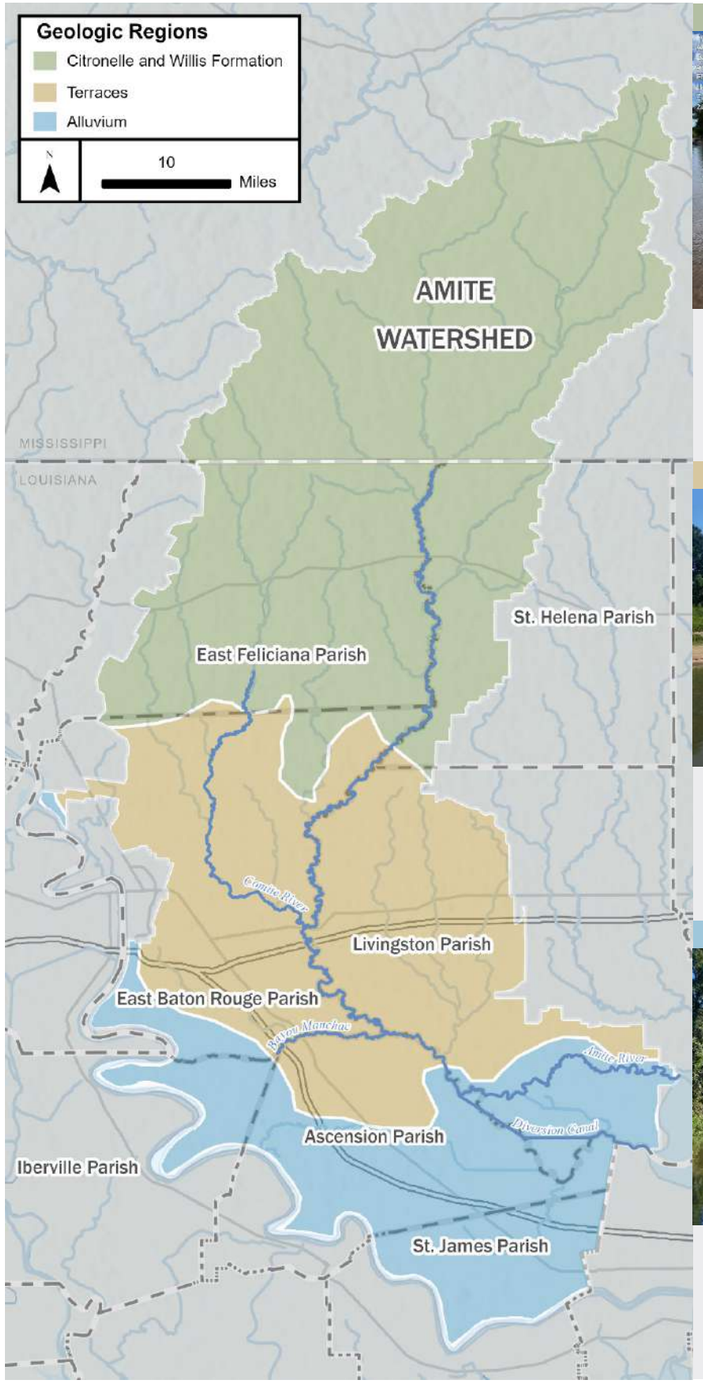
In the Mississippi portion of the Amite River Watershed and upper portion of Louisiana, the Citronelle and Willis Formation (Pliocene to early Pleistocene) consists of sandstone, gravelly sandstone, and mudstone (LSU 2007). This region is characterized by ridge-tops and plateaus (USACE 1975) and is the oldest geologic region in the Amite River Basin (USACE 2007).

Downstream, the Terraces (Pleistocene) are composed of mainly silts, and sandy clays, with some sands and gravels (USACE 2007) and are relatively flat compared to the Citronelle Formation.

The Alluvium (Holocene) can be found along the Comite River and the downstream most portion of the watershed in the floodplain of the Amite and in the vicinity of Lake Maurepas. The Alluvium is characterized by very flat floodplains, saturated wetlands, and deposits of finer river alluvium (silts and clays, with sands and gravels) (LSU 2007, USACE 2007).

Characteristics of the Amite River (in terms of slope, floodplain size, and sediment composition) change coincidentally with the regions (Figure 2-39). Generally, slope is greater where the Citronelle Formation dominates and decreases downstream; Floodplain width increases downstream; Dominant sediment composition becomes finer moving downstream through the geologic regions.

The Amite River's natural state has been altered overtime with increasing new economic growth and urban development. Natural areas are being cleared and the floodplain is being filled, causing the river system to become unstable. As the Amite River becomes more unstable a plethora of problems ensue, including: rapid bank erosion, increased sedimentation, aggradation, increased flood risk, poor water quality, loss of fisheries and wildlife habitat, invasive species, and reduced public recreational and navigational opportunities.



CITRONELLE AND WILLIS – EXAMPLE OF GRAVEL ON THE CHANNEL BED (PHOTO SOURCE: ARBC 2024)

CITRONELLE AND WILLIS – EXAMPLE OF SANDS AND GRAVELS IN THE FLOODPLAIN (PHOTO SOURCE: ARBC 2024)

TERRACES – EXAMPLE OF SANDY MEANDER BEND (PHOTO SOURCE: ARBC 2024)

TERRACES – EXAMPLE OF SANDY MEANDER BEND (PHOTO SOURCE: ARBC 2024)

ALLUVIUM – EXAMPLE OF CALM WATER AND WIDER RIVER AS THE RIVER SLOPE DECREASES (PHOTO SOURCE: ARBC 2024)

ALLUVIUM – EXAMPLE OF CYPRESS TREES IN THE SATURATED FLOODPLAIN (PHOTO SOURCE: ARBC 2024)

FIGURE 2-39: GEOLOGIC REGIONS IN THE AMITE RIVER WATERSHED WITH CORRESPONDING FIELD PHOTO EXAMPLES FROM 2024 FIELD RECONNAISSANCE (PHOTO SOURCE: ARBC)

Amite River Channel Forms

The Amite River is comprised of both modified and natural reaches which include both stable and dynamic channel forms. Along the Amite River corridor, some reaches have a history of modifications including channel straightening and widening, snagging, diversions, and riparian mining (USACE 2007, Amite River and Tributaries 1956). Other reaches have remained relatively unmodified by anthropogenic actions (i.e., have remained in a more natural state). Channel form is defined as the pattern of the channel streamline, and can include straight, meandering, and braided reaches.

Stable reaches are characterized by a natural equilibrium of channel pattern, dimensions, and slope over time that results in neither channel aggradation or degradation (Rosgen). An example of a natural reach that is generally stable in terms of channel and aggradation and degradation over time includes the Amite River upstream of LA Highway 10 (Figure 2-40). While the streamline has changed over time (dynamic), a fairly constant meander pattern is achieved in this reach. Additionally, invert elevation and size of the channel has remained relatively constant, and channel slope has remained relatively constant.

FIGURE 2-40: EXAMPLE OF A GENERALLY STABLE MEANDER PATTERN (I.E., STABLE MEANDER LENGTH, MEANDER BELT, BANK WIDTH, ETC.) DOWNSTREAM OF THE LOUISIANA STATE LINE (PHOTO SOURCE: GOOGLE EARTH IMAGERY)

Additionally, there are smaller portions of stable sections of reaches that can be seen downstream of the Amite River Diversion Canal in the historic Amite River. The streamline has not changed very much over time, invert elevation and size of the channel has remained relatively constant, and channel slope has remained relatively constant (Figure 2-41).

Dynamic reaches are characterized by lateral movement of the channel. Dynamic reaches can be both unstable or stable, depending on the channel form, channel dimensions, bed sediment reservoir, and slope. Instability can be both man-made and natural.

FIGURE 2-41: EXAMPLE OF A STABLE PORTION OF REACH IN THE HISTORIC AMITE RIVER DOWNSTREAM OF THE AMITE RIVER DIVERSION CANAL NEAR HIGHWAY 22 (PHOTO SOURCE: ARBC 2024)

Generally, the Amite River is considered unstable based on widespread bank erosion and channel widening, braided streams and largely changing streamlines, changes in sediment erosion and deposition, and changes in slope (USACE 2007). An example of a naturally dynamic reach can be seen near River Mile 49, where meander bends cause erosion on the cut-bank side of the channel and deposition on the other (Figure 2-42).

FIGURE 2-42: EXAMPLE OF A DYNAMIC MEANDER BEND NEAR RIVER MILE 48.9 (PHOTO SOURCE: ARBC 2024)

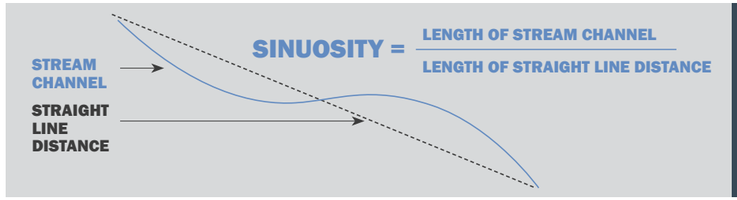
Additionally, an example of a natural yet dynamic reach becoming more stable (or healing) can be seen where grass is re-establishing on meander bends (Figure 2-43).

FIGURE 2-43: EXAMPLES OF RE-ESTABLISHING GRASS ON SAND BARS WITHIN A DYNAMIC REACH (PHOTO SOURCE: ARBC 2024)

Differences over time in channel form (including channel width), sinuosity, and aggradation and degradation can be seen across the modified and natural reaches along the Amite River.

Sinuosity

River sinuosity is the tendency of a channel to take a circuitous path which is measured as the stream length divided by the straight-line length. This is a generally a naturally occurring process which evolves overtime but can often be disturbed by man-made activities within the watershed.



Between 1950 and 2024, the length of the Amite River within Louisiana has been observed to decrease by 3.8 miles

River sinuosity was tracked for different reaches along the Amite River from the 1950s through 2024. Through this analysis, it was determined that although anthropogenic actions along the Amite River have often reduced sinuosity and increased slope, over time the river reaches a new equilibrium. See Figure 2-44 and 2-45 on the following pages and Table 2-4 and 2-5 below.

Sinuosity is a commonly used metric to describe river platform geometry and is widely interpreted as a indicator for environmental processes including channel stability and the effects of vegetation and sediments. Through the review of historical aerial imagery, maps and other studies, changes in river sinuosity are highly evident throughout the Amite River Basin. Between 1950 and 2024, the length of the Amite River in Louisiana, as measured along its centerline has decreased from 122.3 to 118.5 miles in length. Different sections of the river have experienced different anthropogenic impacts which have exacerbated changes in sinuosity.

From the confluence of Bayou Manchac to the Amite River Diversion Canal Weir, the river was enlarged and straightened in the late 1950s (USACE New Orleans District "Survey of Amite River and Tributaries, Louisiana" June 8, 1955), reducing the length in this section of the river by 1.8 miles. Table 2-4 summarizes the river length, sinuosity ratio, and slope in this portion of the river from the 1950s (pre-enlargement and straightening) to 2024.

Other notable reductions in sinuosity have been observed in the general vicinity of sand and gravel mining operations in the upper river. For example, within the portion of the Amite River between River Miles 90 and 94, these changes are particularly noticeable, as evidenced in Figure 2-45. Some key trends observed from the 1950's to present include:

- Decreasing river length
- Decreasing sinuosity ratio
- Increasing channel slope

Table 2-5 summarizes the river length, sinuosity ratio and slope between River Miles 90 and 94 based on the 2004 streamline.

TABLE 2-4

RIVER SINUOSITY FROM BAYOU MANCHAC TO AMITE RIVER DIVERSION CANAL			
BAYOU MANCHAC TO AMITE RIVER DIVERSION CANAL			
YEAR	RIVER LENGTH (MI.)	SINUOSITY RATIO	SLOPE (FT/MI)
1950s	10.2	1.5	1.1
2024	8.4	1.3	1.4

TABLE 2-5

RIVER SINUOSITY FROM MILE 90 TO MILE 94			
RIVER MILE 90 TO 94			
YEAR	RIVER LENGTH (MI.)	SINUOSITY RATIO	SLOPE (FT/MI)
1950s	5.8	1.6	2.9
1980s	4.7	1.3	3.5
2004	4.2	1.2	4.0
2017	4.2	1.2	4.0
2024	4.2	1.2	4.0

As can be seen, the river sinuosity between River Miles 90 and 94 has decreased by approximately 28% from the 1950s to 2004, increasing the river slope from approximately 2.9 ft/mile to 4 ft/mile. While further changes in the river alignment are evident from 2004 to 2024 indicating the constant evolution of the meandering river, it is notable that the length, slope and resulting sinuosity ratios appear to have established an equilibrium and have remained consistent.

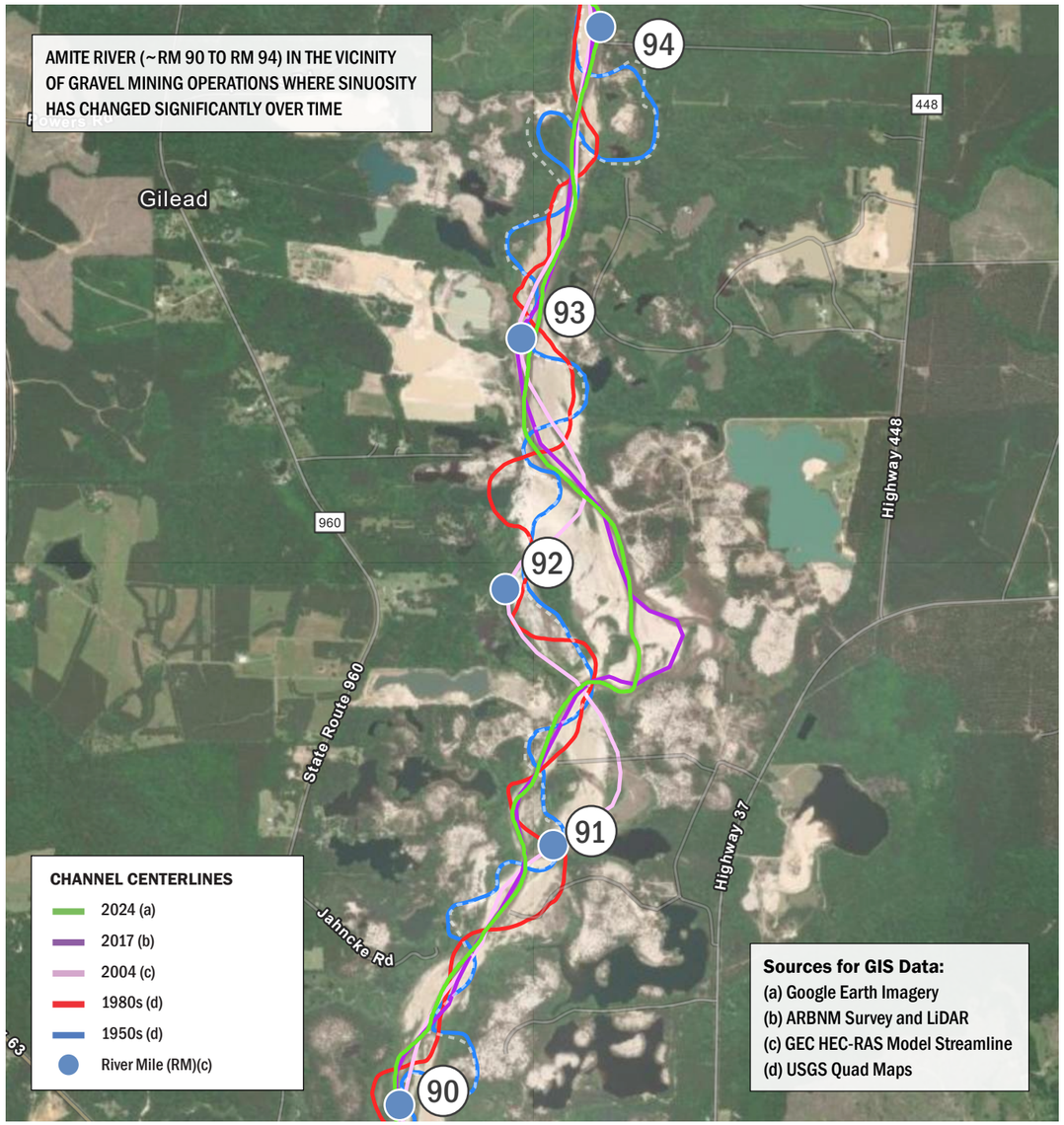


FIGURE 2-44: RIVER SINUOSITY CHANGES FROM MILE 90 TO MILE 94 (SOURCE: ARBC)

Figures 2-46 and 2-47 were taken at River Mile 84.3 in 2008 and 2017 respectively, demonstrating changing sediment and vegetation. In the images to the right, channel and bank stability and vegetation degradation is evident from the figure on the top taken on a field visit in 2008 (Image provided to Dewberry on behalf of PLD) to the figure on the bottom taken during field reconnaissance in 2017.

In this location:

- Channel width has increased (based on Google Earth aerial imagery from 1989 and 2024) from 750 ft to 1400 ft (See Figure 2-48 for more on channel width)
- Sinuosity has decreased by 25% (2004 River Mile 83 to River Mile 85 based on the 1950s and 2024 channel centerlines)
- Slope has increased by 34% (2004 River Mile 83 to River Mile 85 based on the 1950s and 2024 channel centerlines)

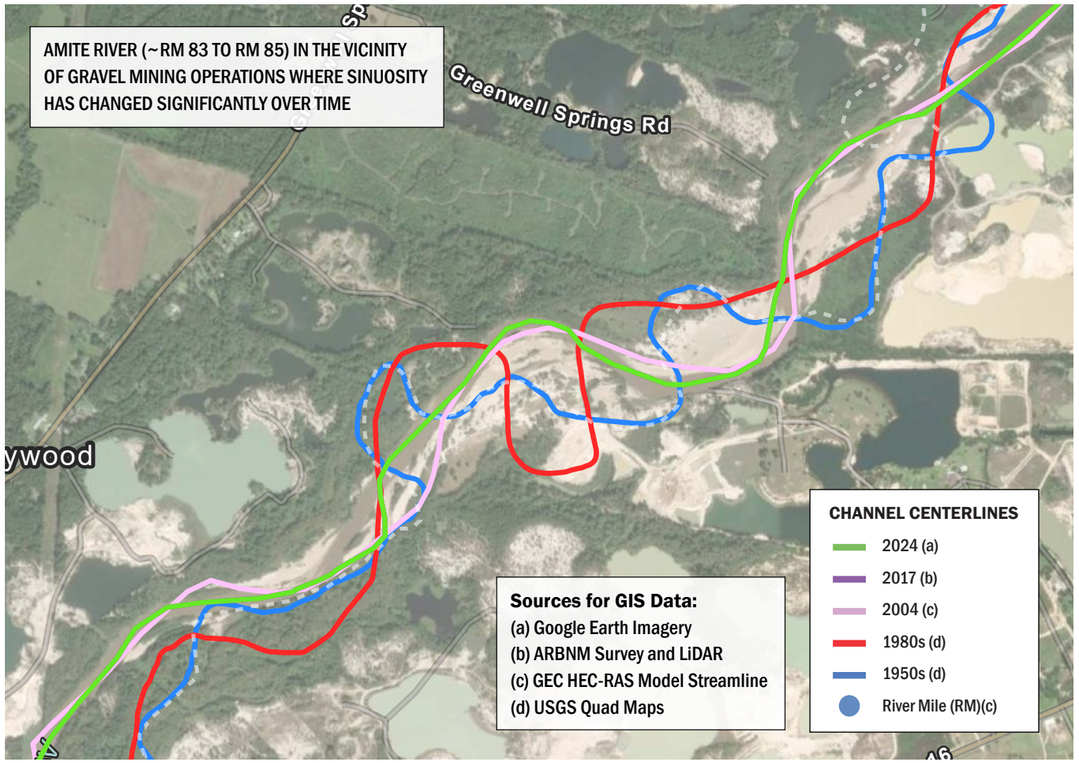


FIGURE 2-45: CHANNEL SINUOSITY OVER TIME (CONT.) (SOURCE: ARBC)

FIGURE 2-46: PHOTO TAKEN DURING FIELD RECONNAISSANCE AT RIVER MILE 84.3 IN 2008 (PHOTO SOURCE: PLD)

FIGURE 2-47: PHOTO TAKEN DURING FIELD RECONNAISSANCE AT RIVER MILE 84.3 IN 2017 (PHOTO SOURCE: DOTD)

River Aggradation, Degradation and Channel Form

AGGRADATION

This is a term used to describe the increase in elevation of a river overtime due to the deposition or buildup of sediment. It occurs in areas where the supply of sediment from upstream exceeds the amount of material that can be eroded and transported downstream. Aggradation can occur or be accelerated because of both natural and human factors.

DEGRADATION

This is a term used to describe the decrease in elevation of a river overtime due to the removal or erosion of sediment. It occurs in areas where the supply of sediment from upstream is less than the amount of material that is being eroded and transported downstream. Degradation can occur or be accelerated because of both natural and human factors.

While a channel can be both stable and dynamic at the same time, characteristics of stable channels include an equilibrium over time of channel width, slope, and aggradation/degradation (Rosgen). When one or more of those channel form aspects changes, it can impact other aspects of a stable channel. For example, if a channel is straightened, sinuosity decreases, and slope increases. This can result in increased velocities, and potentially increased erosion of the channel bed.

Bankfull width of stable alluvial channels remains relatively constant (Rosgen), and thus is a directly observable feature that can help determine if a reach is stable or unstable.

Utilizing survey from the 1980s (DOTD 1983, PLD (Mobile Boundary Hydraulics 2010)) and 2017 (USACE, DOTD), general river aggradation and degradation was determined by comparing invert elevations of the surveyed cross sections. Additionally, 2017 channel bank lines were used to estimate bank width stability along the river.

TABLE 2-6: HISTORIC SURVEY AND STUDIES LEVERAGED TO DETERMINE AGGRADATION, DEGRADATION, AND CHANNEL WIDTH

DATA	SOURCE
1983 Cross Section Survey	DOTD
1980s Cross Section Survey	PLD (HEC-RAS and HEC-6T models)
2017 Channel Bathymetry	USACE and DOTD

From the 1980's to 2017, channel width remained fairly stable in natural locations of the river, while channel width generally increased in modified reaches of the river. While aggradation and degradation occur throughout the river, generally observations include:

- Minor degradation to no change upstream of LA Highway 10
- Minor to Major degradation from LA Highway 10 to Bayou Manchac
- Major aggradation in the vicinity of the Amite River Diversion Canal Weir
- Both aggradation and degradation occur

Additionally, along the Amite River Diversion Canal there is generally some aggradation, but along the Blind River major degradation occurs. While taking the change in channel invert elevation rather than change in channel area as a measure of aggradation and degradation is a simplification of sediment accumulation, it can tell us generally how the river is changing. Table 2-7 details the classification of sediment accumulation used in Figures 2-48 and 2-49.

TABLE 2-7: CLASSIFICATION OF AGGRADATION AND DEGRADATION USED IN FIGURE 2-48 AND 2-49

CHANGE IN INVERT ELEVATION FROM 1980S TO 2017	CLASSIFICATION
$\Delta < -5$ ft	Major Degradation
-5 ft $< \Delta < -1$ ft	Minor Degradation
-1 ft $< \Delta < +1$ ft	No Change
$+1$ ft $< \Delta < +5$ ft	Minor Aggradation
$\Delta > +5$ ft	Major Aggradation

In the vicinity of the Amite River Diversion Canal Weir, the Amite River experiences sediment deposition, while the Amite River Diversion Canal experiences local scour. See Section titled "Amite River Diversion Canal and Weir" for a more detailed description of the Amite River Diversion Canal Weir.

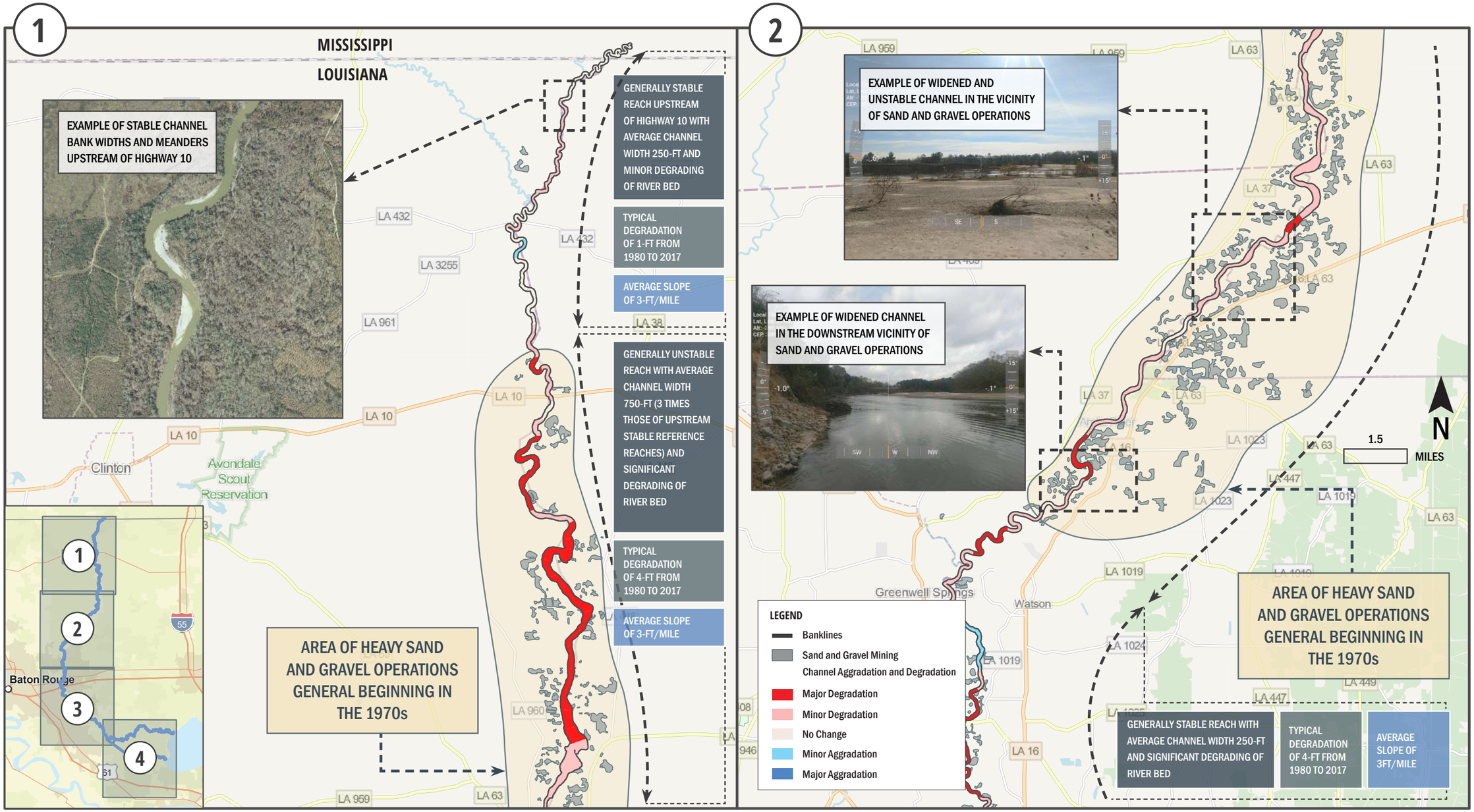


FIGURE 2-48: RIVER AGGRADATION, DEGRADATION AND CHANNEL FORM OBSERVATIONS ON THE UPPER AMITE RIVER (SOURCE: ARBC)

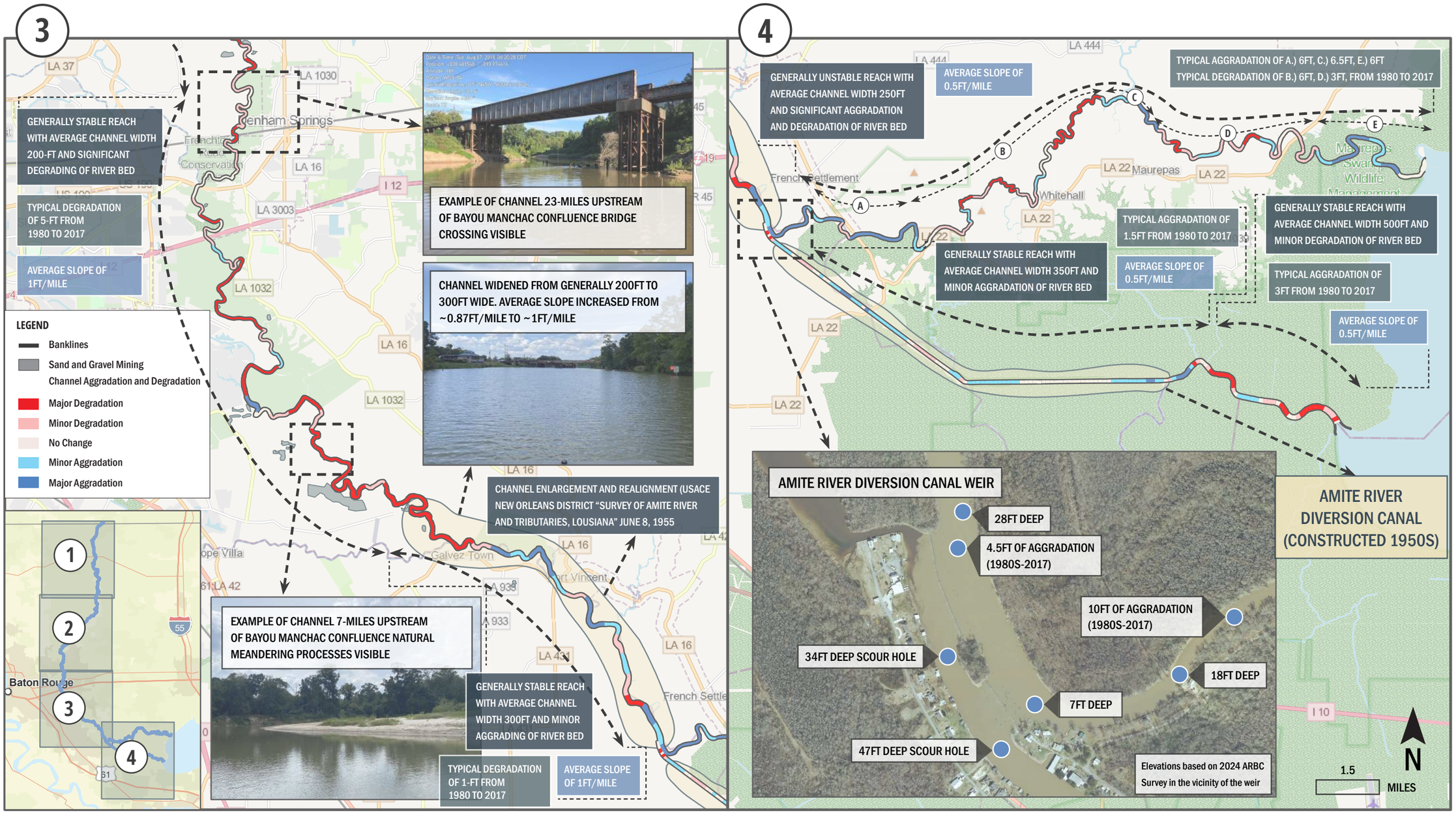


FIGURE 2-49: RIVER AGGRADATION, DEGRADATION AND CHANNEL FORM OBSERVATIONS ON THE LOWER AMITE RIVER (SOURCE: ARBC)

FEMA NFIP Considerations

National Flood Insurance Program

BACKGROUND

According to the U.S. Congress Joint Economic Committee, flooding causes billions of dollars in damages to homes and businesses around the country every year. Standard homeowners and commercial property insurance policies do not cover flood losses – to fill this critical insurance gap, FEMA administers the National Flood Insurance Program (NFIP). The NFIP is a voluntary program that provides federally backed flood insurance within communities that enact and enforce floodplain regulations which meet certain minimum national standards. Since FEMA's administration of NFIP in 1968, the program has helped flood survivors get back on their feet with nearly 2.7 million claims paid, totaling over $80 billion.

PARTICIPATION

To be covered by an NFIP flood insurance policy, a residential and business property must be in a community that participates in good standing with the NFIP. To qualify, the community must designate a local floodplain administrator and demonstrate that it has adopted and enforces a floodplain management ordinance to regulate development in flood hazard areas. The objective of the regulations is to minimize the potential for flood damage to future development. Today, almost 23,000 communities participate in the NFIP. Within the ARBC, 26 out of 27 communities participate.

BENEFITS

The NFIP has been effective in requiring new buildings to be protected from damage by the 100-year flood, also known as the 1% annual chance flood. However, flood damage still occurs when floods exceed the calculated 100-year event, reach areas beyond mapped floodplains, and inundate vulnerable buildings constructed before the community joined the NFIP.

TABLE 2-8: BENEFITS OF NFIP PARTICIPATION

DISASTER RECOVERY	MITIGATION GRANTS
Federal disaster assistance remains available in Special Flood Hazard Area (SFHA)	Federal grants and loans remain available in SFHA
Damage claims are paid for insured properties even if a federal disaster is not declared	Additional grants become available (FMA)
INSURANCE	**MORTGAGES**
Federally subsidized flood insurance is made available to all members of the community	Federally backed mortgages and loan guarantees will be available in SFHA

TO LEARN MORE ABOUT...

the NFIP, please visit:
https://www.fema.gov/flood-insurance

OR SCAN THE FOLLOWING QR CODE

FEMA Flood Insurance Study and Flood Insurance Rate Maps Status and Accuracy

Through the NFIP, FEMA provides methods for identifying properties that require the purchase of flood insurance for federally secured mortgages. The current program that creates and distributes official maps that identify the flood risk for communities is called Risk MAP (Mapping Assessment and Planning). Through that program, engineering and mapping methods are used to assess the flood risk and communicate it to communities and stakeholders through reports and maps. The communities within the ARBC have Flood Insurance Studies (FIS) and supporting Flood Insurance Rate Maps (FIRMs) that range in effective date from 2007 to as recent as 2024. However, as noted later in this section, the age of the engineering data including hydrologic and hydraulic flood models used to create FIS and FIRMs is typically much older. *Table 2-9 summarizes* ARBC communities' participation status in the NFIP, their FIRM date, and the number of Letters of Map Change (LOMCs) on file with FEMA. LOMCs are letters from FEMA that reflect official changes on a FIRM. These are often performed due to a physical project or a structure being vertically above the flood risk through some mitigation tactic (e.g., elevation). However, a high number of LOMCs can indicate inaccuracies in the engineering data and models used to create the FIRMs.

What are FEMA Flood Insurance Studies and Flood Insurance Rate Maps?

To determine a community's risk to flood hazards, FEMA performs an engineering study called a Flood Insurance Study (FIS). A FIS is a compilation and presentation of flood hazard areas along rivers, streams, coasts, and lakes within a community.

Flood maps, known officially as Flood Insurance Rate Maps (FIRMS), show areas of high- and moderate- to low-flood risk. They are shown as a series of zones. Communities use the maps to set minimum building requirements for coastal areas and floodplains; lenders use them to determine flood insurance requirements.

FISs and FIRMs are available to the public free of charge through the FEMA Flood Map Service Center at https://msc.fema.gov/

TABLE 2-9: SUMMARY OF COMMUNITY PARTICIPATION, FIRM DATES AND NUMBER OF LOMCS

COMMUNITY NAME	PARISH	PARTICIPATING COMMUNITY	FIRM DATE	NO. OF LOMC'S
ASCENSION PARISH	ASCENSION PARISH	YES	2007	802
CITY OF GONZALES	ASCENSION PARISH	YES	2007	
TOWN OF SORRENTO	ASCENSION PARISH	YES	2007	
CITY OF BAKER	EAST BATON ROUGE PARISH	YES	2008	
CITY OF BATON ROUGE	EAST BATON ROUGE PARISH	YES	2012	
CITY OF CENTRAL	EAST BATON ROUGE PARISH	YES	2012	
EAST BATON ROUGE PARISH	EAST BATON ROUGE PARISH	YES	2008, 2012	1143
CITY OF ZACHARY	EAST BATON ROUGE PARISH	YES	2012	
TOWN OF CLINTON	EAST FELICIANA PARISH	YES	2012	
EAST FELICIANA PARISH	EAST FELICIANA PARISH	YES	2012, 2024	6
VILLAGE OF NORWOOD	EAST FELICIANA PARISH	YES	2012, 2024	
TOWN OF SLAUGHTER	EAST FELICIANA PARISH	YES	2012	
VILLAGE OF WILSON	EAST FELICIANA PARISH	YES	2012	
IBERVILLE PARISH	IBERVILLE PARISH	YES	2013	18
CITY OF ST. GABRIEL	IBERVILLE PARISH	YES	2013	
CITY OF DENHAM SPRINGS	LIVINGSTON PARISH	YES	2012	1294
VILLAGE OF FRENCH SETTLEMENT	LIVINGSTON PARISH	YES	2012	
TOWN OF KILLIAN	LIVINGSTON PARISH	YES	2012	
LIVINGSTON PARISH	LIVINGSTON PARISH	YES	2012	
TOWN OF LIVINGSTON	LIVINGSTON PARISH	YES	2012	
VILLAGE OF PORT VINCENT	LIVINGSTON PARISH	YES	2012	
CITY OF WALKER	LIVINGSTON PARISH	YES	2012	
ST. HELENA PARISH	ST. HELENA PARISH	YES	2013	4
TOWN OF GRAMERCY	ST. JAMES PARISH	YES	2011	2
TOWN OF LUTCHER	ST. JAMES PARISH	YES	2011	
ST. JAMES PARISH	ST. JAMES PARISH	YES	2011	

EXISTING FLOOD STUDIES

A comprehensive analysis of existing FEMA flood hazard data from parish's effective FIS and FEMAs Coordinated Needs Management Strategy (CNMS), a geospatial database used to identify and track flood hazard study lifecycle and mapping needs within the flood hazard mapping program, determined that within the ARBC geographic boundary, the average age of the predictive models supporting the FIS stands at 33 years, with 86% of the studies relying on outdated, one-dimensional predictive modeling techniques and low resolution topographic data. This included the reliance on low resolution USGS topographic maps that were potentially created as far back as the 1950's with stereoscopic photogrammetry.

The use of one dimensional predictive models is generally suited to flooding sources with well-defined valleys demonstrating unidirectional flow and confined floodplains as typically observed in the upper reaches of the Amite and Comite Rivers. However, use of these techniques in flatter reaches with poorly defined valleys and unconfined floodplains as observed in the lower Amite River Basin within the Alluvium geologic region requires considerable engineering judgment and observed data to confidently model flood risk.

Conversely, two-dimensional modeling, known as 2D, is a technology that has more recently become more widely implemented within the NFIP and engineering community because of improved computing power and modeling technology. 2D modeling presents an alternative engineering approach that is better suited in situations where floodplains are unconfined and flow paths are not fully understood or may change during various modeled events. In the Amite River Basin, such flooding scenarios are particularly noticeable in the lower river, generally downstream of the Comite River confluence in the Terraces and Alluvium geologic formations, and are particularly well suited to 2D modeling approaches.

Engineering assessment of the primary flooding sources took place from 1978 to 2001. However, the hydrologic, hydraulic, and topographical data from that era may now be considered outdated, particularly when compared to modern modeling techniques implemented by LWI. The findings from the modeling performed through LWI and utilized to inform the development of this Master Plan will represent a significant advancement over the older results from the existing FIS.

Furthermore, the engineering studies for flooding sources within the ARBC as incorporated into the effective FIS for each community appear to have generally been developed between 1983 and 2005, predating high resolution topographic data and advanced modeling technologies as used for LWI studies.

Table 2-10 summarizes the FEMA FIS engineering data by parish. Included in these metrics are the miles of study by flood zone and miles of floodway according to CNMS. The table also includes the average age of each parish's modeling data, with Livingston and East Baton Rouge Parishes at 30 years as the youngest set of data.

During FEMA's Map Modernization Program, paper FIRM maps were often converted to digital formats without performing new engineering studies. Therefore, the technical data included within a FIS and FIRM is often significantly older than the published date.

TABLE 2-10: SUMMARY OF EFFECTIVE FEMA FIS ENGINEERING DATA BY PARISH

PARISH	MILES OF FEMA ZONE AE RIVERINE STUDIES	MILES OF FEMA ZONE A RIVERINE STUDIES	MILES OF FEMA ZONE AE RIVERINE STUDIES WITH FLOODWAY	TOTAL MILES OF FEMA RIVERINE STUDIES (A AND AE)	AVERAGE AGE OF FEMA RIVERINE STUDIES (YEARS)
Ascension	145	49	-	194	31
East Baton Rouge	283	123	62	406	30
East Feliciana	46	113	35	159	37
Iberville	44	19	-	63	37
Livingston	204	145	55	349	30
St. Helena	46	-	40	46	35
St. James	-	107	-	107	-
Overall	**768**	**556**	**192**	**1,324**	**33**

LWI MODELING SUMMARY

LWI Models are based on high-resolution combinations of LiDAR based terrain data supplemented with ground-based survey of bathymetry and hydraulic structures. Further these models utilize the state of the art hydrologic and 2D hydraulic modeling methodologies within the USACE HEC HEC-HMS and HEC-RAS modeling software, the most widely used software both nationally and within the local ARBC community of practice. Through LWI, these models have been extensively calibrated using all suitable historic data and observations previously limited or not available during the development of the effective FIS studies within the Amite River Basin. This includes extensive high-water marks collected by and coordinated by the ARBC following the August 2016 flood which were used to calibrate and validate the LWI Models and demonstrated exceptional accuracy.

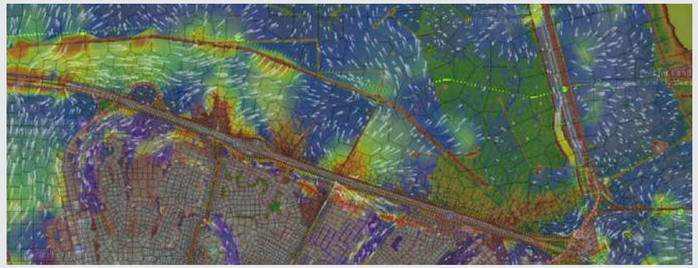


FIGURE 2-50: 2D HYDRAULIC MODELS LIKE HEC-RAS ARE IDEALLY SUITED TO THE LOWER AMITE RIVER BASIN WHERE LOW RELIEF TERRAIN RESULTS IN UNCONFINED, MULTI-DIRECTIONAL FLOW (PHOTO SOURCE: LWI)

CURRENT MODELING COMPARISON

The LWI Models used in the development of this Master Plan for the Amite River Basin were evaluated against the effective FIS for the seven ARBC parishes. Each parish has its own FIS conducted at different points in time, which often lacked coordination across parish and community lines to assess the interrelations of local flooding within the larger Amite watershed. This lack of synchronization has led to a variety of modeling and mapping techniques, shaped by the evolution of engineering practices, hydrological and hydraulic software, as well as the accessibility of terrain and rainfall data, alongside advancements in technological hardware at the time of these historical studies.

The modeling methods used in the LWI Modeling and used to inform the development of this Master Plan generally exceed the minimum requirements of FEMA's Guidelines and Standards for Flood Risk Analysis and Mapping Activities for purposes of establishing detailed Zone AE flood zones. However, LWI Models do not include flood-way simulations as required to replace existing flood-ways in the FIS and FIRMs.

To update existing flooding sources within the Amite River Basin that contains flood-ways, FEMA will likely require new flood-ways to be developed using the LWI Models. The November 2023 FEMA Guidance for Flood Risk Analysis and Mapping, Flood-way Analysis and Mapping provided updated technical guidance for the development of flood-ways using 2D models. These procedures would likely need to be performed for these new studies to be incorporated into FIS and FIRM's within the Amite River Basin. It is estimated that 192 miles of flood-way will need to be developed for communities within the Amite River Basin.

TABLE 2-11: SUMMARY OF THE POTENTIAL IMPACTS TO FEMA SFHA'S IF LWI MODELING ARE TO BE USED TO UPDATE FEMA FIS AND FIRMS'S

PARISH	TOTAL MILES OF FEMA RIVERINE STUDIES (A AND AE)	ADDITIONAL MILES OF LWI RIVERINE STUDY (DRAINAGE AREA >1SQ MI)	TOTAL MILES OF LWI RIVERINE STUDY	EFFECTIVE FEMA SFHA (SQUARE MILES)	LWI MODEL AREA (SQUARE MILES)	NET CHANGE IN SFHA CHANGE (SQUARE MILES)
Ascension	194	14	208	159.2	154.4	- 4.8
East Baton Rouge	406	26.7	432.7	156.9	144.1	- 12.8
East Feliciana	159	37	196	36.0	39.7	3.7
Iberville	63	1.3	64.3	23.5	24.1	0.6
Livingston	349	24.5	373.5	267.5	216.0	- 51.5
St. Helena	46	22	68	19.2	18.2	- 1.0
St. James	107	22.5	129.5	61.6	77.2	15.6
Overall	**1,324**	**148**	**1,472**	**723.9**	**673.8**	**- 50.1**

When comparing the effective FEMA SFHA to the LWI 100-year floodplains, there are notable differences in the horizontal extent of the inundations.
This depicts areas of no change, reductions and increases in the 100-year floodplain or SFHA as highlighted in Figures 2-51 and 2-52. Detailed comparisons of each parish can be found in the Supplements.

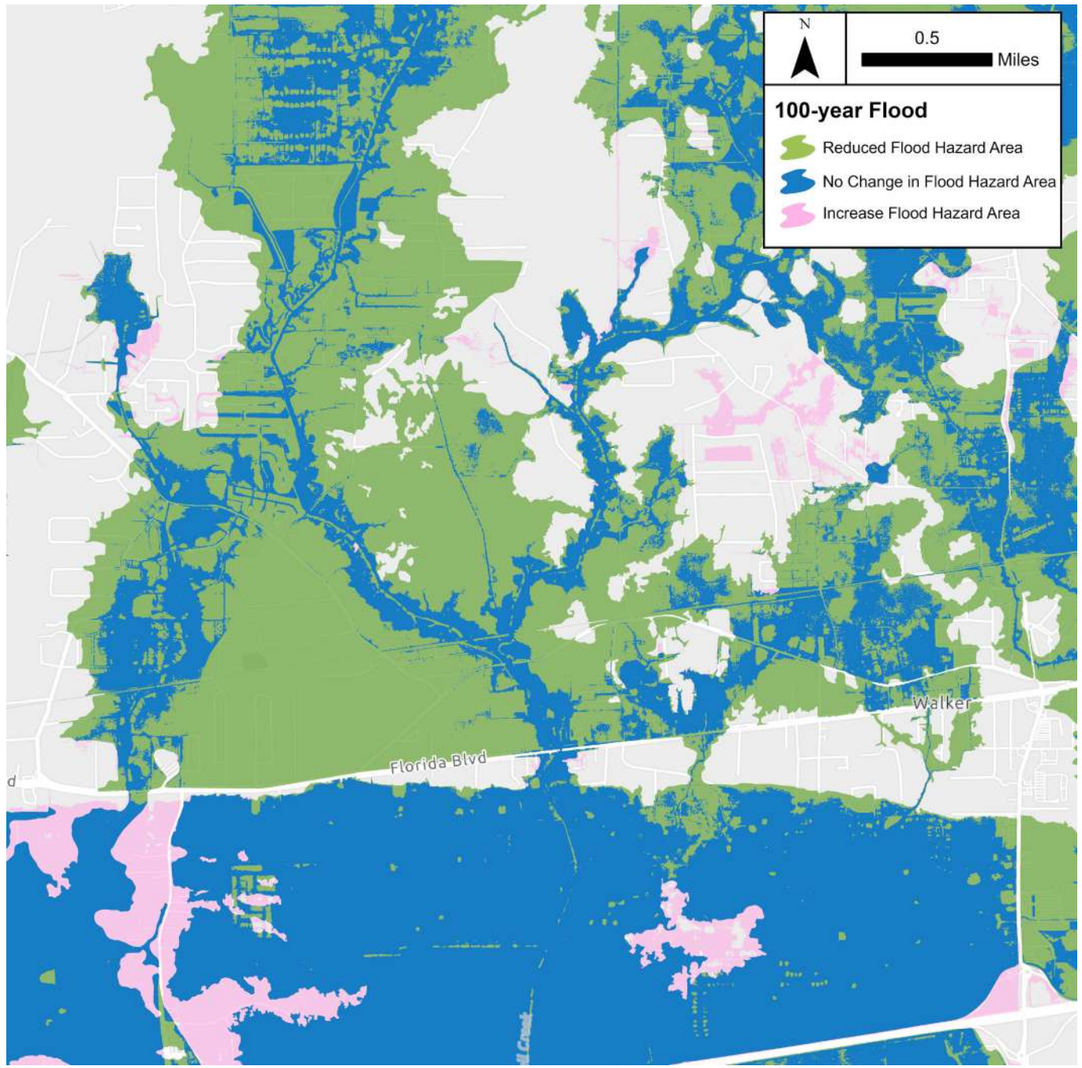


FIGURE 2-51: EXAMPLE COMPARISON WITHIN LIVINGSTON PARISH OF THE FEMA SFHA COMPARED TO THE LWI 100-YEAR FLOOD EXTENT TO DEMONSTRATE THE POTENTIAL REDUCTIONS AND INCREASES IN SFHA IF LWI MODELS WERE TO BE ADOPTED FOR FEMA FIS AND FIRMS (SOURCE: ARBC)

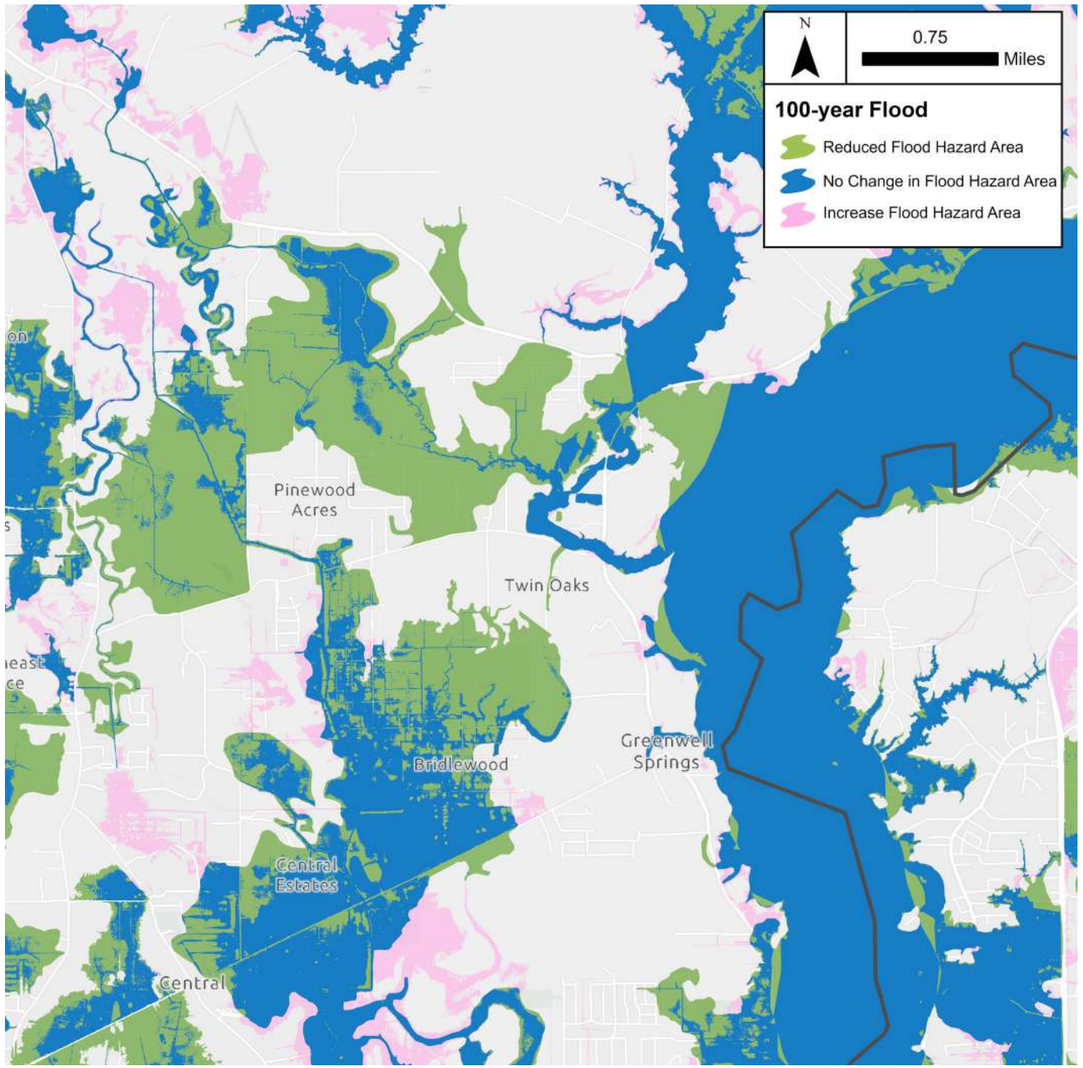


FIGURE 2-52: EXAMPLE COMPARISON WITHIN EAST BATON ROUGE AND LIVINGSTON PARISH OF THE FEMA SFHA COMPARED TO THE LWI 100-YEAR FLOOD EXTENT TO DEMONSTRATE THE POTENTIAL REDUCTIONS AND INCREASES IN SFHA IF LWI MODELS WERE TO BE ADOPTED FOR FEMA FIS AND FIRMS (SOURCE: ARBC)

FEMA 2018 BASE LEVEL ENGINEERING

For this Master Plan, other flood studies were reviewed for potential leverage information to inform the LWI Model. It was found that in May 2018 FEMA Region VI completed the 2D Base Level Engineering (BLE) for the Amite watershed.

BLE is an approach that can provide floodplains, depths grids, velocity grids, and water-surface elevation grids over large geographic areas. BLE data can be used as best available information in areas without FIS or FIRM data or in areas identified as Zone A with no model data available from the FIS. A comparison of BLE data performed on behalf of DOTD during the development of the ARBNM indicated that the BLE data frequently underestimated flood elevations when compared to USGS gages along the Amite River and consistently underperformed when compared to other models.

Community Rating System

The NFIP's Community Rating System (CRS) is a voluntary program that encourages and rewards community efforts that go above and beyond minimum national standards for floodplain management. The CRS is similar to—but separate from— the private insurance industry's programs that grade communities on the effectiveness of their fire suppression and building code enforcement efforts. As such, communities that exceed requirements of the NFIP can earn a reduction in flood insurance premiums for policy holders.

FEMA defines the goals of the CRS as (1) reduce flood damage to insurable property; (2) strengthen and support all insurance aspects of the NFIP; and (3) encourage a comprehensive approach to floodplain management.

HOW IT WORKS.

To receive credit points towards premium reductions, local floodplain management activities must be described, measured, and evaluated by the CRS. The CRS provides credit under 19 activities organized under four categories (or "Series"):

- Public Information (Series 300) – This series credits programs that advise people about flood hazards, encourage the purchase of flood insurance, and provide information about ways to reduce flood damage. These activities also generate data needed by insurance agents for accurate flood insurance rating. They generally serve all members of the community.
- Mapping & Regulations (Series 400) – This series credits programs that provide increased protection to new development. These activities include mapping areas not shown on the Flood Insurance Rate Map (FIRM), preserving open space, protecting natural floodplain functions, enforcing higher regulatory standards, and managing stormwater. The credit is increased for growing communities.
- Flood Damage Reduction (Series 500) – This series credits programs for areas in which existing development is at risk. Credit is provided for a comprehensive floodplain management plan, relocating or retrofitting flood-prone structures, and maintaining drainage systems.
- Warning & Response (Series 600) – This series provides credit for measures that protect life and property during a flood, through flood warning and response programs. There is credit for the maintenance of levees and for state regulatory programs for dams, as well as for programs that prepare for the potential failure of levees and dams.

TABLE 2-12: CRS CREDITS AND POLICY PREMIUM REDUCTIONS

CREDIT POINTS	CLASS	PREMIUM REDUCTION
4,500+	1	45%
4,000 – 4,499	2	40%
3,500 – 3,999	3	35%
3,000 – 3,499	4	30%
2,500 – 2,999	5	25%
2,000 – 2,499	6	20%
1,500 – 1,999	7	15%
1,000 – 1,499	8	10%
500 – 999	9	5%
0 – 499	10	0

The CRS assigns credit points for each activity based upon the extent to which it advances the three goals of the CRS per the CRS Coordinator's Manual. In some cases, credit points may be assigned to a community for activities that are implemented by the state or a regional agency (for example, state hazard disclosure laws). In these cases, the community will receive credit points when it demonstrates that the activity is effectively being implemented within its jurisdiction. Communities are assigned to one of ten classes based on the total number of credit points earned, and the CRS Class determines the discount on flood insurance premiums (see Table 2-12). Class 1 requires the most credit points (4,500) and gives the largest premium reduction (45%). If a community earns as little as 500 points, it is in Class 9 and policy holders get a 5% discount. If a community is enrolled in the program but does not achieve at least 500 points, it is in Class 10 and policy holders get no discount. Under Risk Rating 2.0 the CRS discount is applied to all NFIP policies, both within and outside of the Special Flood Hazard Area.

TO LEARN MORE ABOUT...

the CRS Program, please visit:
https://www.fema.gov/floodplain-management/community-rating-system

OR SCAN THE QR CODE BELOW

PREREQUISITES FOR ENROLLMENT

To join and maintain its participation in the CRS, a community must meet six standard prerequisites as summarized below. These general program prerequisites are more fully described in FEMA's CRS Coordinator's Manual1 along with additional prerequisites that are required for communities to achieve CRS ratings of Class 6 or better.

1. The community must have been in the Regular Phase 2 of the NFIP for at least one year.
2. The community must be in full compliance with the minimum requirements of the NFIP as verified through written correspondence from the FEMA Regional Office. The correspondence must have been sent within six months of the initial CRS verification visit. The FEMA Regional Office or State NFIP Coordinator may need to conduct a Community Assistance Visit (CAV) if neither has been in the community recently. If a community is determined at any time to be in less-than-full compliance, it will retrograde to a CRS Class 10.
3. The community must create and implement plans and procedures for managing specific floodplain-related construction certificates (2021 CRS update includes Elevation Certificates, Floodproofing Certificates for Non-Residential Structures, V Zone Design Certificates, Residential Basement Floodproofing Certificates, and where applicable, Engineered Opening Certifications) for newly constructed, substantially improved, and/or reconstructed due to substantial damage within their communities. The community must maintain a 90% accuracy rate each year for those construction certificates.
4. If there are one or more repetitive loss properties in the community, the community must take certain actions as specified in the CRS Coordinator's Manual. These include reviewing and updating the list of repetitive loss properties, mapping repetitive loss areas, describing the causes of the losses, and sending an outreach project to those areas each year. A community with 50 or more repetitive loss properties must also prepare a repetitive loss area analysis or floodplain management plan that addresses its repetitive flood problem.
5. The community must maintain in force flood insurance policies for insurable buildings owned by the community and located in the Special Flood Hazard Area (SFHA) shown on the community's Flood Insurance Rate Map (FIRM). The community's Chief Executive Officer (CEO) must sign an official statement that attests to this. Typically, this requirement applies to community owned buildings located in the SFHA which have received federal financial assistance in the past.
6. If a coastal community receives a draft FIRM that delineates the Limit of Moderate Wave Action (LiMWA), the community must agree to show the delineation on its final published FIRM. The LiMWA delineation is for informational purposes only and there is no CRS requirement to regulate the area differently. The LiMWA is not applicable to ARBC communities.

ARBC Communities with Repetitive Losses

Communities in the Amite River Basin have endured several events that have caused millions of dollars in damages. FEMA tracks major loss events and flood insurance claims to understand areas of concern, including Repetitive Loss Properties (RLPs). An RLP, as defined by FEMA, is a property for which **two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period. Table 2-13 summarizes repetitive loss properties for ARBC communities.**

TABLE 2-13: REPETITIVE LOSS PROPERTIES BY ARBC COMMUNITY (SOURCE: FEBRUARY 2024 FEMA NFIP REPETITIVE LOSS OVERVIEW MAP VIEWER; FROM OPENFEMA DATASET)

COMMUNITY	REPETITIVE LOSS STRUCTURE COUNT
Iberville Parish	**73**
City of St. Gabriel	10
St. Helena Parish	**5**
Ascension Parish	**406**
City of Gonzales	83
Town of Sorrento	5
Livingston Parish	**955**
City of Denham Springs	255
City of Walker	30
Town of Livingston	11
Village of French Settlement	19
Village of Port Vincent	41

COMMUNITY	REPETITIVE LOSS STRUCTURE COUNT
E. Feliciana Parish	**2**
Town of Clinton	10
Town of Jackson	0
Town of Slaughter	0
Village of Wilson	0
E. Baton Rouge Parish	**1430**
City of Zachary	55
City of Central	78
City of Baker	32
St. James Parish	**14**
Town of Gramercy	4
Town of Lutcher	3

As mentioned above in Prerequisites for Enrollment, communities with one or more repetitive loss properties must make specific efforts to manage these losses as a prerequisite for Class 9 and all subsequent classifications.

- Communities with 1-50 repetitive loss properties must:
  - Review and update the list of repetitive loss properties,
  - Map repetitive loss areas, describing the causes of the losses, and
  - Send an outreach project to those areas each year.
- Communities with 50 or more repetitive loss properties must:
  - Complete the prerequisites above and
  - Prepare a Repetitive Loss Area Analysis or Floodplain Management Plan that addresses its repetitive flood problem.

CRS Community Participation Status

Of the 23 parishes, cities, and towns in the Amite River Basin, 11 are CRS communities with classes ranging from 6 to 9 as summarized in Table 2-14.

TABLE 2-14: ARBC COMMUNITY PARTICIPATION IN NFIP AND CRS, CURRENT AS OF 03/13/2025

ARBC COMMUNITIES ENROLLED IN CRS			NFIP COMMUNITIES NOT ENROLLED IN CRS
Community Name	**Class**	**NFIP Policy Discount**	
E. Baton Rouge Parish	6	20%	Iberville Parish
Ascension Parish	7	15%	City of St. Gabriel
City of Central	7	15%	St. Helena Parish
City of Denham Springs	7	15%	Town of Livingston
City of Walker	7	15%	E. Feliciana Parish
St. James Parish	8	10%	Town of Clinton
City of Zachary	8	10%	Town of Jackson
City of Gonzales	8	10%	Town of Slaughter
Town of Lutcher	8	10%	Town of Gramercy
City of Baker	9	5%	
Town of Sorrento	9	5%	
Livingston Parish	10	0%	
Village of Port Vincent	10	0%	
Village of French Settlement	10	0%	

COMMONLY CREDITED ACTIVITIES

Table 2-15 shows ARBC CRS Community average participation and average points compared to Louisiana state averages.

TABLE 2-15: ARBC CRS COMMUNITY AVERAGE PARTICIPATION AND AVERAGE POINTS COMPARED TO LOUISIANA STATE AVERAGES

ACTIVITY/ ELEMENT	DESCRIPTION	% PARTICIPATION		CREDITS EARNED		
		LA AVG.	ARBC AVG.	MAX	LA AVG.	ARBC AVG.
300 Series: Public Information Activities						
Activity 310	Elevation Certificates	100%	100%	116	33	35
Activity 320	Map Information Service	97%	91%	90	62	62
Activity 330	Outreach Projects	100%	100%	350	145	175
Activity 340	Hazard Disclosure	100%	100%	80	23	23
Activity 350	Flood Protection Information	95%	91%	125	50	49
Activity 360	Flood Protection Assistance	59%	64%	110	74	45
Activity 370	Flood Protection Promotion	46%	73%	110	62	53
400 Series: Mapping and Regulations						
Activity 410	Floodplain Mapping	8%	18%	850	39	3
Activity 420	Open Space Preservation	95%	91%	2870	259	224
Activity 430	Higher Regulatory Standards	100%	100%	2462	272	286
Activity 440	Flood Data Maintenance	100%	100%	222	109	120
Activity 450	Stormwater Management	85%	64%	775	56	49
500 Series: Flood Damage Reduction Activities						
Activity 510	Floodplain Mapping	92%	91%	622	168	140
Activity 520	Open Space Preservation	56%	45%	--	74	58
Activity 530	Higher Regulatory Standards		27%	1600	86	7
Activity 540	Flood Data Maintenance	51%	36%	470	201	91
600 Series: Warning and Response						
Activity 610	Flood Warning and Response	15%	9%	395	285	19
Activity 620	Levees	0%	0%	235	0	0
Activity 630	Dams	33%	0%	160	45	0

2.4 OPERATIONS AND MAINTENANCE CONSIDERATIONS

Local communities within the Amite River Basin are responsible for operating and maintaining their own flood control projects and drainage infrastructure, which includes routine clearing, snagging, and drainage infrastructure upkeep as well as pump station and gate structures. These activities are vital for reducing localized flood risks and ensuring that drainage systems operate efficiently. To sustain these efforts, local governments must allocate resources, perform regular inspections, and manage maintenance within their jurisdiction. Unlike regional initiatives that address broader flood control needs, local projects are specifically tailored to serve individual communities, prioritizing localized protection and functionality. Regional flood control projects, by contrast, are overseen by entities such as the USACE and state agencies and typically involve large-scale improvements.

Amite River and Tributaries Project

The 1963 Operations and Maintenance (O&M) Manual for the Amite River and Tributaries outlined agreements between USACE and local police juries. Ascension Parish assumed responsibility for maintaining all works in its jurisdiction, including the Amite River Diversion Canal Weir at the head of the Amite River Diversion Canal. The manual stipulated that the parish "will not permit the boat way to further erode or enlarge," emphasizing its obligation to maintain the weir. Livingston Parish also agreed to maintain parts of the Amite River in their territorial jurisdiction. At the time of these agreements, parishes implemented committees to ensure the maintenance of regional projects. Since transitioning to a president-council form of government, the agreements do not appear to have been revised. Ongoing discussions between Ascension and Livingston Parishes as well as PLD aim to clarify maintenance responsibilities for the weir and canal. The 1963 manual required inspections every 90 days and after high-water events, along with semiannual reporting, but these protocols have not been consistently tracked.

Waterway Debris

In recent years, several clearing and snagging projects have been completed within the Amite River Basin to address debris and litter obstructing waterways, improving drainage, and reducing flood risks. The Bayou Fountain Project recently cleared approximately 4.6 miles of channel from Bayou Manchac to Burbank Drive. This effort removed vegetation from channel side slopes that had hindered water flow, as well as debris from the channel bottom, including tires and shopping carts. The Jones Creek Project was another major initiative, involving 15.2 miles of channel clearing and snagging, along with the placement of 4.3 miles of rip-rap to stabilize banks. Improvements targeted critical tributaries in areas like O'Neal Lane and Sherwood Forest Boulevard, enhancing the drainage system. Similarly, the Ward Creek project restored 3.3 miles of channel from Bayou Manchac to an upstream endpoint near Pecue Lane, improving hydraulic performance and reducing the risk of flood damage caused by out-of-bank flooding during heavy rainfall events as illustrated in Figure 2-53.

FIGURE 2-53: CLEARING AND SNAGGING OF BASIN WATERWAYS (PHOTO SOURCE: USACE)

Livingston Parish has recently cleared and snagged over 600 miles of waterway within the Amite River Basin.

The impact of both natural and man-made debris can vary drastically depending on the individual waterway. For example, smaller, urbanized flooding sources are typically more prone to increased flood risk because of debris build up as illustrated in Figure 2-54, while larger waterways are typically less sensitive as illustrated in Figure 2-55.

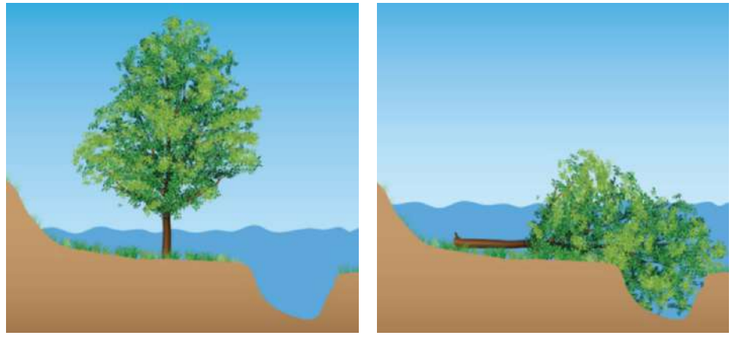


FIGURE 2-54:WATERWAY DEBRIS CAN HAVE SIGNIFICANT IMPACTS ON SMALLER FLOODING PHOTO SOURCES. WHILE AN UPRIGHT TREE TRUNK TYPICALLY RESULTS IN MARGINAL REDUCTIONS IN FLOW CAPACITY, THE CANOPY OF A FALLEN TREE IN A SMALL CHANNEL CAN DRASTICALLY REDUCE THE FLOW CAPACITY, EXACERBATING FLOOD RISK (SOURCE: DEWBERRY)

FIGURE 2-55:WATERWAY DEBRIS IN MAJOR FLOODING PHOTO SOURCES LIKE THE AMITE AND COMITE RIVERS, WHILE OFTEN A NUISANCE FOR RECREATIONAL NAVIGATION, ARE TYPICALLY SUBMERGED BY OVER 20 FEET OR MORE DURING A MAJOR FLOOD EVENT AND HAVE LITTLE IMPACTS ON FLOW CAPACITY (PHOTO SOURCE: ARBC)

Comite River Diversion Canal

The Comite River Diversion Canal project when complete will play a vital role in flood mitigation for the region. East Baton Rouge Parish has been designated as responsible for the ongoing maintenance of this critical infrastructure, ensuring its long-term functionality and effectiveness in reducing flood risks.

Regular maintenance activities may include:

- Clearing debris
- Managing vegetation
- Monitoring hydraulic performance
- Monitoring erosion and sedimentation
- Preserving structural integrity of the project

Implementation of these measures will sustain the project benefits for surrounding communities.

Amite River Diversion Canal Weir

To support the development of this Master Plan and in response to stakeholder concerns regarding the physical condition of the Amite River Diversion Canal Weir and its hydraulic performance in respect to the downstream flow distribution between the original Amite River channel and the Amite River Diversion Canal Weir, detailed bathymetric and photogrammetric survey of the weir and adjacent channel was performed in the summer of 2024.

Original Design Conditions

In lieu of the availability of as-built information, the June 1955 U.S. Army Corps of Engineers (USACE) report titled Survey of Amite River and Tributaries Louisiana (USACE 1955) and November 1956, USACE report titled Amite River and Tributaries, LA., Design Memorandum No.1, General Design (USACE 1956) provided details pertaining to the Amite River and Tributaries project. USACE 1955 stated that the Amite River Diversion Canal Weir will be a 1,500 feet long structure built at elevation 0 MSL and will pass about 60% of the total flow above its junction with the Amite River at mile 25.3 (i.e., 40/60% flow split Amite River/Amite River Diversion Canal). It also stated that above the Amite River Diversion Canal Weir on the main Amite River channel, the channel will be enlarged, realigned, and intermittently cleared and snagged as necessary upstream to Mile 54. The enlargement would involve widening the channel to have a bottom width of 165 feet at elevation -26.6 MSL adjacent to the weir with 2:1 side slopes.

A 1963 Operation and Maintenance Manual for Amite River and Tributaries, Louisiana, indicated that the plan was modified at the request of the Ascension Parish Police Jury to add a boat way from the Amite River to the Amite River Diversion Canal with the navigation opening (boat way) as a trapezoid section with a 20-foot bottom width and 1 vertical to 2 horizontal side slopes with an invert elevation of -5 feet (assumed MSL).

Since these reports were referenced to the MSL vertical datum and in absence of supporting documentation and monuments, it was assumed that MSL was equal to NGVD 29, and therefore an elevation of 0 MSL was equivalent to -0.15 feet NAVD 88.

Through conversations with ARBC staff, it was suggested that after the initial construction, fisherman were rumored to have used dynamite to enlarge the boat way, resulting in an increased width and depth as experienced today. This claim has not been verified; however, the boat way was observed to be significantly larger than the design conditions.

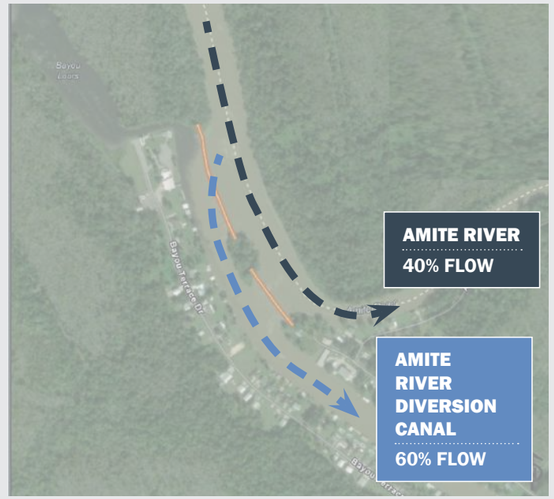
Figure 2-56 illustrates the original design conditions, recreated using best available historic information for the original design. It should be noted that due to the poor quality of the historic documents, dimensions interpreted from plans and documented here are made using best judgment and may contain errors. Figure 2-57 illustrates the existing 2024 conditions surveyed during the development of this Master Plan, clearly showing the physical deterioration of this structure and need for maintenance.

AMITE RIVER DIVERSION CANAL WEIR FLOW SPLIT

According to the June 1955 USACE report Survey of Amite River and Tributaries Louisiana, the weir was designed to divert 60% of the design flood discharge down the Amite River Diversion Canal and 40% down the main river. This is contrary to the widely discussed 75%/25% design flow split frequently cited among the local and engineering community which suggests 75% of the flow was designed to go down the Amite River.

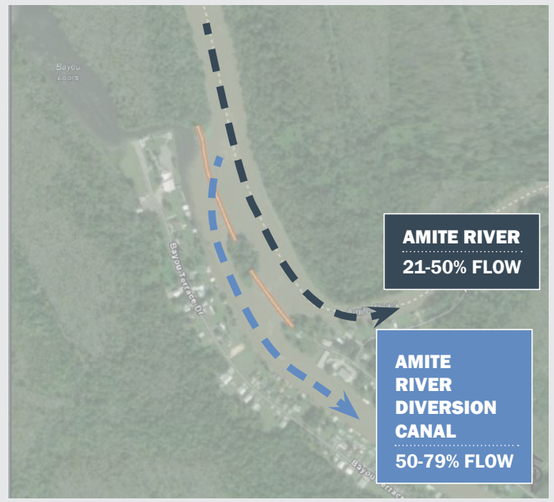
The March 9, 2021 Amite River Diversion Canal Weir Investigation, developed jointly by Dewberry and Forte and Tablada on behalf of Livingston Parish, leveraged gaged flow data and hydraulic modeling to determine diversion weir flow splits for the Amite River and Amite River Diversion Canal which indicated that flow splits range from 21.3/78.7% at very lows flows to 50.3/49.7% (Amite River/Amite River Diversion Canal) during the extreme flood experienced in 2016.

Original 1955 Design Conditions (1)



JUNE 1955 USACE REPORT SURVEY OF AMITE RIVER AND TRIBUTARIES LOUISIANA (PHOTO SOURCE: ARBC)

2021 Observed Conditions (2)



MARCH 9, 2021 AMITE RIVER DIVERSION CANAL WEIR INVESTIGATION (PHOTO SOURCE: ARBC)

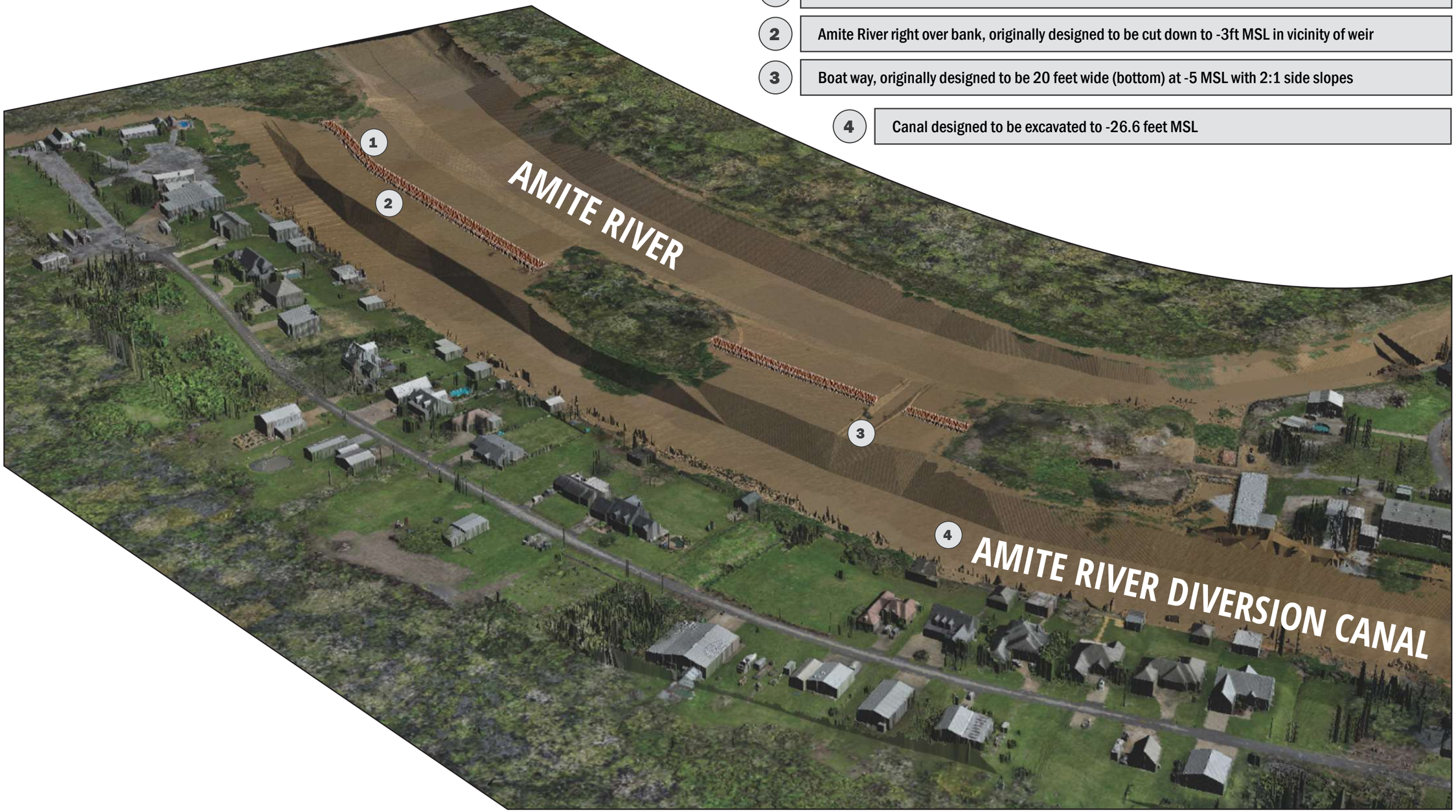
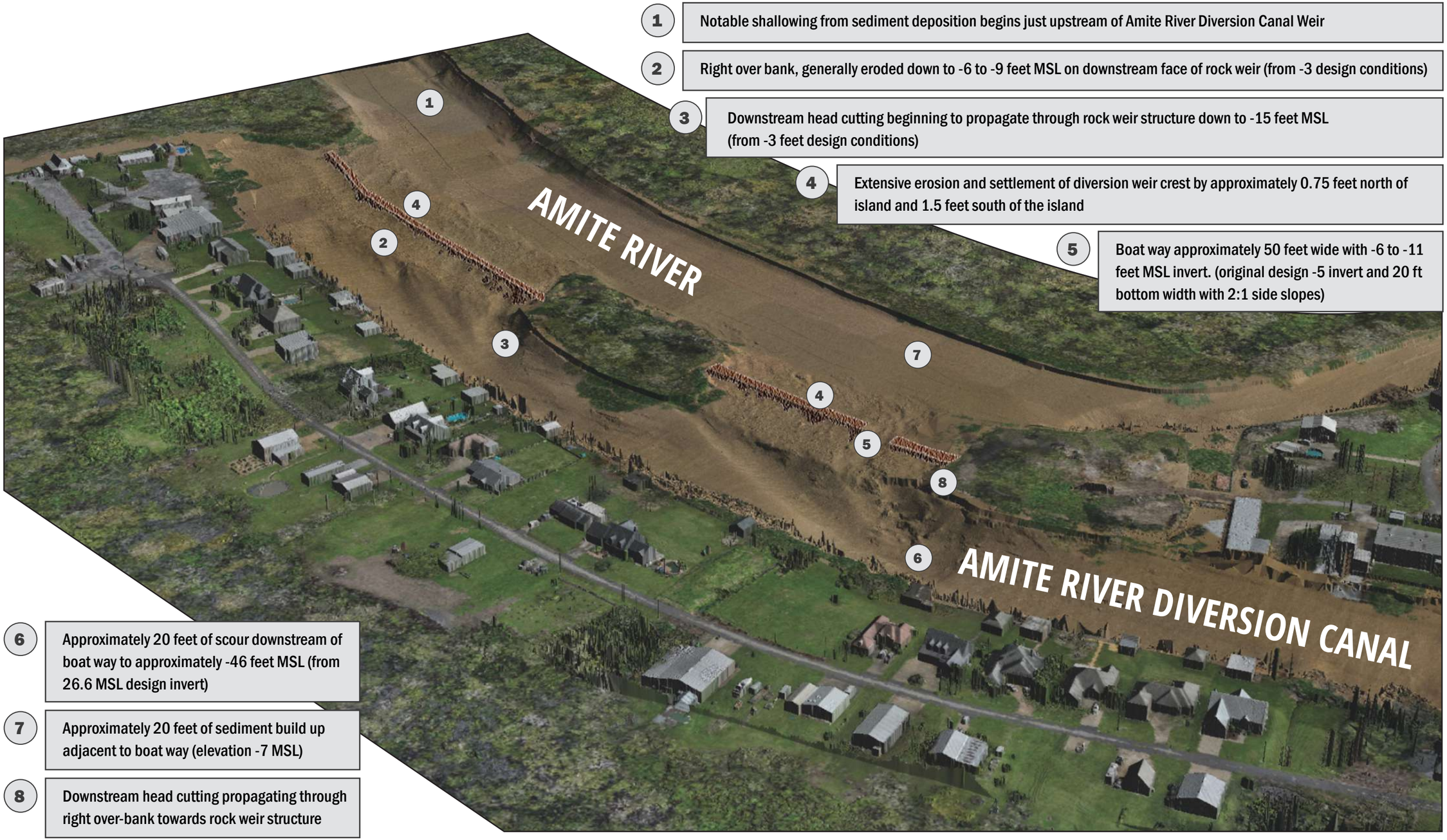


FIGURE 2-56 AMITE RIVER DIVERSION CANAL WEIR ORIGINAL WEIR CONDITIONS, RECREATED USING BEST AVAILABLE INFORMATION FROM USACE DOCUMENTATION (SOURCE: ARBC)



1. Notable shallowing from sediment deposition begins just upstream of Amite River Diversion Canal Weir
2. Right over bank, generally eroded down to -6 to -9 feet MSL on downstream face of rock weir (from -3 design conditions)
3. Downstream head cutting beginning to propagate through rock weir structure down to -15 feet MSL (from -3 feet design conditions)
4. Extensive erosion and settlement of diversion weir crest by approximately 0.75 feet north of island and 1.5 feet south of the island
5. Boat way approximately 50 feet wide with -6 to -11 feet MSL invert. (original design -5 invert and 20 ft bottom width with 2:1 side slopes)
6. Approximately 20 feet of scour downstream of boat way to approximately -46 feet MSL (from 26.6 MSL design invert)
7. Approximately 20 feet of sediment build up adjacent to boat way (elevation -7 MSL)
8. Downstream head cutting propagating through right over-bank towards rock weir structure

FIGURE 2-57: AMITE RIVER DIVERSION CANAL WEIR EXISTING 2024 CONDITIONS, CREATED FROM BATHYMETRIC AND PHOTOGRAMMETRIC SURVEY COLLECTED DURING THE DEVELOPMENT OF THIS MASTER PLAN (SOURCE: ARBC)

2.5 PLAN AND CODE ASSESSMENT

Effective flood management is a multifaceted effort requiring a well-balanced approach to zoning regulations, stormwater management, fill mitigation, and floodplain preservation. To assess where each community stands in terms of floodplain management, a comprehensive review of ordinances from entities within the Amite River Basin was conducted. These ordinances were analyzed based on key components recognized by the CRS program as well as best practices in flood risk management.

The purpose of this analysis is to establish standardized recommendations that the ARBC can promote, encouraging communities to adopt them as baseline standards. The following assessment reviews the state of practice, strengths and gaps in current floodplain management ordinances and policies across the basin's parishes and communities, pinpointing specific opportunities for improvement. Table 2-16 provides a detailed breakdown of our findings.

Zoning and Land Use Policies

Zoning regulations play a fundamental role in guiding development, particularly in flood-prone areas. They serve as a strategic framework to prevent high-risk projects and reduce potential flood damage to new developments.

FINDINGS

- Communities including Ascension Parish, East Baton Rouge Parish, and St. James Parish have demonstrated foresight by enacting zoning laws that limit or prohibit development in vulnerable flood zones. This level of control ensures that future growth aligns with flood safety measures, protecting both people and property.

Many ARBC communities with more proactive flood management practices experience discounted flood insurance premiums.

- In contrast, communities which have fewer zoning restrictions, run the risk of allowing unchecked developments in flood-prone areas. This makes regulating resilient floodplain developments harder and could not only worsen flooding but also endanger public safety as development pressures grow without adequate safeguards.
- Many communities within the basin have implemented zoning, however, there remain seven entities out of 23 that currently do not have zoning regulations, highlighting an opportunity to bolster flood resilience across the region.

Stormwater and Detention Requirements

Effective stormwater management is critical in controlling runoff from heavy rains, mitigating flooding risks by ensuring that drainage systems are equipped to handle increased water volumes, especially in rapidly developing areas.

FINDINGS

- East Baton Rouge Parish sets an excellent example, requiring comprehensive stormwater analyses for a range of storm intensities as well as distributed detention requirements. This commitment reflects a thorough understanding of flood dynamics, aiming to prevent runoff from overwhelming drainage infrastructure.
- In contrast, some communities face increased flood risks due to limited stormwater policies, especially as development continues to grow. By enhancing their regulations to better manage runoff from future projects, these areas could significantly improve their resilience to intense rainfall events reducing flood risk.

Best Management Practices

Requiring development to reduce runoff is a critical strategy for managing stormwater and mitigating flood risks. By implementing measures such as permeable surfaces, green infrastructure, and detention basins, developments can capture and manage rainwater effectively, helping to prevent stormwater systems from becoming overwhelmed. These practices not only reduce the risk of flooding and erosion but also improve water quality by filtering pollutants before they reach waterways. In addition, they contribute to sustainable land use, ensuring that growth doesn't exacerbate existing flood challenges, and ultimately help protect communities and natural resources from future flood events.

FINDINGS

- Several communities have taken a proactive approach to stormwater management by going beyond the basic requirement of balancing pre- and post-development runoff during certain storm events. These communities have made it a priority to actually reduce the overall volume of runoff produced by new developments or store runoff to match pre-development conditions.
- Ascension Parish has set a standard that requires post-development runoff from a 50-year storm event to be 90% of the pre-development 10-year storm. This progressive approach helps to reduce the impact of future development on local flood risks.
- Similarly, Livingston Parish has instituted requirements for development to provide a 20% reduction in runoff for the 5, 10, 25, and 100-year storm events. These forward-thinking regulations not only help to manage immediate flood risks but also contribute to the long-term sustainability and resilience of the community.

TABLE 2-16: ORDINANCE AND CODE COMPARISON FOR ARBC PARISHES AND COMMUNITIES

ORDINANCE AND CODE COMPARISON														
Community	**CRS Rating**	**Comprehensive Plan**	**Zoning/ Land Use**	**Review Entity**	**Floodplain Preservation**	**Requirements for DIS**	**Storm Analysis**	**Detention Requirements**	**Fill Mitigation**	**Compensatory Storage Requirement**	**Hazardous Material Stoarge Restriction**	**Floodway Restrictions**	**FFE above BFE**	**Roadway Elevation**
Ascension Parish	7	✓	✓	Self		All Development other than Single family Residential.	10, 25, 50, 100	90% pre 10 year/ post 50 year	✓	1:1 (36" max on subs and commercial)		Study	2	Gutter 1' below BFE
Gonzales	8	✓	✓	Self		All Development other than Single family Residential.	10, 25, 50, 100	90% pre 10 year/ post 50 year	✓	1:1 (36" max on subs and commercial)	Yes	Study	2	Base Grade 1' below
Sorrento	9	✓	✓	Self		All Development other than Single family Residential.	10, 25, 100	10 year pre/ 25 year post	✓	1:1 (2' only) (no requirement for lots smaller than 2 ac)		Study	0	Gutter 1' below BFE
East Baton Rouge Parish	6	✓	✓	Self		All Development other than Single family Residential and Dev less than 20% impervious surface on site and Dev additions or modifications with less than 10% increase in impervious.	2, 10, 25, 100	Pre/Post 2, 10, 25, and 100 year	✓	3,500 sf or less 2' allowed, MH 18", other 1:1 or shown no increase in water surface		Study	1	2' below BFE
Baker	9	✓	✓	Self		-	-	-				Study	2	
Central	7	✓	✓	Self		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	2, 10, 25, 100	Pre/Post 2, 10, 25, and 100 year	✓	4' allowed for 5,000 sf or less, other 1:1		Study	1 or 1' above lowest street crossection	2' below
Zachary	8	✓	✓	Self		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	10, 50		✓	1:1		Study	1 or 1' above lowest street crossection	
East Feliciana Parish		✓	✓	Self				Pre/Post 10 Year (standard practice)				Study	2	
Clinton														
Jackson				Self								Study	1	

TABLE 2-16: ORDINANCE AND CODE COMPARISON FOR ARBC PARISHES AND COMMUNITIES

ORDINANCE AND CODE COMPARISON														
Entity	**CRS Rating**	**Comprehensive Plan**	**Zoning/ Land Use**	**Review Entity**	**Floodplain Preservation**	**Requirements for DIS**	**Storm Analysis**	**Detention Requirements**	**Fill Mitigation**	**Compensatory Storage Requirement**	**Hazardous Material Stoarge Restriction**	**Floodway Restrictions**	**FFE above BFE**	**Roadway Elevation**
Slaughter			✓	Self		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	100			Study to show no adverse impact		Study	1.5	18" below BFE or 1' above 50 year (whichever is greater)
Iberville Parish		✓		Self		All Development other than Single family Residential and Dev additions or modifications with less than 10% increase in impervious surface on-site.	10, 100					Study	1	
St. Gabriel			✓	Self									0	
Livingston Parish	10	✓		Self		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	5, 10, 25, 100	20% reduction (5, 10, 25 and 100 year)	✓	1:1	Yes	Study	2	Above 10 year design storm elevation
Denham Springs	7		✓	Self		-	-	None				Study	2	
French Settlement	10			Parish		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	10, 25, 100	20% reduction (10, 25 and 100 year)				Study	1	Above 10 year design storm elevation
Town of Livingston				Self								Study	1	
Port Vincent	10			Parish		All Development other than Single family Residential and Dev less than 20% impervious surface on-site and Dev additions or modifications with less than 10% increase in impervious.	10, 25, 100	20% reduction (10, 25 and 100 year)				Study	1	Above 10 year design storm elevation
Walker	7		✓	Self		All Development other than Single Family	25	Pre/Post 25 Year	✓	2' allowed (anything more requires a DIS or 1:1)	Yes	Study	1	
St. James Parish	8	✓	✓	Self		Solar Farm	Not specified	Pre /Post (no storm specified)				Study	1	
Gramercy			✓	Self		-	-	None				Study	0	
Lutcher	8		✓	Self		-	-	None				Study	0	

Fill Mitigation and Elevation Standards

Elevation standards and fill mitigation are vital in preventing the unintended consequences of land modifications, such as redirecting floodwaters and/or creating elevated surfaces that worsen flood risks for neighboring areas.

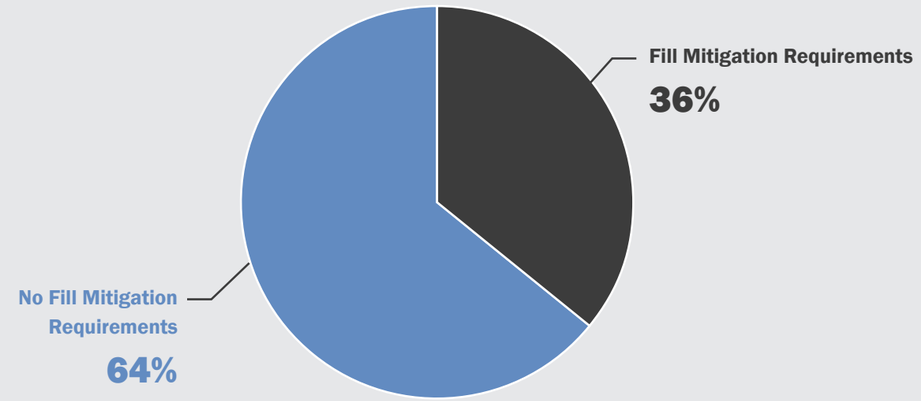
FINDINGS

- Ascension Parish, East Baton Rouge Parish, and Livingston Parish have implemented proactive flood management measures, including strict fill limits. Ascension Parish has further strengthened its approach by requiring finished floor elevations (FFE) to be set at least two feet above base flood elevations (BFE). These practices provide essential safeguards against flood risks, particularly in low-lying areas, and offer enhanced protection against rising water levels.

Ascension Parish, East Baton Rouge Parish, and Livingston Parish have effective fill mitigation and elevation standards that serve as a model for flood risk management.

- The Louisiana Administrative Code Title 17 now mandates that the finished floor elevation (FFE) of new and substantially improved residential buildings be at least one foot above the base flood elevation (BFE), following ASCE-24 standards. While this requirement is adhered to as state law, many entities have yet to formalize it through local ordinances. To ensure uniform enforcement and maximize flood resilience, it is strongly recommended that all entities update their ordinances to reflect this requirement.
- Communities have the opportunity to strengthen their flood resilience by adopting enhanced fill and elevation standards. These measures provide an effective way to reduce flood risks, offering greater protection for both new developments and existing structures while fostering safer, more sustainable growth.

COMMUNITIES WITH FILL REGULATIONS



Floodplain Preservation

Natural floodplains play a crucial role in flood mitigation by absorbing and slowing the flow of floodwaters. Preserving these areas not only reduces downstream impacts but also enhances ecological resilience.

FINDINGS

- Currently, no communities within the Amite River Basin appear to enforce robust floodplain preservation policies. While some communities require studies and fill mitigation to offset developmental impacts, they stop short of mandating that portions of the floodplain be reserved in their natural state. This gap presents a significant opportunity for improvement. By implementing more effective floodplain preservation strategies, these communities could greatly enhance their capacity to absorb and manage floodwaters, reducing risks downstream and protecting natural water ecosystems.

There is an opportunity for communities in the Amite River Basin to adopt robust floodplain preservation policies, presenting a major opportunity for flood risk mitigation.

Opportunities for Improvement

While many communities have taken positive steps toward flood risk management, there are clear opportunities to enhance policies and practices, creating a unified and comprehensive flood mitigation strategy across the region.

FINDINGS

- Many communities in the Amite River Basin could see immediate benefits from adopting more stringent stormwater management and fill mitigation standards. This would not only contribute to improving CRS ratings, leading to reduced flood insurance premiums, but also provide a safer, more sustainable living environment for their residents.
- Many smaller or less regulated communities are well-positioned for policy advancements. Implementing comprehensive zoning regulations and proactive stormwater management strategies can provide a strong foundation for sustainable growth while greatly enhancing their capacity to manage and mitigate flood risks.

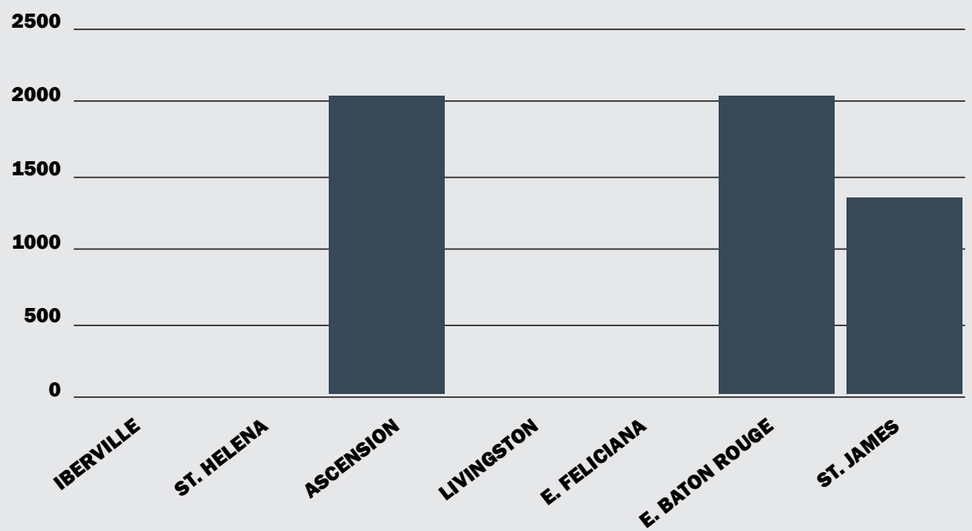
General Trend: Larger Communities Have More Proactive Flood Codes and Policies

Larger, urbanized communities tend to have more resources at their disposal for flood management, enabling them to enact more comprehensive regulations and engage in more detailed planning efforts.

FINDINGS

- East Baton Rouge Parish is a shining example of the benefits that come with a proactive approach to flood management. Through a combination of stringent regulations, comprehensive planning, and community engagement, they have not only improved public safety but also reduced flood insurance costs for residents by enhancing their CRS rating. As of 03/2025, East Baton Rouge has a CRS rating of 6, resulting in a 20% premium reduction on flood insurance.
- Smaller, rural areas often face challenges due to limited resources, leaving them more vulnerable to flood risks. With increased support and guidance from the Amite River Basin Commission (ARBC), these communities could bridge resource gaps and implement effective flood management practices, fostering greater equity in resilience across both urban and rural areas.

CRS TOTAL ACTIVITY POINTS BY PARISH



Plan and Code Assessment Summary

A review of flood management strategies across the Amite River Basin highlights important differences in policy and implementation. Larger, well-resourced communities like Ascension Parish and East Baton Rouge Parish illustrate the benefits of proactive planning, effective zoning, and comprehensive stormwater regulations, which contribute to greater flood resilience and safety. Smaller or less-regulated communities, while facing unique challenges due to limited resources, have significant opportunities to strengthen their flood management efforts. With additional support and guidance from the ARBC, these communities can build on their existing strengths and enhance resilience across the entire region.

Actionable Insight: There is a clear need for a coordinated approach to flood risk management across all communities in the Amite River Basin to ensure a do-no-harm approach.

By learning from successful models in proactive parishes, under-resourced areas can improve their flood resilience, ensuring a safer future for all residents as flood risks increase with climate change.

2.6 WETLAND MITIGATION BANK CONSERVATION

Compensatory Wetland Mitigation Banking History and Background

Compensatory Wetland Mitigation Banking is a system designed to compensate for environmental impacts—typically from development projects—by restoring, creating, or enhancing wetlands, streams, or other habitats to compensate for losses due to permitted activities. In 1995, USACE, EPA, NRCS, the USFWS, and NOAA issued guidance titled “Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks,” which formally recognized mitigation banking as a method for compensating for wetlands lost due to development. The goal is to ensure that any loss of ecological function in one area is balanced by an equivalent or greater ecological gain in another. Credits derived from the ecological benefits associated with a mitigation bank may be used as compensatory mitigation for unavoidable permitted impacts to waters of the United States, including wetlands, that result from activities authorized under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. Any potential compensatory mitigation bank must be approved by USACE and other state and federal agencies. Mitigation banks improve and/or create large areas of wetlands, and credits are sold to applicants who request permits to impact wetlands.

95% of acreage in the Spanish Lake/Bluff Swamp sub basin is listed as a wetland mitigation bank in perpetuity.

TO LEARN MORE ABOUT...

the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks, please visit: https://www.epa.gov/cwa-404/federal-guidance-establishment-use-and-operation-mitigation-banks

OR SCAN THE QR CODE BELOW

Mitigation banking involves several key processes to offset unavoidable environmental impacts:

To create a mitigation bank, a sponsor must purchase land to rehabilitate and create ecological habitats in designated areas, often on degraded land, to enhance ecological function.

Prior to a bank being able to generate “credits”, the bank must be approved by Regulatory agencies to ensure the bank meets specific environmental standards.

Once approved by the reviewing Agencies, the bank can begin generating credits, each credit represents a specific unit of ecological function, such as acres of wetlands or linear feet of restored streams.

Developers needing to mitigate their environmental impacts can purchase these credits, making the process more efficient and cost-effective than creating on-site mitigation.

Additionally, these banks require long-term management and financing plans to guarantee the ongoing success of the restored habitats and the generation of available credits.

The key to compensatory mitigation is to generate credits by improving the ecological value of the parcel. Therefore, optimal parcels are not typically used as mitigation banks, as they do not generate much potential for credits due to the lack of need for improvement. For example, a functional wet bottomland hardwood forest with primarily native vegetation does not offer much potential for improvement and therefore does not offer much credit generation potential. In contrast, a severely degraded, altered, and drained relic bottomland hardwood forest that has become infiltrated with exotic and nuisance vegetation (such as a commercial pine plantation, or soybean field) may offer high restoration and credit potential due to its ability to be restored.

ARBC Wetland Mitigation Banking Evaluation Along the CRDC Servitude

The ARBC owns several hundred acres of land acquired for the construction and right of way for the Comite River Diversion Canal project that may have the potential to be converted into a compensatory mitigation bank (Figure 2-58). These parcels were generally purchased whole without subdividing along the needed right of way creating excess property. Such a bank could potentially generate salable credits which could be used as an additional income source for ARBC while further enhancing the environment quality of the Amite River Basin.

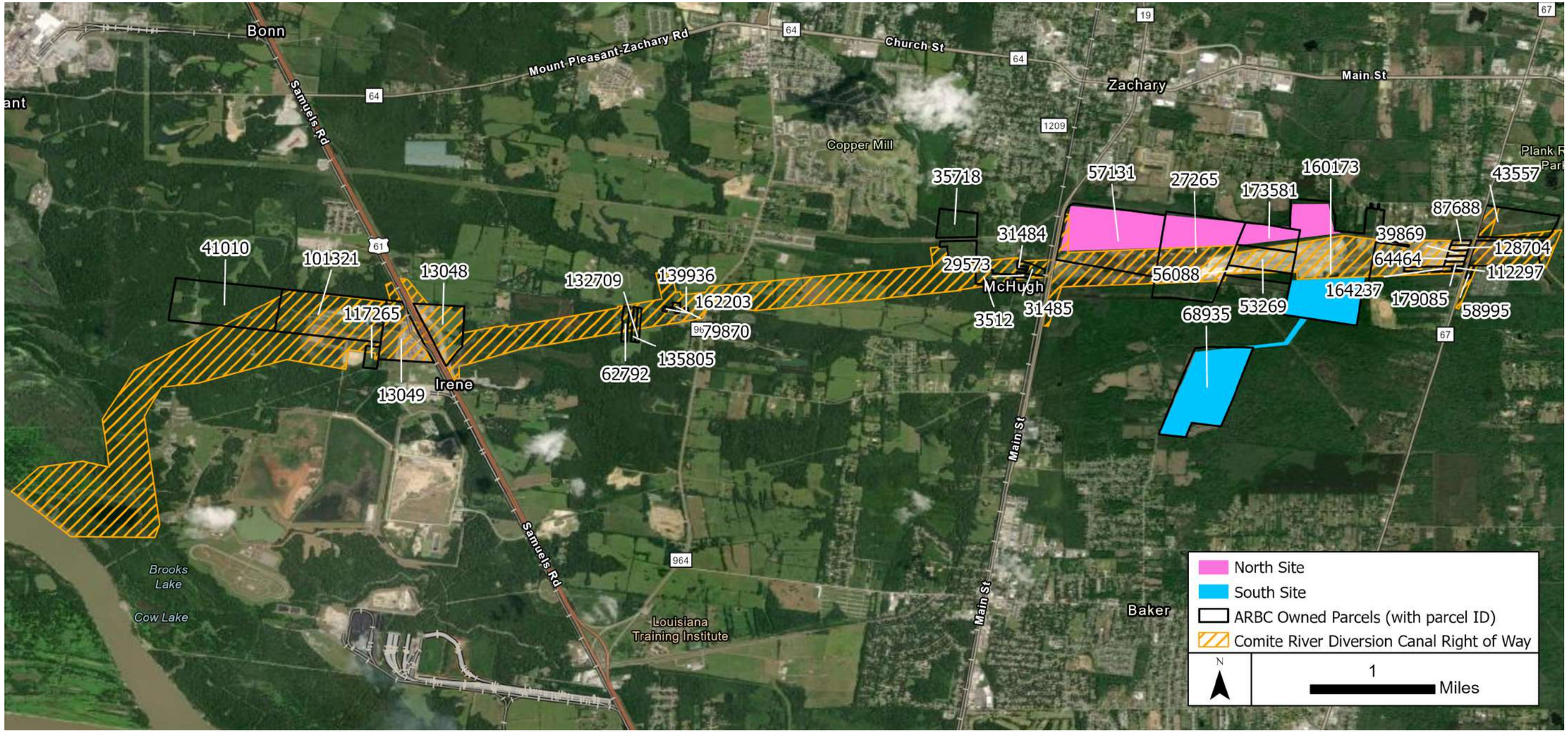


FIGURE 2-58: ARBC OWNED PARCELS IN THE COMITE RIVER DIVERSION RIGHT OF WAY (SOURCE: ARBC)

The ARBC is interested in maintaining the ecological integrity and any potential cultural resources of commission-owned parcels while also facilitating a sustainable level of development and mitigation potential for the region. The following tasks and evaluations were conducted to determine if certain properties would be at an advantage of pursuing the track of mitigation banking:

TASK A

Conduct an initial feasibility assessment on two areas of ARBC-owned properties to establish a relative baseline of ecological health;

TASK B

Conduct an ecological assessment to determine habitat regime and value of potential credits; and

TASK C

Consider existing mitigation banks within the same watershed basin to determine current credit availability and potential credit sales competition

Preliminary meetings with USACE regulatory staff to discuss the potential mitigation sites and permitting efforts were conducted. To summarize the effort, a feasibility determination and deliverable complete with an anticipated timeline, projected composite cost calculations, and a chronological path forward for implementation was created.

Analysis of publicly available data, utilization of GIS mapping, and remote sensing to analyze spatial data was conducted. This analysis included topography, hydrology, and vegetative data to characterize the habitat regime and establish a baseline of ecological health of potential mitigation banking sites owned by ARBC. Site selection for mitigation bank suitability is determined by assessing the characteristics of the various parcels, as well as any proposed bank's potential geographic service area, estimated amount of regional CWA Section 404 permit activity, and the estimated potential value of any potential credits.

The primary assessment characteristics used to determine land's mitigation suitability are those that relate to the physical habitat condition of the land and surrounding area:

FIGURE 2-59: AERIAL VIEW OF BOTTOMLAND HARDWOOD WITHIN THE EVALUATED PARCELS ADJACENT TO THE COMITE RIVERS DIVERSION (PHOTO SOURCE: ARBC)

FIGURE 2-60: DEPICTION OF NATURALLY OCCURRING WETLAND HYDROLOGY WITHIN AN ARBC PARCEL (PHOTO SOURCE: ARBC)

Hydrologic Characteristics

ARBC parcels were assessed for their existing hydrologic capacity, soil composition, and drainage features. This assessment included the evaluation of the current state of drainage patterns, any hydrological indicators, soil characteristics, and any thing that may be causing an interruption of natural flow. The ideal hydrologic regime of a restored wetland mitigation bank should feature a natural drainage pattern of naturally occurring surface sheet flow with minimal anthropogenic interruptions or channelization by hydrology-altering features (such as culverts, ditches, roads, etc. that alter surface flow) and consist of primarily wetland soil types. The evaluation also accounted for what necessary alteration would need to occur to allow for the parcel to generate mitigation credits.

Ecological Value

The ecological value of ARBC parcels were examined by assessing the existing vegetative community. Optimal restored wetland mitigation bank conditions are a canopy dominated by appropriate native vegetation with native mid-story and ground-cover present. The ARBC-owned parcels exhibit vegetative characteristics of Bottomland Hardwood Forests (BLH). BLH forests are fluctuating water level ecosystems characterized and maintained by a natural hydrologic regime of alternating wet and dry periods, dominated by mast-producing wet hardwood species. These forests are important to the surrounding community for maintenance of water quality, providing productive habitat for distinct assemblages of plants and animals, and the regulation of flooding and stream recharge.

Regulatory Considerations

Credits derived from the ecological benefits associated with a mitigation bank may be used as compensatory mitigation for unavoidable permitted impacts to waters of the United States, including wetlands, that result from activities authorized under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Any potential compensatory mitigation bank must be approved by the US Army Corps of Engineers (USACE) and other state and federal agencies. The process for bank approval can take over two years from the initial submittal and involves the creation of a Mitigation Banking Instrument which stands as the binding agreement under which the bank effort is undertaken. Regulatory considerations will include the likelihood of successful restoration, the sustainability and hydrologic management needs for the bank, the value of the restoration work in credits, the general need for mitigation banks in the general region (service area), and the details of the work proposed to affect the restoration. For the New Orleans District of the USACE, the functional minimum for establishment of a mitigation bank is 100 acres. For this Master Plan, USACE will be the permitting agency for the bank creation and operation and determines the constraints under which the bank will exist and the performance standards that will attach.

Potential Costs

The three primary expenses associated with mitigation banks are administration (initial establishment expenses plus ongoing management), construction (including engineering and design), and monitoring. Table 2-17 includes a breakdown of each estimated expense based on the construction and management of a hypothetical 100-ac bottomland hardwood site over the course of a 20-year period.

TABLE 2-17: BREAKDOWN OF POTENTIAL MITIGATION BANK COSTS FOR A HYPOTHETICAL 100-AC BOTTOMLAND HARDWOOD SITE OVER THE COURSE OF A 20-YEAR PERIOD

Expense	Cost	Notes
Administration (Proposal/IRT Review/Approval)	$250,000	Approximate one-time expense
Administration (Ongoing Management)	$300,000	Approximate 20-year total
Construction	$10,000,000	Based on 100-ac Site
Monitoring	$500,000	Approximate 20-year total
20-Year Estimated Total:	**$11,050,000**	

It should be noted that overall expenses associated with establishing and the perpetual operation and maintenance of a mitigation bank long term could potentially equal or outweigh the profitable credit sales.

ARBC Mitigation Parcel Evaluation and Determination

As a result of this preliminary analysis of all the parcels, two large sites meeting the 100-acre criteria composed of multiple parcels were selected for further evaluation, and these two evaluations are summarized below and discussed in more detail in the Supplements.

NORTH SITE:

The North Site consists primarily of forested areas located due north of the Comite River Diversion Right of Way (ROW) and includes parcels 57131, 27265, 173581, 160173. Hydric wetland soils are present with the exception of upland areas interspersed throughout the site that possess non-hydric soils. The North Site is comprised of approximately 346-ac in total, with large upland areas.

SOUTH SITE:

The South Site consists primarily of forest and farmland located due south of the Comite River Diversion ROW and includes parcels 68935, 164237. Most of the site is at elevations that are not characteristic of typical wetland mitigation bank habitats. The site includes several upland ridge-like areas with low lying sloughs interspersed throughout. The existing forested areas observed consisted predominantly of old growth trees possessing dense overstory in relatively healthy condition. However, the survey indicated the vegetation regime across the South Site to be largely dominated by invasive Chinese tallow.

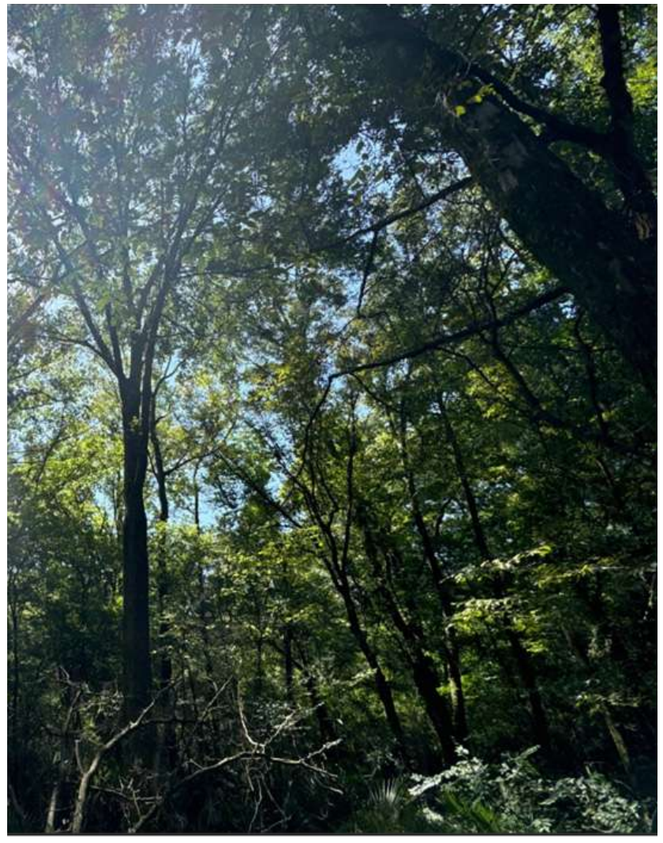


FIGURE 2-61: EXAMPLE OF HIGH QUALITY BLH HABITAT EXISTING WITHIN ARBC-OWNED PROPERTIES (PHOTO SOURCE: ARBC)

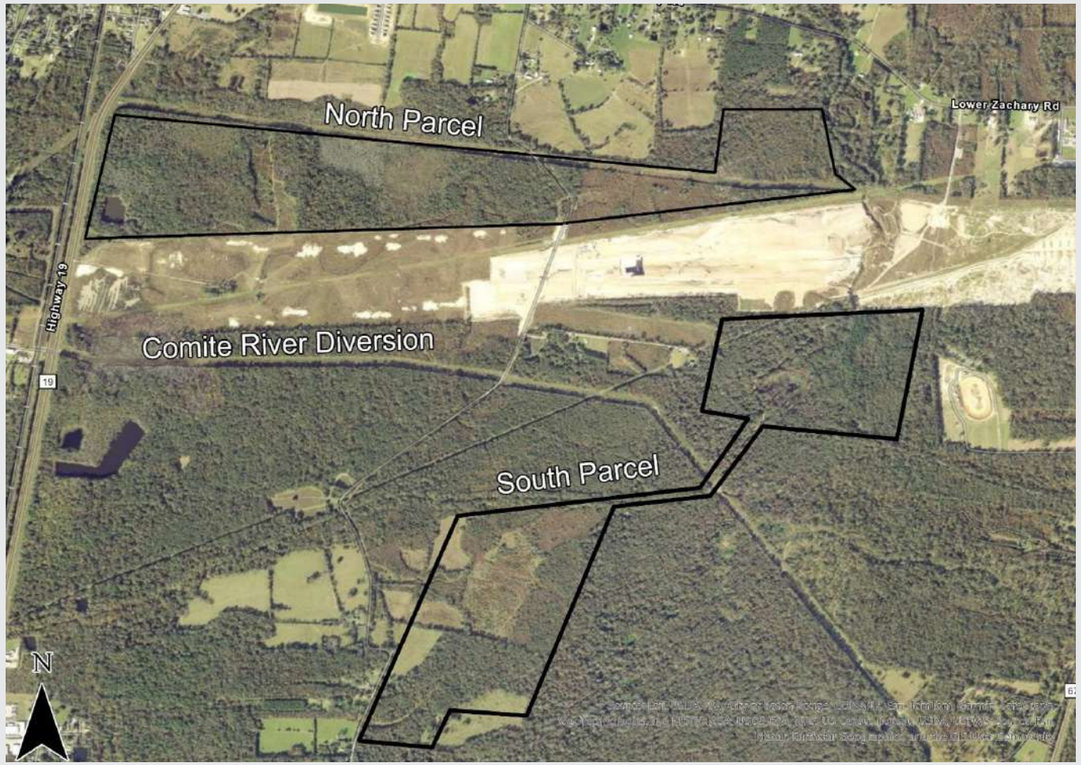


FIGURE 2-62: AERIAL VIEW OF THE 2 SITES SELECTED FOR FURTHER EVALUATION (SOURCE: ARBC)

While nearly all ARBC-owned parcels have been influenced by anthropogenic development and surface drainage work, to some extent, the existing wetlands found throughout both sites are fairly intact and functional. The majority of the wetlands on-site consist of moderately functional BLH forest, and are not sufficiently degraded to the degree that restoration efforts would not be expected to generate enough credits to make the restoration and enhancement work feasible. Moreover, the two sites evaluated do not possess enough existing wetland acreage for a wetland mitigation bank to be sustainable in the long term. Given the lack of ecological lift, additional challenges become more prominent, including securing the initial funding to cover the costs of establishing and financially guaranteeing the mitigation bank, the physical development and construction of the site (thereby making credits available), and the 50-year maintenance and monitoring of the site in the long-term.

In the near-term, initial construction and establishment costs associated with mitigation banking can be significant (as depicted in Table 2-17) and it could take years before revenue from credit sale transactions would be collected to recuperate those expenditures.

Review of ARBC parcels purchased for the construction and right of way of the Comite River Diversion Canal identified that these areas already contained large areas of high quality, functional bottom land hardwood wetlands demonstrating the need to protect these critical natural resources.

Alternative Conservation Efforts

As an additional consideration, other potential conservation or natural resource focused uses for ARBC-owned properties or other areas in the basin were evaluated for the potential to satisfy the ARBC's goal of maintaining the integrity of the Master Plan. Flood control, recreation, conservation, and habitat improvement are all potential uses that fit within ARBC's goals for basin management and could be implemented in some form on several parcels.

FIGURE 2-63: EXAMPLE OF NATURE TRAIL ON ARBC-LAND THAT COULD BE MAINTAINED AS A PATH FOR RECREATIONAL HIKING AND BIRD WATCHING (PHOTO SOURCE: ARBC)

There are some concepts that require further investigation as they could provide potential flood control and ecological improvements along the river, and in some cases may provide a limited source of revenue. Some provide the potential for basin wide benefit. Uses focusing on restoring abandoned sand and gravel mines in the flood plain, forestry practices involving commercial timber leases and/or carbon offset credits, citizen-focused recreational uses such as kayaking or passive recreation, hunting and fishing opportunities, and other uses consistent with flood management were investigated.

Louisiana Coastal Protection and Restoration Authority (CPRA)

The CPRA's Coastal Master Plan prioritizes projects aimed at reducing flood risk and building resilience to future storms and rising sea levels. The Deepwater Horizon Disaster's settlement will help fund restoration projects contained in the Coastal Master Plan through approximately 2031. Other important sources of funding include: Gulf of Mexico Energy and Security Act (GOMESA), Water Resource Development Act (WRDA), Coastal Protection & Restoration (CPR) trust Fund, Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), State Capital Outlay funds, disaster-based funding, and grants to support implementation.

CPRA manages several programs aimed at flood protection and coastal resilience in Louisiana, especially along the coastal and delta regions that are highly vulnerable to flooding. These programs include:

- **Coastal Master Plan Projects:** CPRA administers funding for large-scale projects aimed at reducing flood risks along Louisiana's coastline, such as levees, marsh restoration, and other storm protection efforts.
- **Flood Risk Reduction Programs:** CPRA funds efforts to elevate properties in flood-prone areas and restore natural systems (e.g., wetlands) that act as natural buffers to flooding. The CPRA implemented the Amite River Diversion Canal modification project (PO-142) which focused on restoring hydrologic connectivity and reducing impoundments for the freshwater swamp habitat adjacent to the Amite River Diversion Canal. The project involved vegetative plantings, the construction of gaps in the dredged material berms found along the Amite River Diversion Canal, and the connection of these gaps and the interior swamp through the construction of conveyance channels.
- **Surplus funding:** CPRA is granted surplus funding for protection and restoration projects through the Parish Matching Program. This program supports the implementation of projects that address the goals and objectives of the Master Plan and facilitate collaboration with parishes. Projects that are shovel ready typically receive priority.

FIGURE 2-64: AMITE RIVER DIVERSION CANAL MODIFICATION PROJECT (PO-142) FUNDED BY CPRA (PHOTO SOURCE: ARBC)

Louisiana Waterworks Association (LWA) & Local Programs

For smaller municipalities or local organizations within the ARBC, the Louisiana Waterworks Association and various local flood control and drainage districts may offer funding or technical assistance to improve flood control systems, particularly in areas where infrastructure needs to be upgraded to handle more frequent or severe flooding events.

State of Louisiana, Capital Outlay

Louisiana Office of Facility Planning and Control, Capital Outlay Section prepares the proposed state construction program which is submitted to the Louisiana Legislature annually. Known as the capital outlay bill, the document includes state and some local projects financed with state and federal funds as well as state general obligation bonds and fees and self-generated revenues. The Capital Outlay Act includes projects that have been proposed, reviewed, and evaluated in accordance with constitutional and statutory provisions and excludes any project deemed not feasible after evaluation.

The legislature conducts hearings on the proposed plan and makes changes as it moves through the legislative process. After its enactment, the Capital Outlay Section reviews legislative changes and prepares the governor's veto messages (if any).

Capital Outlay funds are typically used for projects that provide benefits over an extended period.

State Appropriations

Refers to the allocation of funds by a state government for specific purposes within its budget. These funds are typically earmarked for specific programs, projects, or departments, and they represent the legal authorization by the state legislature for the expenditure of public money.

TO LEARN MORE ABOUT...

the Capital Outlay, please visit:
https://www.doa.la.gov/doa/fpc/capital-outlay/

OR SCAN THE QR CODE BELOW

In the context of state government finance, appropriations are a crucial part of the budget process and are typically divided into different categories based on the nature of the spending, such as operating expenses, capital expenditures, or specific program funding.

Nonpoint Source (NPS) Pollution Program

The Louisiana Nonpoint Source (NPS) Pollution Program is managed by the Louisiana Department of Environmental Quality (LDEQ) and is a collaborative effort that includes many partners. NPS is a type of water pollution that is not generated from a discrete conveyance, such as a discharge pipe, but is generated during rainfall events. NPS pollution is the largest remaining type of water pollution that needs to be addressed within Louisiana and across the nation to restore the designated uses to the impaired water bodies. Section 319 of the Clean Water Act (CWA) required that the states develop a NPS Management Plan to reduce and control non-point sources of pollution from the various types of land uses that contribute to water quality problems across the United States. Some of these categories can also be defined as point source discharges and may require a storm water permit. Louisiana determined that agriculture, forestry, urban runoff, home sewage systems, sand and gravel mining, construction, and hydromodification all contribute to NPS pollution problems across the state.

The State of Louisiana has applied for and is receiving Section 319 funding to implement both statewide and watershed projects to address NPS pollution. The goal is to educate the public about NPS pollution and Best Management Practices (BMPs) that can be implemented to reduce and control this type of pollution.

Federal Funding Sources

There are numerous federal programs that support flood prevention, infrastructure, and recovery. Through different federal agencies and programs. Some of the key federal funding sources include:

FEMA Programs

FEMA HAZARD MITIGATION ASSISTANCE PROGRAMS

- **Flood Mitigation Assistance (FMA) Program:** Provides funding to state and local governments to implement flood mitigation measures that reduce the long-term risk of flood damage. This is non-disaster, nationally competitive, annual funding. The specific funding amount varies annually. The focus is on reducing the number of properties in the SFHA, so it includes activities such as flood studies, property buyouts, and elevation of homes. These funds can be used for:
  - Property buyouts and relocations to reduce future flood exposure.
  - Flood control measures, such as levees, flood walls, and drainage systems.
  - Elevation of homes or structures to keep them above flood levels.
  - Floodplain mapping and planning to identify and address at-risk areas.

TO LEARN MORE ABOUT...

the FEMA's Flood Mitigation Assistance Grant Program, please visit:
https://www.fema.gov/grants/mitigation/learn/flood-mitigation-assistance

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- **Building Resilient Infrastructure and Communities (BRIC):** Formerly the Pre-Disaster Mitigation (PDM) Program, it provides grants for state and local governments to develop and implement mitigation strategies to reduce flood risk. This is non-disaster, nationally competitive, annual funding. The specific funding amount varies annually. The BRIC program provides funding for flood mitigation efforts, including:
  - Community-level mitigation projects, like flood risk assessments, early warning systems, and resilient infrastructure.
  - Planning grants to help local governments develop mitigation strategies and plans for reducing flood risks.

This program encourages states and local communities to focus on pre-disaster mitigation, so the funds can be used for planning, hazard mapping, and mitigation projects that prevent future flood damage.

TO LEARN MORE ABOUT...

the Building Resilient Infrastructure and Communities Program, please visit:
https://www.fema.gov/grants/mitigation/learn/building-resilient-infrastructure-communities

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- **Hazard Mitigation Grant Program (HMGP):** This program helps fund projects designed to reduce the loss of life and property in future disasters. This is post-disaster funding which is activated following a major disaster declaration. The amount of funding allocated is typically 15 percent of total disaster assistance received (20% if the state has an approved Enhanced State Mitigation Plan). This program can provide funds to support flood resilience projects, scoping and planning efforts. Funding is allocated in accordance with state and local hazard mitigation plans.

TO LEARN MORE ABOUT...

the FEMA's Hazard Mitigation Grant Program, please visit:
https://www.fema.gov/grants/mitigation/learn/hazard-mitigation

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- **Flood Mitigation Assistance Swift Current:** Provides funding after a major disaster declaration for flood to reduce the number of NFIP residential properties. Specifically, it is designed to streamline funding for mitigation during the recovery process at a 75% federal cost share. It is only available for properties with an NFIP policy that are NFIP-defined Repetitive Loss, Severe Repetitive Loss, or Substantially Damaged.

  This funding can be used for:
  - Property acquisition and structure demolition/relocation
  - Structure elevations
  - Dry flood-proofing of historic residential structures or non-residential structures
  - Non-structural retrofitting of existing structures and facilities
  - Mitigation reconstruction
  - Structural retrofitting of existing structures

  This funding source was made available through the Infrastructure Investment and Jobs Act and is currently applicable to major disaster declarations between June 1, 2024 and May 31, 2025.

- **Safeguarding Tomorrow Revolving Loan Fund (RLF) Program (STORM):** This funding source allows states to capitalize a RLF to reduce natural hazard risk including flooding. States can apply annually for funding through FEMA. There is flexibility in how states use their funds, but they must allow low interest loans (no more than 1%). GOHSEP manages STORM for Louisiana, which has nearly $20 million in capitalization funds (from FY23 and FY24). Local governments can apply STORM project loans up to $5 million.
- **Pre-Disaster Mitigation (PDM) Congressionally Directed Spending (CDS):** Formerly known as Legislative PDM, this projects funds shovel ready projects and project scoping activities. In FY2024, there was nearly $200 million available for CDS projects.

OTHER FEMA PROGRAMS

- **Public Assistance Technical Assistance Contract (PA-TAC):** This funding provides post-disaster recovery support following major disaster declarations. It is intended to repair community infrastructures such as roads, bridges, water control facilities, public buildings, and public utilities. Typically, the cost share is 75% federal, though the President has the authority to adjust or eliminate the non-federal cost share.
- **PA-TAC 406 Mitigation :** This funding is part of the PA-TAC program and provides funding specifically to integrate hazard mitigation measures into PA-TAC repair projects. The cost share follows the public assistance disaster guidelines, though 406 projects must also be cost-effective by FEMA definitions.

NATURAL RESOURCES CONSERVATION SERVICE

- **Emergency Watershed Protection (EWP) Program:** The EWP Program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms and other natural disasters that impair a watershed. EWP does not require a disaster declaration by federal or state government officials for program assistance to begin. The NRCS State Conservationist can declare a local watershed emergency and initiate EWP program assistance in cooperation with an eligible sponsor (see the Eligibility section below). NRCS will not provide funding for activities undertaken by a sponsor prior to the signing of a cooperative agreement between NRCS and the sponsor.

- Remove debris from stream channels, road culverts and bridges.
- Reshape and protect eroded stream banks.
- Correct damaged or destroyed drainage facilities.
- Establish vegetative cover on critically eroding lands.
- Repair levees and structures.
- Repair certain conservation practices.
- Purchase of EWP Buyouts.

FIGURE 2-65: SEVERAL ARBC COMMUNITIES HAVE SUCCESSFULLY RECEIVED EWP GRANTS TO HELP WITH POST-DISASTER WATERWAY DEBRIS REMOVAL TO HELP RECOVER FROM DISASTERS INCLUDING HURRICANE IDA IN 2021 (PHOTO SOURCE: ELOS ENVIRONMENTAL)

TO LEARN MORE ABOUT...

the Emergency Watershed Protection Program, please visit:
https://www.nrcs.usda.gov/programs-initiatives/ewp-emergency-watershed-protection

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- **Watershed Protection and Flood Prevention (WFPO) Program:** The WFPO Program helps units of federal, state, local and federally recognized tribal governments (project sponsors) protect and restore watersheds. Project sponsors initiate a request for assistance through their local NRCS office to develop a preliminary feasibility study which helps communities consider sustainable climate resilient solutions to address watershed resource concerns. After a feasibility study is conducted, a watershed plan is chosen, reviewed, approved, and authorized. Once authorized, projects sponsors gain access to NRCS's financial and technical resources to help implement their plan.

TO LEARN MORE ABOUT...

the Watershed Protection and Flood Prevention Operations (WFPO) Program, please visit:
https://www.nrcs.usda.gov/programs-initiatives/watershed-protection-and-flood-prevention-operations-wfpo-program

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U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

- **Community Development Block Grant (CDBG) Mitigation Program - MIT:** Administered by the U.S. Department of Housing and Urban Development (HUD), the CDBG program can provide grants to local governments for disaster recovery and mitigation efforts, including flood control infrastructure. Local governments, states, and territories receive CDBG funds based on a statutory formula. The program targets areas with a high percentage of low- and moderate-income residents. LWI coordinates funding with several agencies OCD being one of the agencies. OCD oversees disaster mitigation and recovery programs funded by federal Community Development Block Grant dollars.
- **Community Development Block Grant – Disaster Recovery (CDBG-DR):** After major disasters like Hurricane Katrina or the 2016 floods, Louisiana has used CDBG-DR funds for flood mitigation projects. These funds may be used for floodplain buyouts, infrastructure improvements, and recovery. CDBG-DR is a (OCD-DRU) administered program. CDBG-DR funds are allocated to areas affected by a declared disaster. These funds are administered through a different set of rules, and the allocation is typically based on the severity of the disaster and the number of individuals affected. More recent disbursements of CDBG-DR have a minimum 15% set aside for mitigation rather the a separate CDBG-MIT grant.

TO LEARN MORE ABOUT...

The Comite River Diversion Canal, please visit:
https://www.mvn.usace.army.mil/About/Projects/Comite-River-Diversion/

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U.S. ARMY CORPS OF ENGINEERS

- **Flood Risk Management Program:** The Corps of Engineers works with local governments to plan and implement large-scale flood protection projects, such as levees, dams, and flood-walls. Funding can come from federal budget appropriations, though local governments may be required to provide a portion of the funding. This program can include:
  - General Investigations
    - Committee on Public Works of the United States Senate – Response to congressional resolution
  - Continuing Authorities Program
    - Section 205 - Flood Risk Management Projects are an essential tool for the U.S. Army Corps of Engineers to address flood risks in smaller or localized areas, providing tailored, cost-effective solutions to protect communities from the devastating impacts of flooding. Some projects include a variety of flood control measures some common features are levees, flood-walls, dams, reservoirs, flood gates, and pumps.
    - Section 206- Flood Risk Management Projects are aimed at restoring or enhancing ecosystems that can play a key role in flood mitigation and resilience. Some projects include wetland restoration, floodplain reconnection, and coastal restoration.
    - Aquatic Ecosystem Restoration Projects (Section 206) are authorized by WRDA, which allows USACE to restore aquatic ecosystems in order to improve water quality, restore habitats, and reduce flood risks.
    - Construction Assistance Program (CAP) Floodplain Management Services (FPMS) is a USACE program aimed at supporting floodplain management and flood risk reduction efforts. The program helps communities at risk of flooding by providing technical assistance and guidance on how to manage and mitigate flood risks effectively within floodplains.
  - Water Resources Development Act
    - Water Resources Development Act (WRDA) is a reference to public laws enacted by Congress to deal with various aspects of water resources: environmental, structural, navigational, flood protection, and hydrology. The Amite River Diversion Canal project, which was authorized by the Water Resources Development Act, goal was to restore acres of degraded swamp in both Ascension and Livingston Parishes.

ENVIRONMENTAL PROTECTION AGENCY (EPA) PROGRAMS

- **Clean Water State Revolving Fund (CWSRF):** While primarily aimed at water quality projects, CWSRF can be used for flood control projects related to stormwater management or other water infrastructure improvements.
- **National Estuary Program:** The National Estuary Program goal is to protect and restore the water quality and resources of estuaries and associated watersheds designated by the EPA Administrator as estuaries of national significance. The 28 estuaries of national significance, or National Estuary Programs, use an ecosystem-based management approach to help achieve their protection and restoration goals.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) PROGRAMS

- **Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Discretionary Grant Program:** The PROTECT program, established through the Bipartisan Infrastructure Law, awards funding for projects that help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure. The program includes four different grant categories with varying cost share and grant caps and will provide $1.4 billion in funding over 5 years.

Through DOTD, Louisiana is currently developing a Comprehensive Transportation Resilience Plan under the FHWA Promoting Resilient Operations for Transformative, Efficient, and Cost- Saving Transportation (PROTECT) Discretionary Grant Program.

The plan will make Louisiana more competitive and reduce state cost share requirements which will increase federal investment in Louisiana transportation projects and address the state's most critical transportation vulnerabilities from natural hazards including flooding.

While this resilience plan pertains to state infrastructure, local transportation assets may also benefit from the best practices and actions of this plan.

FIGURE 2-66: STREET FLOODING IN EAST BATON ROUGE DUE TO A HEAVY RAINFALL EVENT. (PHOTO SOURCE: HNTB 2021)

TO LEARN MORE ABOUT...

the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Grant Program, please visit: https://www.transportation.gov/rural/grant-toolkit/promoting-resilient-operations-transformative-efficient-and-cost-saving

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

- **NOAA Habitat Restoration:** The National Oceanic and Atmospheric Administration's Office of Habitat Conservation will implement the habitat restoration funds through a competitive grants process with the purpose of restoring marine, estuarine, coastal, and Great Lakes ecosystem habitat as well as constructing or protecting ecological features that protect coastal communities from flooding or coastal storms.

Other Funding Sources

PUBLIC-PRIVATE PARTNERSHIPS (P3)

Local governments may engage in public-private partnerships to fund flood mitigation projects. These partnerships often involve a mix of public sector financing (e.g., tax credits, government grants) and private sector investment. Some potential forms of P3 funding include:

- Bond Financing: Local governments can issue bonds to raise capital for large flood control projects. These bonds are paid back over time with interest, and investors may include private companies, banks, or other institutional investors.
- Tax Increment Financing (TIF): In some cases, local governments use TIF district bonds to fund flood control infrastructure. This involves using future property tax revenue increases in a specified area to finance upfront infrastructure investments, including flood control measures.
- Private Investment in Infrastructure: Private companies, particularly in the insurance or infrastructure sectors, may invest in flood risk reduction projects in exchange for long-term financial returns or incentives.

GRANTS AND LOANS FROM NONPROFIT AND ADVOCACY ORGANIZATIONS

In certain circumstances, nonprofit organizations, foundations, or other advocacy groups may provide grants to support flood control projects. These can include:

- Local or Regional Foundations: Some foundations have environmental or disaster relief programs that can fund flood mitigation efforts.
- Environmental Groups: Organizations focused on environmental conservation may offer grants for floodplain restoration or other natural flood mitigation strategies (e.g., wetland restoration).
- Climate Resilience Grants: Some nonprofits or foundations fund projects that improve community resilience to climate change, including flooding due to rising sea levels or changing precipitation patterns.

CROWDFUNDING AND COMMUNITY FUNDRAISING

In some cases, local communities may raise funds through grassroots campaigns or crowdfunding platforms to support smaller-scale flood mitigation efforts, such as riverbank stabilization, community flood preparedness education, or flood-resistant infrastructure for vulnerable populations.

INSURANCE AND RISK FINANCING

While not technically a direct funding source for projects, flood risk insurance and other forms of risk financing can help local governments reduce the financial impact of flooding:

- Catastrophe Bonds: The policyholder receives a pay-out if a disaster reaches a certain threshold, providing quick revenue to the impacted area to help expedite recovery.
- Resilience bonds: Typically create a revenue stream for losses avoided. For example, if a flood wall is built that reduces losses using a resilience bond, the bondholder will issue a rebate (revenue) based on the reduction in losses.
- Flood Insurance Programs: The National Flood Insurance Program (NFIP), managed by FEMA, provides flood insurance to properties in flood-prone areas. Local governments may use flood insurance as part of their overall risk management strategy, helping to reduce the financial burden of future flooding.
- Risk Pooling or Insurance Pool Programs: Some counties or parishes may participate in state-run or multi-jurisdictional insurance pools to finance flood recovery and mitigation costs.

SPECIAL LOAN PROGRAMS

In addition to state revolving loan funds, other specialized loan programs may be available, often through partnerships with local banks or federal agencies. These can include:

- Low-Interest Loans: Programs designed to provide low-interest loans for flood resilience and infrastructure improvements.
- Disaster Recovery Loans: In the aftermath of a declared disaster, loans may be available to support immediate recovery efforts, including flood control projects.

SALE OF EXCESS PROPERTY

- Excess property acquired for the Comite River Diversion Canal could be sold. Those revenues would need to be used exclusively for the Comite River Diversion Canal because of the fact that they were from tax revenues from the Comite River impact area.

2.7 PROJECT COMPILATION

During the development of this Master Plan, existing and new project concepts were identified, and on request of the ARBC Board of Commissioners, were evaluated and included within this plan. At several key milestones, the Master Plan team met with members of the ARBC Board of Commissioners through project workshops to discuss project concepts and inclusion in the Master Plan and perform an evaluation of public interest and perception of each project.

Previous Projects

Since the 1950's, the Amite River Basin has had multiple projects proposed and constructed aimed at flood control and improved conveyance. As previously discussed in Chapter 1, the Amite River and Tributaries Improvements which was completed by USACE in 1964 included construction of the Amite River Diversion Canal and Control Weir which provided a more direct outlet for the Amite River into Lake Maurepas via the Blind River, and upstream channel improvements that included widening, clearing, snagging, and dredging portions of the Amite River, lower Comite River, Blind River, and Bayou Manchac. Between 1953 and 1967, the state and East Baton Rouge made improvements to Ward Creek, Claycut Bayou, Jack's Bayou, Bayou Duplantier, and White Bayou. Other projects, like the Amite River Diversion Canal Modification completed in 2017 have been implemented to restore hydraulic connectivity to adjacent swamps.

Project Needs

As the population of the Amite River Basin continues to grow, there continues to be an increased need to mitigate flood damage, coordinate river management, promote responsible watershed management, and to conserve and restore the unique natural resources in the Amite River Basin watershed. The ARBC has the authority to establish adequate drainage, flood control, and water resource development by constructing reservoirs, diversion canals, gravity and pumped drainage systems, and other flood control works. This section outlines several projects that are in different phases: Under construction, engineering and design, feasibility and planning, and conceptual.

Master Plan Project Inclusions

ARBC Board of Commissioner's Priority Projects Included in this Master Plan

On July 9, 2024, the ARBC board passed a resolution (No. 1180) to submit four (4) flood mitigation projects to the LWI for potential funding that were determined by the board to be top priority projects. These projects have been included in the Master Plan at the request of the ARBC and are listed in Table 2-18.

TABLE 2-18: ARBC BOARD OF COMMISSIONERS PRIORITY PROJECTS

PROJECT NAME	PROJECT LOCATION (PARISH)	LWI BUDGET REQUEST	SUB-RECIPIENT	PROJECT GOALS
Bayou Manchac Channel Improvements and Ward Creek Realignment	Ascension, East Baton Rouge, and Iberville	$30,000,000	East Baton Rouge Parish	Improve conveyance within the Bayou Manchac and Ward Creek basin for portions of Ascension, East Baton Rouge and Iberville parishes.
Lower Amite River Sediment Removal	Ascension, EBR and Livingston	$20,000,000 (Mouth of lake to Highway 22, upstream reaches TBD)	Livingston Parish	Removal of unnatural sediment build up in the Lower Amite River for portions of Ascension, EBR and Livingston Parish.

TABLE 2-18: ARBC BOARD OF COMMISSIONERS PRIORITY PROJECTS (CONT.)

PROJECT NAME	PROJECT LOCATION (PARISH)	LWI BUDGET REQUEST	SUB-RECIPIENT	PROJECT GOALS
New River Stormwater Management Pump Station Project	Ascension	$40,000,000	Ascension Parish	Removal of stormwater runoff from the Amite River Basin directly into the Mississippi River for portions of Ascension and Iberville parishes.
West Shore Connector Levee	St. James	$10,000,000	St. James Parish	Provide protection from wind driven flooding in portions of St. James Parish.

As part of the LWI project evaluation, these projects will be analyzed by the LWI for cost and flood mitigation effectiveness.

Projects Under Construction Included in this Master Plan

Projects that are under construction are important to include within the Master Plan and show progress made on the ground. Some projects will function as stand-alone projects, and some will be dependent on others. For instance, the Laurel Ridge Levee Extension project, being performed by PLD and Ascension Parish, is dependent on the LA-22 Gapping project to offset a rise in water surface elevations. Once complete, the Laurel Ridge Levee Extension project will protect over 8,000 structures in Ascension Parish during the 100-year flood. Another project under construction is the Comite River Diversion Canal which is being constructed by USACE and will remove flood waters from the basin by diverting portions of the Comite River flood flows from northern East Basin Rouge Parish directly into the Mississippi River. Table 2-19 summarizes these projects currently under construction:

TABLE 2-19: PROJECTS UNDER CONSTRUCTION WITHIN THE ARBC GEOGRAPHIC BOUNDARY

PROJECT NAME	PROJECT LOCATION PARISH	PROJECT GOALS
Laurel Ridge Levee Extension	Ascension	Provide protection from riverine and wind driven lake flooding for portions of Ascension Parish.
Comite River Diversion Canal	East Baton Rouge	Removal of stormwater runoff from the Comite River basin directly into the Mississippi River primarily for portions of East Baton Rouge Parish adjacent to the Comite River.

Major Long-Term Conceptual Regional Projects

Included in this Master Plan are three major long-term regional flood control project concepts which included the Darlington Reservoir, as previously identified, and originally studied by USACE in the 1992 Amite River and Tributaries, Darlington Reservoir, Feasibility Study. These projects were included in DOTD's response to 2023 House Resolution 290 (HR 290) which urged DOTD to identify potential detention and retention sites in the Upper Amite River Basin. These three projects were further included in DOTD's response to 2024 Senate Concurrent Resolution 79 (SCR 79) as summarized in Table 2-20 to reflect table below. While each project would have major impacts, only one of these projects would be necessary as part of this plan.

TABLE 2-20: MAJOR LONG-TERM CONCEPTUAL REGIONAL PROJECTS

PROJECT NAME	PROJECT LOCATION	FUNDED	STUDY SPONSOR/ OWNER	STATUS	PROJECT GOALS
Upper Amite Detention (Minor) Site 1	East Feliciana and St. Helena	No	DOTD	Conceptual	The goal of this project is to provide some level of detention of flood discharges in the Upper River reducing downstream flood risk.
Upper Amite Detention (Major) Site 2	East Feliciana and St. Helena	No	DOTD	Conceptual	The goal of this project is to project major detention in the upper Amite River up to the 100-year flood, significantly reducing downstream flood risk.
Upper Amite Detention and Retention (Major) Site 3	East Feliciana and St. Helena	No	DOTD	Conceptual	The goal of this project is to provide major detention and retention in the upper Amite River up to the 100-year flood, significantly reducing downstream flood risk. Additionally, the reservoir would serve as a source for water supply, reducing the dependency on the Southern Hills aquifer.

Additional Projects Included in this Master Plan

There are many projects being developed by parishes, municipalities, drainage districts, or other special districts that are in various stages including concept, feasibility and planning, or engineering and design phase. During the development of this Master Plan, these projects were researched, and with guidance from the ARBC Board of Commissioners, are included in this Master Plan.

Table 2-21 contains projects in addition to the four priority and three major regional projects and those major projects under construction included within the Master Plan on request of the ARBC.

TABLE 2-21: ADDITIONAL PROJECTS INCLUDED IN THIS MASTER PLAN

PROJECT NAME	PROJECT LOCATION	FUNDED	FUNDING PROGRAM	STUDY SPONSOR/ OWNER	STATUS	PROJECT GOALS
Amite River Diversion Canal Weir Rehabilitation	Ascension	Yes	Capital Outlay	PLD	Design	The goal of this project is to restore and stabilize the deteriorating Amite River Diversion Canal Weir, restoring design flows and slowing down deterioration.
Ascension (Sorrento) Storm Surge	Ascension	Partially	Design ($5.4M) Funded by Capital Outlay. Construction is unfunded	Ascension Parish	Design	The goal of this project is to provide additional storm surge protection to the Sorrento area by raising existing levees and constructing new levees to an elevation of 8 feet, as well as constructing two new pump stations one at Bayou Conway and one at Panama Canal.
Bayou Manchac Backflow Prevention Gates	Ascension and East Baton Rouge	No	Unfunded	Undetermined	Conceptual	The goal of this project is to prevent riverine backflow flooding from the Amite River entering Bayou Manchac by only allowing positive easterly flows during potential flooding events.
Bayou Manchac Floodplain Preservation	East Baton Rouge	No	Unfunded	East Baton Rouge	Conceptual	The goal of this project is to preserve the existing floodplain storage along Bayou Fountain and Bayou Manchac. This will ensure that future projects do not negatively impact flood risk.

TABLE 2-21: ADDITIONAL PROJECTS INCLUDED IN THIS MASTER PLAN (CONT.)

PROJECT NAME	PROJECT LOCATION	FUNDED	FUNDING PROGRAM	STUDY SPONSOR/ OWNER	STATUS	PROJECT GOALS
Louisiana Highway 22 Gapping	Ascension	Yes	LWI Round 1 ($42,000,000); Capital Outlay ($6,800,000)	PLD	Under Design	Addresses concerns from Livingston Parish in accordance with a settlement agreement dated 3/22/2021.
Marvin Braud Pump Station/ Levee Elevation Upgrades	Ascension	Partially	HMGP ($37,276,000); Ascension ($19,796,000); Additional ($19,452,000)	Ascension Parish	Under Design (30%)	The goal of this project is to provide a 100-yr level of flood protection from storm surge on Ascension's eastern flank and to meet the levee certification requirements 44 CFR §65.10.
Upper Amite River Flood Risk Reduction and Restoration	East Baton Rouge, East Feliciana, and St. Helena	Partially	($67,000,000) FY2024 Capital Outlay $65M P5 $2M FY2024 State general fund direct (non-recurring)	ARBC	Conceptual	This goal of this project is to restore the natural channel and floodplain function within an unstable reach of the Upper Amite River in the vicinity of sand and gravel operations, reducing flood risk and downstream sediment loads.
Willow Glen Pump Station	Iberville	No	TBD ($71,000,000)	ARBC Master Plan	Conceptual	The goal of this project is to convert the old Entergy Willow Glenn Pump Station into a drainage pump station, pumping water directly into the Mississippi River from the Spanish Lake basin.

2.8 FUNDING SCENARIOS

Revised Statute 38:3306 A(2)(h) tasks the ARBC with, “Identifying, seeking, receiving, and expending federal and other funding for planning and projects.” As a political subdivision of the State of Louisiana, the ARBC is subject to statutes that will allow it to raise funds for the purpose of establishing adequate drainage, flood control, and water resources development in the basin.

Funding will be the primary constraint to the implementation of this Master Plan. The following is a summary of potential funding sources which will be further discussed in Sections 4 and 5 where recommendations will be made to align funding sources to desired activities to promote implementation of both the short- and long-term objectives of the Master Plan.

Local Funding Sources

According to RS 38:3309, the ARBC has the “authority to levy on all property in the district or within the Comite River Diversion Canal impact area for the purpose of providing revenue for drainage purposes.”

The ARBC may use their own revenues to fund flood-related projects. Currently, the ARBC does not generate funding from taxes and only generates revenue from dirt sales. This revenue has been collected since 2019 and will expire in about 2 years. The revenue generated has averaged $232,000 per year.

Other sources of revenue may include:

LOCAL TAXES AND FEES

Property Taxes: R.S. 38:3309 allows the ARBC to implement a temporary (often renewable) property tax to fund flood control efforts. This tax may be levied on all property in the district, or on all property within the Comite River Diversion Canal Impact Area, subject to taxation for drainage purposes. The tax shall not be levied unless the proposition to levy the tax is approved by a majority of the electors of the district, or by a majority of the electors of the Comite River Diversion Canal Impact Area if limited to such area, who vote on the proposition.

New Impact Areas: The commission may establish additional impact areas that would allow taxing for that specific project or location. Creating a such an authority would require legislative change.

Stormwater Utility Fee: A stormwater utility fee is an option that may potentially be implemented as a funding source to improve the quality of life to all residing within the basin. Stormwater utility fees provide an equitable and adequate funding source to regularly improve, inspect, clean, and maintain the parish’s drainage systems and infrastructure. Currently such fees would require a vote of the district residents to implement this program.

Ad Valorem Tax: The ARBC can propose a drainage tax as an Ad-Valorem to provide revenue, as was done for Comite River Diversion Canal Project. The citizens of the Taxing District approved a 10-year, 3 mill drainage tax for a portion of the non-federal match. That millage was renewed for a period of an additional 10 years by a vote of the taxpayers. At the end of the second 10-year term, the ARBC chose not to renew the millage. The millage generated $2.4 million a year at the time the millage expired. Currently ARBC has $8 million in funds which is dedicated for the Comite River Diversion Canal. Because of the language within the tax measure the funds are restricted to this project.

Bonds: Public Improvements Bonds have been established from levied sales tax. Ascension Parish voters approved a one-half of one percent sales tax to use for the Drainage District. East Ascension Drainage District issued bonds for $62 million for major drainage improvements on the East bank of the Parish. One of the projects constructed with these bonds was the Henderson Pump Station project completed in 2014.

FIGURE 2-67: HENDERSON BAYOU PUMPING STATION, LOCATED IN ASCENSION PARISH, RECEIVED PUBLIC IMPROVEMENT BONDS THROUGH A SALES TAX FOR FUNDING (PHOTO SOURCE: ASCENSION PARISH)

FIGURE 2-68: THE COMITE RIVER DIVERSION CANAL PROJECT, SUCCESSFULLY IMPLEMENTED A MILLAGE DRAINAGE TAX FOR THE IMPACT AREA TO HELP FUND PROJECT WHICH WILL PROVIDE URBAN FLOOD DAMAGE REDUCTION (PHOTO SOURCE: USACE)

FEES FOR PERMITS:

- The commission may charge a process fee to applicants wishing to cross right-of-way owned by the Commission. Such as when a utility company desires to directionally drill under commission owned property.
- The commission may charge a fee for land use to applicants wishing to access commission owned property. This may be fee charged to a company wishing to establish a temporary lay down yard for construction purposes.
- The commission may charge a fee for recreational activities on ARBC owned properties.

State Funding

Louisiana has dedicated funds to help local governments with flood control projects. These funds often come with specific eligibility criteria or matching requirements, and the process can vary significantly by state.

DOTD Statewide Flood Control: The state has established a program to assist parishes with flood management through the DOTD. The DOTD Statewide Flood Control (SFC) 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; stormwater detention; flood proofing of structures; regulation of floodplains; relocation assistance; or other structural or non-structural measures. Funds may provide up to 90% of the cost of construction for projects that reduce existing flood risk, do not encourage additional development in flood-prone areas, do not increase upstream or downstream flooding and have a total construction cost of $100,000 or more. Recently, Ascension Parish was awarded two SFC grants; one for channel improvements and detention in Welsh Gully, and one for channel improvements in Henderson bayou. Both of these SFC grants will provide drainage improvements.

TO LEARN MORE ABOUT...

the Statewide Flood Control Program, please visit:
http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Public_Works/Flood_Control/Pages/default.aspx

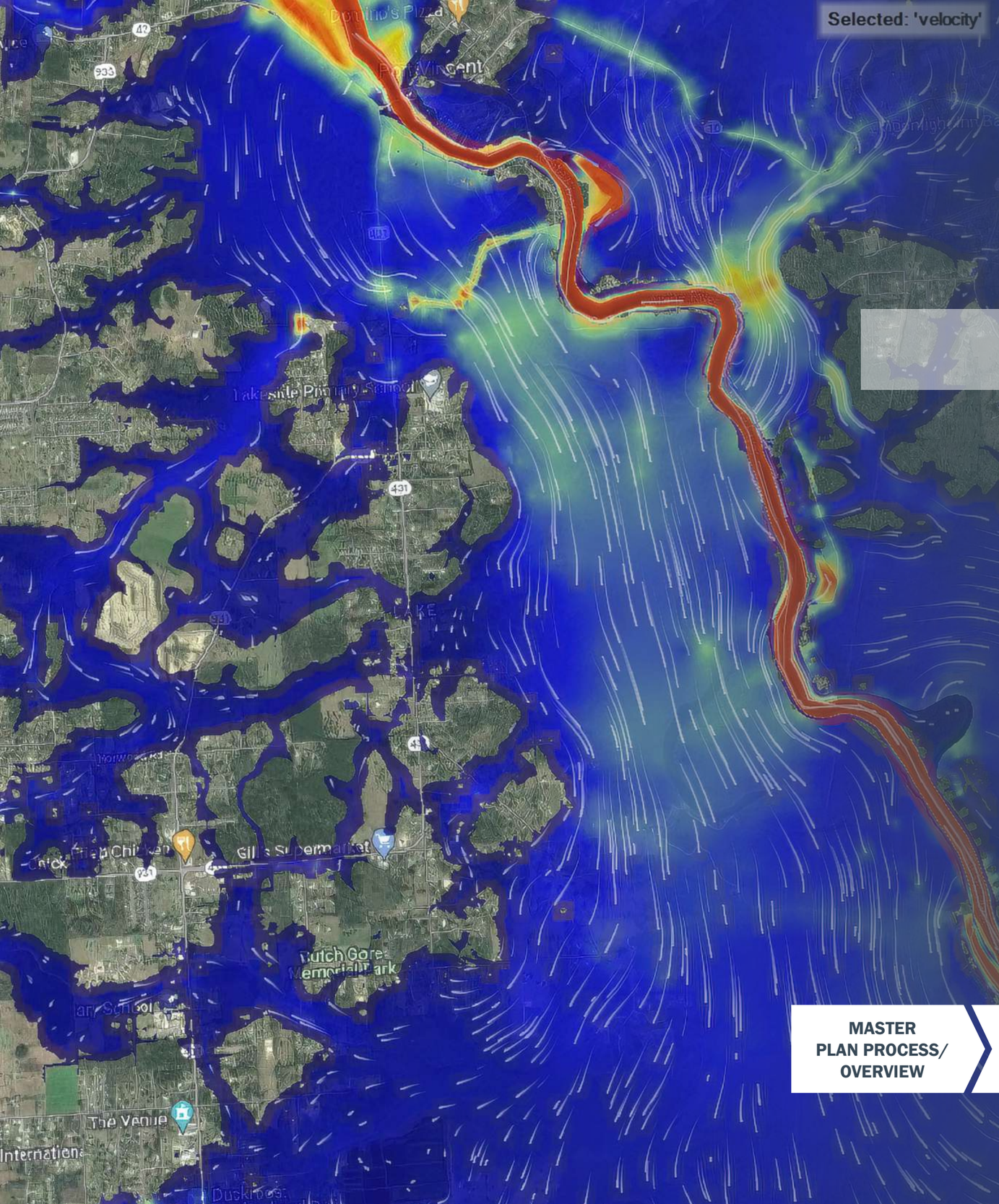
OR SCAN THE QR CODE BELOW

State Emergency Funds: In cases of extreme flooding, the state may allocate emergency funding to assist affected areas. This funding may come after a disaster declaration and is often tied to specific projects aimed at mitigating future flood risks. The Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) provides emergency support to the state once there is a declared state of emergency issued by the Governor.

Louisiana Office of Community Development - Disaster Recovery Unit (OCD-DRU): The OCD-DRU administers several state-level recovery and mitigation programs, especially after major flooding events. Key programs include:

- Louisiana Watershed Initiative (LWI): This initiative funds projects that reduce flood risk, improve watershed management, and enhance community resilience. The LWI is a collaborative effort across state and local levels, focusing on long-term mitigation planning and implementation. LWI funded East Baton Rouge Parish $5 million for the Louisiana State University (LSU) lakes project, currently under construction, to be used for flood risk reduction, including the dredging of four of the six lakes.
- Resilient Louisiana Program: A state-funded program supporting long-term recovery and mitigation efforts, which includes investment in flood protection infrastructure. The program focuses on a variety of resilience-building efforts, ranging from climate adaptation, coastal restoration, flood risk management, to economic diversification and community engagement. It aims to ensure that Louisiana can continue to thrive in the face of rising sea levels, stronger storms, and other risks.

FIGURE 2-69: LWI FUNDED EAST BATON ROUGE, LSU LAKES DREDGING PROJECT (PHOTO SOURCE: ARBC)



CHAPTER 3

PREDICT AND EVALUATE

This chapter focuses on the use of predictive models in the Master Plan process, explains key assumptions in the modeling process, and presents information on risk reduction project types and how projects are evaluated and selected for the plan. It also looks into existing policies and codes implemented by communities throughout the basin and makes best practice recommendations for streamlining these policies and codes.

Disclaimer

The information, data, analyses, projections, and recommendations contained in this Master Plan are provided for informational and planning purposes only. The Amite River Basin Commission (ARBC) has compiled this report using available resources, studies, and data; however, the ARBC has not independently verified all information contained herein.

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PHOTO SOURCE: DOTD

3.1 FLOOD RISK ASSESSMENT

Flood Hazard Modeling Assessment

A comprehensive flood hazard assessment was conducted to understand the flood hazard extent and nature, pinpoint flood-prone areas, identify the sources and mechanisms of flooding, and quantify the potential damage associated with various flood events. This assessment involved collaboration with various statewide initiatives, leveraging previously completed efforts, and utilizing advanced flood hazard risk modeling techniques to evaluate the flood risk accurately.

To perform the flood hazard assessment, a range of predictive models from LWI were leveraged which included:

- HEC-HMS for hydrologic analysis to determine the amount of stormwater runoff making its way to the various flooding sources.
- HEC-RAS for hydraulic modeling which routed stormwater runoff through the Amite River Basin waterways and infrastructure to determine flood elevations, depths, velocities, and other critical parameters.
- Coastal flood elevations from the effective FEMA FIS for areas dominantly influenced by coastal flooding; and
- HEC-FIA for consequence analysis which quantifies hydraulic modeling results into direct economic losses.

These models create a baseline condition that helps identify critical areas of concern throughout the basin and can be used to assess the effectiveness of potential projects. For this Master Plan, the planning period of 2025 to 2050 was selected by the ARBC, striking a balance between achieving both short- and long-term objectives. Therefore to supplement the existing 2025 conditions models performed by LWI and to help understand where we will be in the year 2050 if no action is taken, the LWI models were enhanced to include Future No-Action conditions which provides critical insights into flood risks if no measures are implemented to mitigate changes. It is evident that without proactive measures, flood risks will increase throughout the basin, affecting communities, infrastructure, and potentially altering ecosystems.

The collaborative approach taken in this assessment allows for a more comprehensive understanding of the flood risk. By integrating local knowledge and data from various sources, we can better identify specific vulnerabilities and prioritize areas for flood risk reduction and environmental restoration projects. Moreover, the use of predictive modeling enables us to simulate various scenarios, helping stakeholders visualize potential outcomes under different conditions.

Existing 2025 Conditions: Flood Hazard Extents and Economic Impacts

The current flood hazards in the Amite River Basin are significant and multifaceted, influenced by a combination of environmental, climatic, and human factors. Historical flood events highlight the basin's vulnerabilities, notably the catastrophic flooding in August 2016. This event resulted from unprecedented rainfall—over 30 inches in some areas—leading to widespread devastation across multiple parishes. Thousands of homes were flooded, and entire communities were displaced, underscoring the area's susceptibility to extreme weather conditions. This event is a stark reminder of the potential consequences of heavy rainfall, exacerbated by factors such as urbanization and land use changes.

The LWI HEC-RAS hydraulic models were used to identify the predicted flood inundation extents for each of the flood events simulated which included the 5-, 10-, 25-, 50, -100, 200- and 500-year flood events. Figure 3-1 illustrates the predicted flood depths and inundation extent for the 100-year flood from the LWI HEC-RAS modeling. This information is available in GIS format for all flood events in the digital appendix and is also included at a parish level within the parish specific Master Plan Supplement.

Similarly, the LWI HEC-FIA economic models were used to quantify economic losses for each of the flood events simulated. The LWI HEC-FIA model utilizes the enhanced USACE National Structure Inventory (NSI) dataset that was enhanced through LWI to include estimated finish floor heights above grade that were used to estimate finished floor elevations. The HEC-FIA models then used depth damage curves within HEC-FIA to estimate economic losses at a building level using the HEC-RAS model flood depth outputs. These damages were aggregated at both the basin and parish level. Figure 3-2 illustrates the predicted flood damages per square mile throughout the basin to highlight the hot spots for flood losses during the 100-year flood. This information is available in GIS format for all flood events in the digital appendix. Table 3-1 summarizes the economic losses for each of the 7 ARBC Parishes.

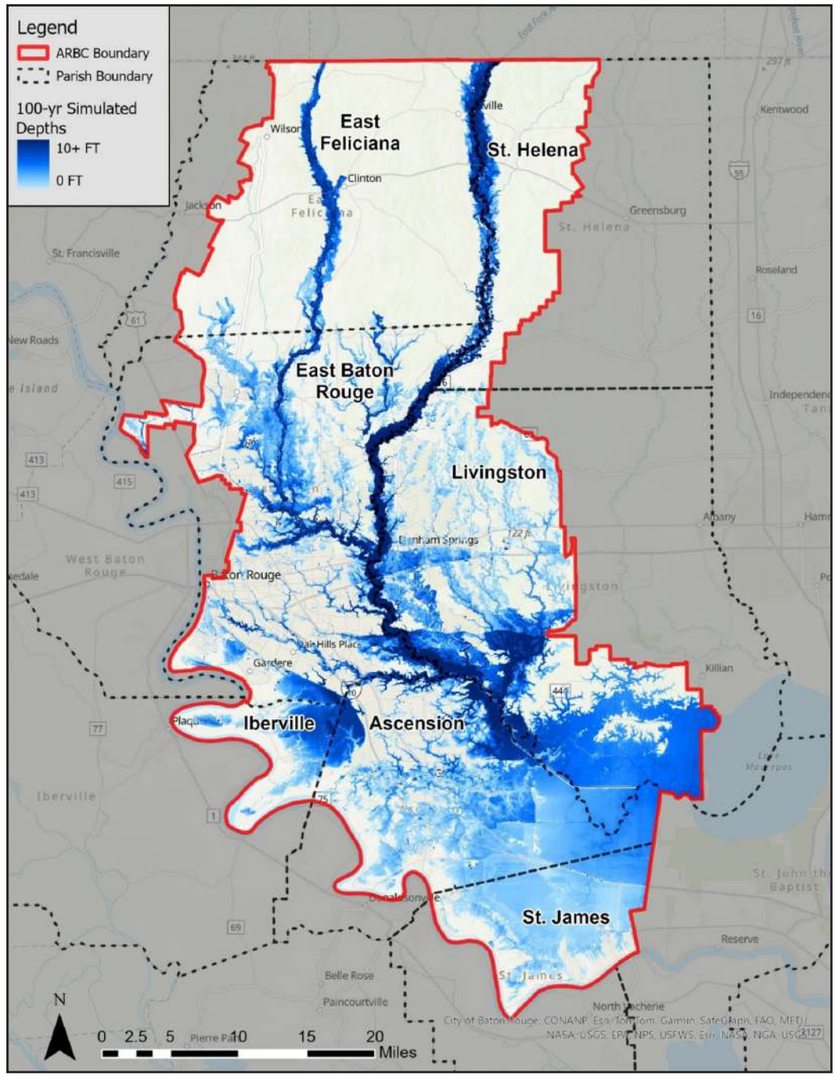


FIGURE 3-1: CURRENT CONDITIONS 100-YEAR FLOOD INUNDATION EXTENTS – AMITE RIVER BASIN (SOURCE: ARBC)

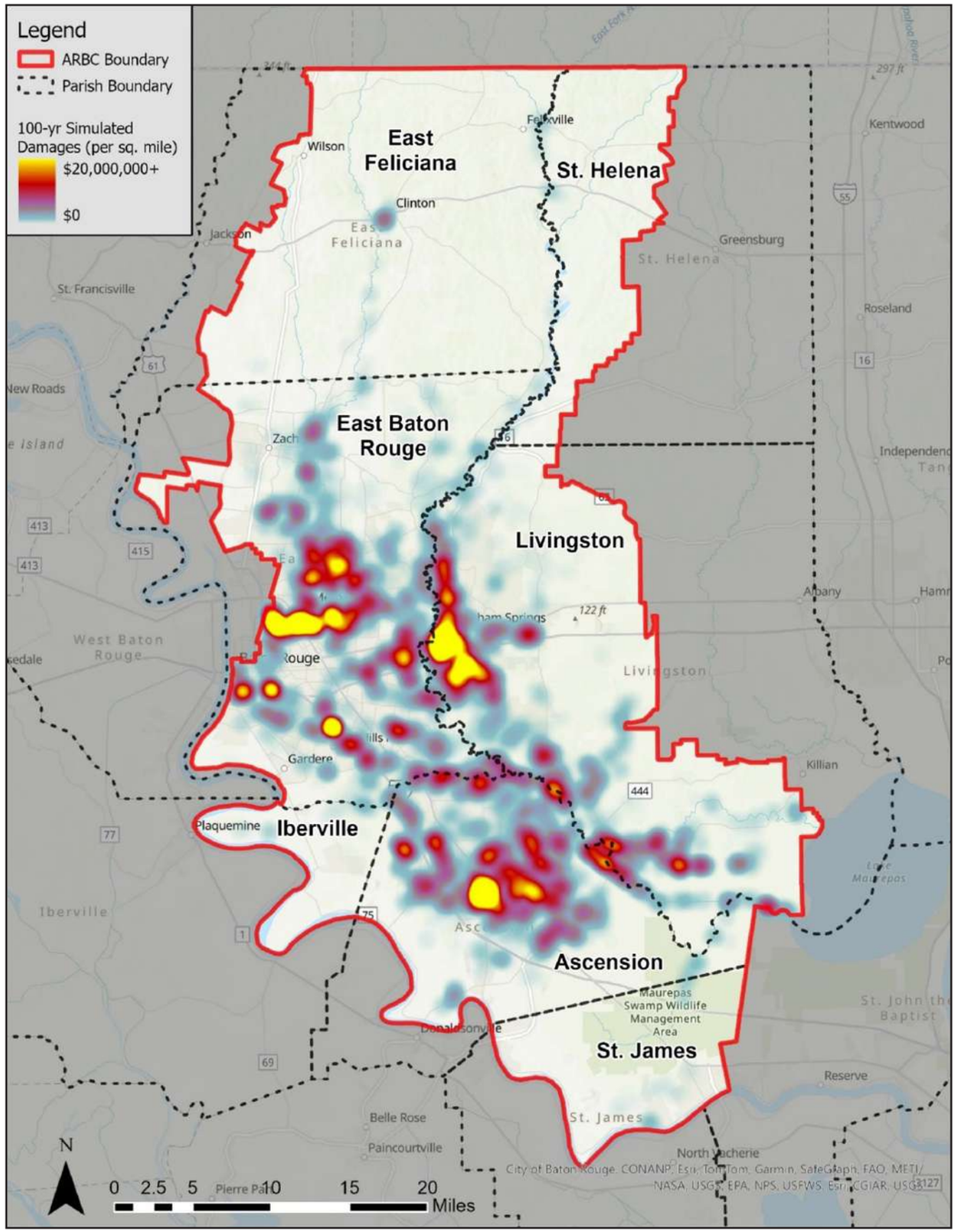


FIGURE 3-2: 100-YEAR FLOOD SIMULATED DAMAGES HEAT MAP (SOURCE: ARBC)

TABLE 3-1: EXISTING 2025 CONDITIONS ECONOMIC LOSSES FOR THE ARBC PARISHES (2025 DOLLAR VALUES)

PARISH	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR	AVERAGE ANNUALIZED LOSSES
Ascension	$339,978,000	$551,626,000	$733,676,000	$978,195,000	$2,019,568,000	$64,190,683
East Baton Rouge	$391,224,000	$718,242,000	$1,020,426,000	$1,450,537,000	$3,853,999,000	$91,951,617
East Feliciana	$6,048,510	$10,239,000	$14,909,000	$19,804,000	$35,448,000	$1,205,574
Iberville	$1,403,290	$2,119,260	$3,584,930	$6,405,370	$47,973,000	$526,129
Livingston	$192,928,000	$303,908,000	$576,032,000	$965,279,000	$2,849,636,000	$52,369,967
St. Helena	$3,195,890	$4,042,420	$5,624,670	$7,246,230	$14,791,000	$495,906
St. James	$1,962,150	$3,746,100	$9,235,090	$8,964,400	$20,779,000	$552,588
Total	$936,739,840	$1,593,922,780	$2,363,487,690	$3,436,431,000	$8,842,194,000	$211,292,465

Future 2050 Conditions: Flood Hazard Extents and Economic Impacts

To assess the future no-action flood impacts for the Amite River Basin, the following key parameters were adjusted within the LWI HEC-HMS hydrologic and HEC-RAS hydraulic models for purpose of this Master Plan:

- Land Use: Adjustments to impervious areas for hydrologic sub-basins were made based on the EPA Integrated Climate and Land Use Scenarios (ICLUS) spatial dataset which provided imperious area projections for various future time-frames including the year 2050. This dataset projected an overall increase in impervious area from 6.5% to 9.3% for the basin between 2025 and 2050.
- Precipitation Trends: Precipitation totals for each flood event were adjusted by an average of +11.5% based on the NASA Earth Exchange Global Daily Downscaled Projections CMIP6 SSP3-7.0 scenario. This was one of nearly 20 future rainfall projection models reviewed and was selected as a mid-range model.
- Sea Level Rise: Increases in Lake Maurepas water levels are approximately 1.85 feet by 2050, as projected by NOAA's 2022 Intermediate Sea Level Rise scenario. For this master plan, it is assumed that the wind driven flood elevations will increase equivalently. This data was obtained from USACE's Climate Preparedness and Resiliency Sea Level Analysis Tool (SLAT) (https://climate.sec.usace.army.mil/slat/)

Figure 3-3 illustrates the increased flooding estimated for the 100-year flood within the Amite River Basin relative to the existing 2025 conditions illustrated in Figure 3-1. The future without-action scenario shows that by 2050, the Amite River Basin is expected to experience an average increase of 0.82 feet in flood elevations during a 100-year event, with maximum increases potentially reaching up to 5 feet in isolated areas without adequate mitigation including stormwater retention and other compensatory measures. In general, the most significant increases in inundation depths (3 feet or more) are concentrated in Livingston Parish and the southern parishes, while East Baton Rouge and the northern parishes show comparatively modest increases (less than 2 feet). This is estimated to result in nearly $50 million of additional average annual losses based on 2025 dollar values.

Table 3-2 summarizes the increased economic losses for each of the 7 ARBC Parishes.

TABLE- 3-2: FUTURE NO-ACTION 2050 CONDITIONS ADDITIONAL ECONOMIC LOSSES FOR THE ARBC PARISHES (2025 DOLLAR VALUES)

PARISH	10-YEAR	25-YEAR	50-YEAR	100-YEAR	500-YEAR	AVERAGE ANNUALIZED LOSSES
Ascension	$418,973,000	$690,777,000	$954,766,000	$1,243,488,000	$2,381,324,000	$80,001,100
East Baton Rouge	$493,115,000	$869,193,000	$1,297,216,000	$1,805,138,000	$3,953,712,000	$108,987,900
East Feliciana	$7,524,280	$12,713,000	$18,148,000	$23,466,000	$40,788,000	$1,462,390
Iberville	$1,559,150	$2,530,110	$5,347,910	$9,672,690	$48,110,000	$603,900
Livingston	$251,603,000	$436,200,000	$836,151,000	$1,338,119,000	$2,885,352,000	$66,893,500
St. Helena	$3,514,210	$4,675,240	$6,625,870	$8,519,280	$14,742,000	$557,000
St. James	$8,766,970	$13,091,000	$23,062,000	$30,235,000	$69,383,000	$1,821,000
Total	$1,185,055,610	$2,029,179,350	$3,141,316,780	$4,458,637,970	$9,393,411,000	$260,326,800

Adjusting for an average 3% annual inflation rate projected between 2025 and 2050 would approximately double the above values for the year 2050. (Source: https://www.officialdata.org/us/inflation/)

Further information pertaining to flood extents and economic losses for the 5-, 10-, 25-, 50, -100, 200- and 500-year flood events for both existing 2025 and Future No-Action 2050 conditions is included in the parish specific supplements to this Master Plan.

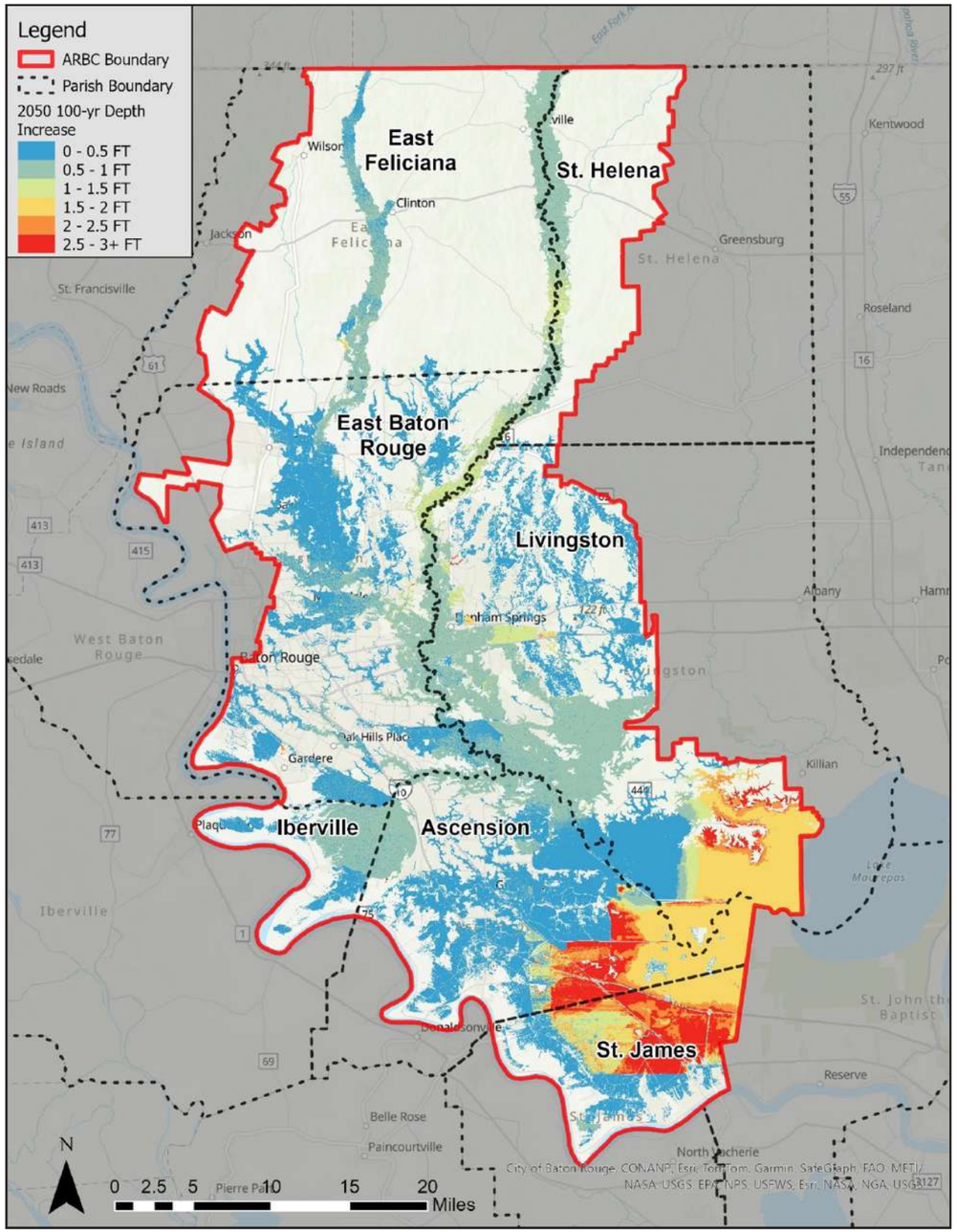


FIGURE 3-3: COMPARISON OF FUTURE 2050 100-YEAR INUNDATION DEPTHS TO CURRENT 2025 100-YEAR INUNDATION DEPTHS (SOURCE: ARBC)

Sediment Loading and Transportation

To understand the current sediment aggradation, degradation, sources and transportation processes within the Amite River Basin, field reconnaissance, sediment sampling and testing and comparisons of historic and more recent channel survey was performed to quantify, assess and perform predictive sediment transport modeling.

In 2010, PLD sponsored a study named the Amite River Tributaries Ecosystem Restoration – Numerical Sedimentation Investigation (2010 Amite Investigation) performed by Mobile Boundary Hydraulics (Mobile Boundary Hydraulics, 2010). This study included the development of a HEC-6T sedimentation transport model for the Amite River from the Louisiana State line to Lake Maurepas. The model incorporated limited sediment grab samples, 1980s cross section geometry, and average daily flows to estimate sediment transport throughout the Amite River Basin from 1985 through 2007. Results of the investigation included average annual sediment yield at Darlington and Denham Springs, and bed change profiles over the simulation period. However, the author indicated that the model did not meet the criteria for a computation model study, rather only a computation analysis, based on the data available and calibration period (Mobile Boundary Hydraulics, 2010). Key recommended enhancements to the study were identified for future modeling efforts, including:

- Adding additional cross sections
- Incorporating water temperature
- Adding additional suspended and bed sediment measurements
- Extending the calibration period

Further evaluation of the model indicated that the HEC-6T software is no longer supported by the developers of the software.

To support the development of this Master Plan and understand the current sediment conditions of the Amite River to inform project and plan development, the HEC-6T model was emulated into a HEC-RAS 1D quasi-unsteady computational sediment model and the recommended enhancements were implemented. Further, detailed survey collected from 2017 to 2024 was used to validate and calibrate the model.

Collection of grab samples and 2024 channel bathymetry was performed as part of this Master Plan effort over the summer of 2024. Boats equipped with single beam sonar and a grab sampler (clam shell) were utilized to collect sediment samples at strategic locations (Figure 3-4). Sediment samples were collected at the 25%, 50%, and 75% distances along the channel cross section (when possible). Additionally, several samples were collected along point bars during the August 2024 Field Reconnaissance (Figures 3-5 and Figure 3-6) and compared to adjacent wet samples which successfully validated the effectiveness of the grab sampler and samples.

FIGURE 3-4: GRAB SAMPLER AND SEDIMENT SAMPLE TAKEN ON THE AMITE RIVER DIVERSION CANAL (PHOTO SOURCE: ARBC)

FIGURE 3-5 & 3-6: SEDIMENT GRAB SAMPLE COLLECTION IN CHANNEL AND ON POINT BARS (PHOTO SOURCE: ARBC)

The samples were analyzed and reports detailing sediment gradation were created as a part of this Master Plan effort. Figure 3-7 shows an example of the information received about the sediment samples. The Supplements include the full report of sediment samples collected.

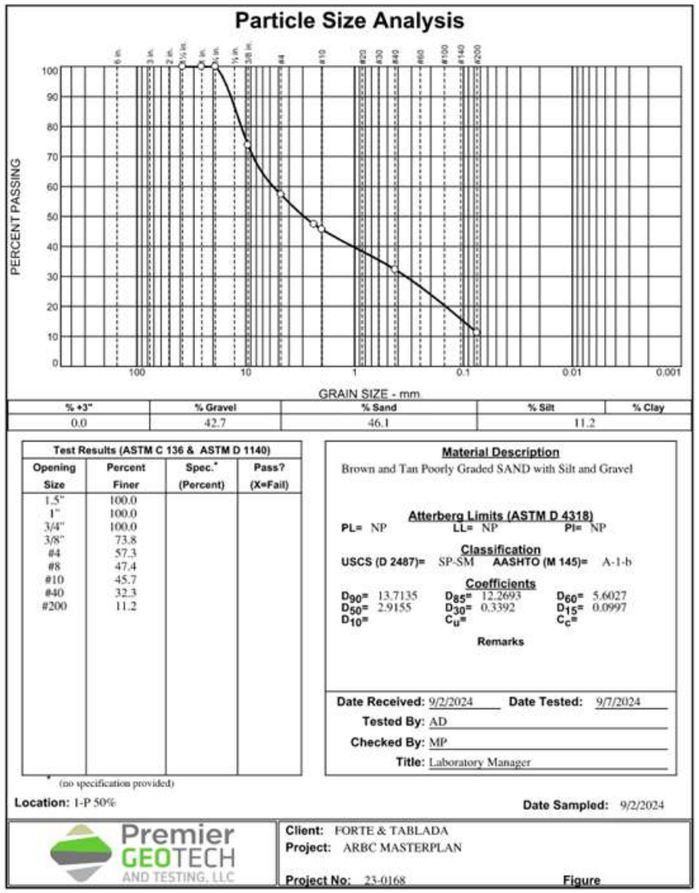
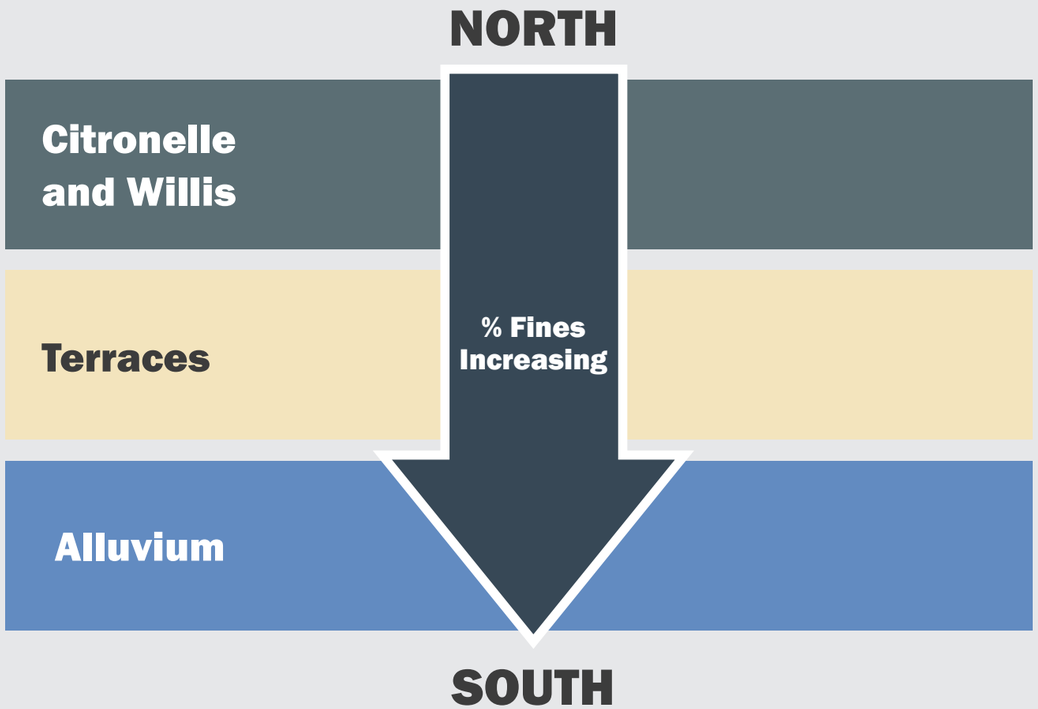


FIGURE 3-7: GRADATION DATA FOR LOCATION 1-P AT THE 50% POINT OF THE CHANNEL CROSS SECTION (PHOTO SOURCE: ARBC)

Generally, the composition of the sediment samples changed from north to south. The sediment compositions generally follow the geologic regions discussed previously in Figure 2-39. From LA HWY 10 to the Comite confluence, fines generally compose less than 10% of the representative sediment samples. From the Comite Confluence to just downstream of the Amite River Diversion Canal Weir, fines represent between 10-60% of the sediment samples. Downstream of the Amite River Diversion Canal Weir, fines generally represent greater than 90% of the sediment samples. On the Amite River Diversion Canal, fines generally represent 70 – 98% of the sediment samples.



Directly downstream of the Amite River Diversion Canal Weir, the sediment on the Amite River Diversion Canal contained approximately 25% more fines than on the Amite River. This is theorized to be the result of water flowing over the weir skimming from the top of the water column, consequently not entraining coarser particle sizes.

Sediment Model Simulations

The following model simulations were prepared to allow quantification of future with and without project sediment conditions.

TABLE- 3-3: AMITE RIVER HEC-RAS MODEL SIMULATIONS PREPARED FOR THE 2025 MASTER PLAN

MODEL	PURPOSE

Duplicate Model (1985 Geometry)	• Purpose: Emulate the unsupported HEC-6T model into HEC-RAS and validate that HEC-RAS reasonably replicates results.
	• Key improvements:
	  • New HEC-RAS computational routines and features
	  • Converted bridge loops to bridges
	  • Validation of cross section geometry with 1983 DOTD survey
	  • Additional functions available for analysis
	• Manning's n (variation with flow) (from calibrated DOTD 2019 study)

Refined Model (1985 Geometry)	• Purpose: Refine the duplicate model by incorporating recommendations from the 2010 study and other actions including:
	• Additional cross sections
	  • Water temperature
	  • Additional 92 grab samples collected by ARBC in 2024 to refine cross section bed gradation data
	  • Extension of the simulation period to 2017 to allow model validation compared to 2017 USACE and DOTD survey
	  • Improved downstream boundary condition time series
	  • 2D LWI Model informed updates to provide improved results, particularly pertaining to flow losses into swamp areas downstream of the Amite River Diversion Canal Weir which were not accounted for previously and overestimated channel flow and scour.

Diversion Canal Impacts Assessment Model (1985 Geometry)	• Purpose: What-if Scenario Model to demonstrate the sediment transport impacts of the Amite River Diversion Canal and Weir. • Hypothetical removal of the Amite River Diversion Canal and Weir and restoration to swamp to predict sediment conditions in the Amite River as if the Amite river Diversion Canal and Weir had not been built.

2017 Existing 2025 Conditions Model	• Purpose: 2017 to 2025 Sediment Forecast Model to create 2025 predicted conditions.
	  • Updated (reset) model cross section geometry to more recent 2017 bathymetric survey
	  • Run through to 2025 and validated in 2024 with 2024 ARBC survey to create 2025 Existing Conditions Geometry.

2025 -2050 Predicted Conditions (No-Action Alternative)	• Purpose: 2025 to 2050 Sediment Forecast Model to assess future no-action conditions and assess projects. • Run through 2050 to determine Future No-action conditions.
2025 to 2050 Future Project Conditions Lower Amite River Sediment Removal	• Purpose: 2025 to 2050 Sediment Forecast Model to assess future conditions with project conditions: • Lower Amite River Sediment Removal: Sediment removal simulation in the vicinity of and downstream of the Amite River Diversion Canal Weir. Run through 2050 to assess impacts and advise on maintenance sediment removal needs.
2025 to 2050 Future Project Conditions Upper Amite River Restoration	• Purpose: 2025 to 2050 Sediment Forecast Model to assess future conditions with project conditions: • Upper Restoration: Restoration of the Amite River channel to historical natural, stable conditions. Run through 2050 to assess impacts.

Key Findings

Duplicate Model (1985 Geometry)

The aim of the Duplicate Model was to replicate the general sediment trends rather than reproduce the exact results of the 2010 Amite Investigation. There are some differing data and parameter selection between the two models, and the two programs have slightly different computational engines. A focus of reviewing results was placed on general trends of erosion and deposition patterns along the river. General trends of both hydraulic results and sediment results were replicated. In general, both models agree with respect to locations of aggradation (net deposition) or degradation (net erosion) in the channel. With calibrated Krone/Partheniades method values, cumulative sediment load trends fall in line with the general trends in the 2010 Amite Investigation results.

Refined Model (1985 Geometry)

As a result of the model refinements and extending the simulation time through 2017, in the vicinity of and downstream of the Amite River Diversion Canal Weir, bed elevation results generally follow the 2017 USACE survey elevations. Average Annual Sediment loads were estimated from the results of the Refined 1985 Model (1985 geometry, run from 1985 to 2017). Key locations of average annual sediment loads are shown in Figure 3-8. Notable trends include:

- Roughly 2X increase in average annual sediment load between HWY10 and Upstream of the Comite Confluence
- Roughly 1.5X increase in average annual sediment load at the Comite Confluence
- At the Amite River Diversion Canal Weir, about 45% more sediment flows down the Amite River compared to the sediment diverted down the Amite River Diversion Canal
  - About 9% of the local sediment load settles in the vicinity of the Amite River Diversion Canal Weir

Amite River Diversion Canal Impacts Assessment Model (1985 Geometry)

Removal of the Amite River Diversion Canal resulted in slowing down of sediment accumulation in the vicinity of the Amite River Diversion Canal Weir by about 72%. For example, from 1985-2017, accumulation was reduced from 5.4 feet to only 0.75 feet at the downstream end of the weir. These results prove the hypothesis that diversion accelerates deposition rates downstream. These results are further supported by sediment gradation analysis which indicated greater fines on canal compared to the Amite River Diversion Canal directly downstream of the Amite River Diversion Canal Weir.

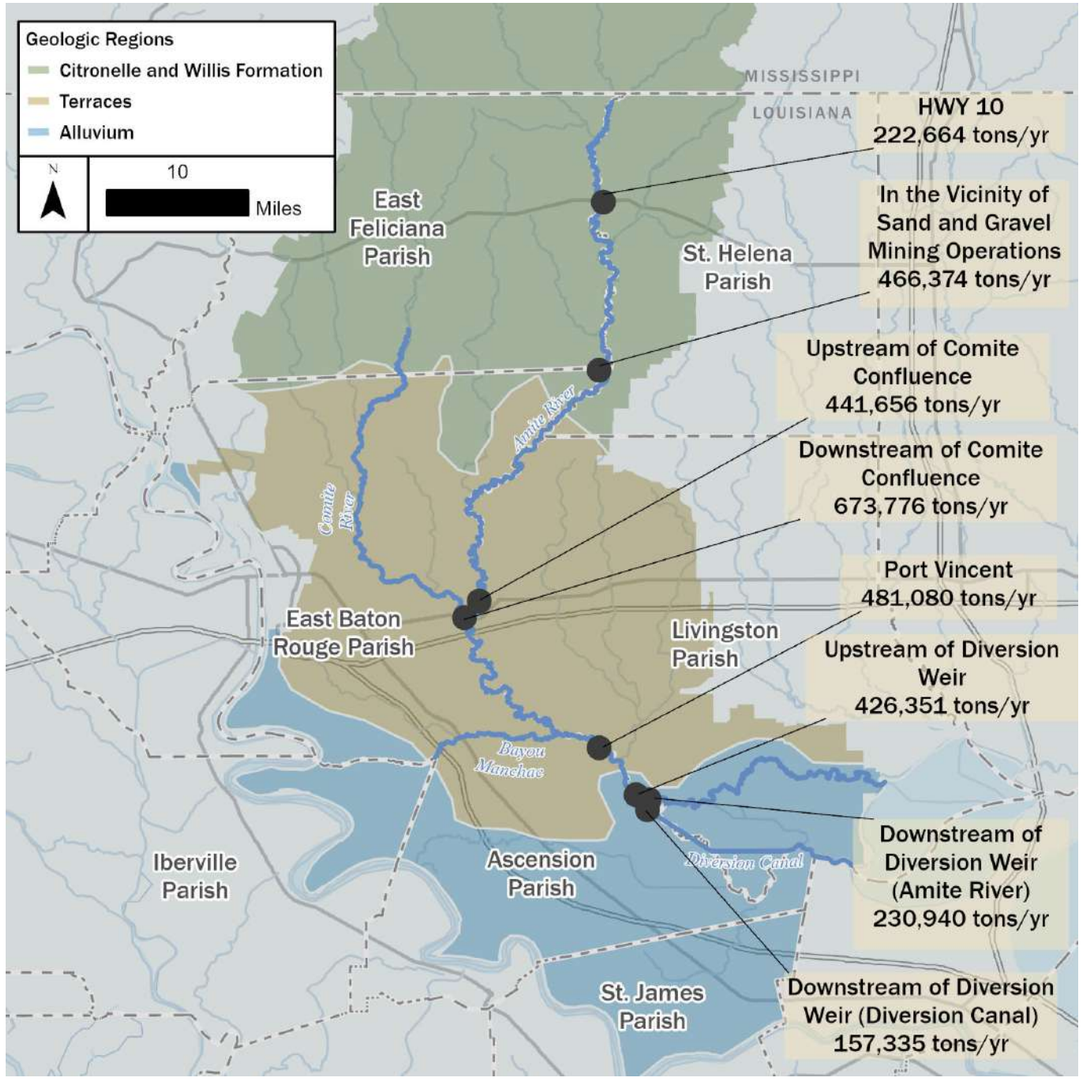


FIGURE 3-8: KEY LOCATIONS OF AVERAGE ANNUAL SEDIMENT LOADS ALONG THE AMITE RIVER (VALUES DETERMINED FROM 2024 ARBC SEDIMENT MODELING EFFORTS) (SOURCE: ARBC 2024)

2017 Existing 2025 Conditions Model

The 2017 Existing Conditions Model was run from 2017 to 2025 and compared to limited channel bathymetry cross sections collected during the summer of 2024 as a part of the ARBC Master Plan effort and the forecast out to 2025. In general, invert elevations along the Amite River were an average of 0.5 ft lower than the surveyed inverts. Additionally, invert elevations along the Amite River Diversion Canal were an average of 0.7 ft higher than the surveyed inverts. HEC-RAS 1D quasi-unsteady cannot simulate channel movement or widening, which can account for some of the discrepancies. When channel area was compared between the 2024 modeled results and 2024 surveyed results, generally change in channel area followed the same trends. For example, at cross section 200965.5 in the HEC-RAS model, invert elevation did not change from 2017 to 2024, but the model showed deposition (Table 3-4). However, the 2024 surveyed cross section did experience a decrease in area similar to that of the model cross section.

TABLE 3-4: INVERT ELEVATION AND AREA CHANGE AT CROSS SECTION 200965.5 FROM SURVEYED BATHYMETRY AND HEC-RAS MODEL RESULTS

YEAR	INVERT ELEVATION (FT, NAVD 88)	AREA (FT2)	CHANGE IN AREA COMPARED TO 2017 (FT2)	PERCENT CHANGE IN AREA COMPARED TO 2017 (%)
2017	-19.28	5069	--	--
2024 (ARBC Survey)	-19.28	4864	-205	-4.0%
2024 (Modeled)	-18.66	4777	-292	-5.8%

2025 to 2050 Predicted Conditions (No Action Alternative)

Under the No-Action Alternative, an average of 1.3 ft of sediment erosion is expected along the Amite River between Highway 10 and the Comite confluence near Denham Springs. HEC-RAS 1D quasi-unsteady sediment transport cannot compute changes in channel width, bank migration, or channel pattern changes. Thus, HEC-RAS reports any erosive activity in the channel as a decrease in invert elevation. However, based on historical trends, most likely this would result in erosion of the soils that would continue to widen the channel rather than deepen the channel. This would continue to prevent vegetation from successfully regrowing, and banks would remain unstable.

The sediment load from upstream erosive activity moves downstream and settles where velocities are no longer high enough to keep sediment entrained in the flow. As a result, approximately 2-8 ft of sediment deposition occurs adjacent to and immediately downstream of the Amite River Diversion Canal Weir along the Amite River under the No-Action Alternative. Increased deposition decreases the navigability of the river in this location. See Section 2.3 for additional information.

2025 to 2050 Future Project Conditions Lower Amite River Sediment Removal

This alternative was developed to simulate sediment removal in the Amite River beginning adjacent to the Amite River Diversion Canal Weir and extending to a point approximately 12 miles downstream. In 2050, without project conditions (No Action Alternative) bed elevations are 0.5-15 ft higher than with project conditions (sediment removed). It is expected that regular maintenance will need to be done to maintain project conditions. See Section 4.4 for additional information.

2025 to 2050 Future Project Conditions Upper Amite River Restoration

Modeling results for channel restoration in the upper Amite River demonstrated that average annual sediment loads at the downstream end of the project reach could be decreased by approximately 10,200 tons/year (about 3%) over the next 25 years (2025-2050). Sediment loads were decreased both within the project reach and downstream of the project reach. With respect to hydraulics, the with-project conditions raises WSE within the project reach but lowers WSE downstream of the project reach compared to the No Action Alternative for the 100-year storm. See the Upper Amite River Flood Risk Reduction and Restoration Project Sheet for additional information.

3.2 RESTORATION PROJECT EVALUATION

The Amite River Basin's floodplain serves as a critical natural buffer that absorbs, stores, and gradually releases stormwater runoff, mitigating the impact of flooding across the region. Restoration and conservation of this floodplain are essential to uphold the river's natural functions. This Master Plan acknowledges the role of healthy floodplains in reducing flood risks by allowing natural overflow during heavy rainfall events, thereby lessening downstream flooding impacts. Focusing on floodplain conservation and restoration helps preserve the river system's natural capacity to moderate floodwaters, recharge groundwater, and support the basin's rich ecosystems. Identifying and rehabilitating degraded areas within the basin can help restore native vegetation, improve soil retention, and increase natural water infiltration capacity. Strategic restoration projects that prioritize wetland and floodplain revitalization also reinforce natural flood control measures, enhancing the basin's ability to manage stormwater and support biodiversity.

One promising restoration option involves the use of abandoned sand and gravel pits along the Amite and Comite Rivers and the restoration of degraded channels. Originally excavated to supply fill materials, these pits now offer valuable opportunities for wetland restoration, mitigation banking, sediment sinks and stormwater storage. By reconfiguring these pits to better connect with the river system, additional floodwater retention areas can be created, reducing the strain on downstream areas during heavy rain events. Restoring these pits to wetlands or shallow water habitats not only enhances their storage capacity but also provides new ecological habitats for wildlife and supports water quality improvements through natural filtration processes. This strategy is explored in more detail below which includes the review and evaluation of various pits to prioritize those with the greatest potential.

Conservation efforts within the Amite River Basin directly support FEMA's CRS under Activity 420 as discussed in Section 4.3, which emphasizes open space preservation as a way to reduce flood risks for communities. Enhancing floodplain conservation helps communities achieve higher CRS ratings, which can lead to lower flood insurance premiums for residents and businesses. These efforts also play a key role in sustainable watershed management by reducing flood frequency and severity through preservation of natural land areas and minimization of impervious surfaces. As we advance the Master Plan, prioritizing floodplain conservation and restoration not only strengthens community resilience but also aligns with state and federal goals to manage flood risks through nature-based solutions.

Evaluation of Sand and Gravel Pits

Twenty-one sand and gravel pit sites that appeared unused were identified as potential sites for environmental restoration, flood control and recreation potential. Since many of these sites are located on private land, their specific location is not included within this Master Plan. Each site was evaluated to determine their potential using the following criteria as summarized in Table 3-5:

Environmental Restoration Potential

Each site was reviewed to determine the general condition of the site in terms of vegetation cover and general size range to assess the potential for environmental restoration. The vegetation cover was evaluated using the following criteria:

- Bare earth – Sites with minimal vegetation cover resulting in exposed sand and gravel that provide the greatest need and potential for environmental restoration.
- Mixed – Sites with a combination of bare earth and partial revegetation that provide a reasonable need and potential for environmental restoration.
- Revegetated or healed – Sites where stable vegetation has reestablished itself and provides a lesser need and potential for environmental restoration.

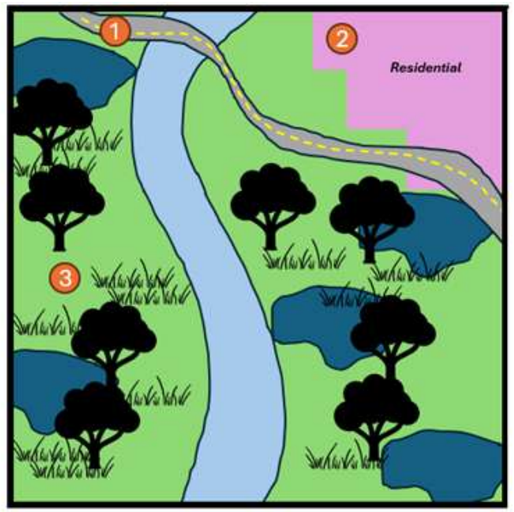
The size of the sites was evaluated using the following general size ranges:

- 0 - 100 acres – Less favorable due to small size and too small for wetland mitigation banking.
- 101 – 200 acres – More favorable and meeting the minimum size criteria of 100-acre minimum for wetland mitigation banking.
- 200 + acres - Greater potential due to the large size for both restoration and or mitigation banking

The restoration potential was determined as a combination of size and vegetative cover whereby sites with poor vegetative cover and greater size were considered higher potential sites while vegetated sites with smaller areas were considered to have a lower potential for environmental restoration.

Flood Control Potential

Each site was reviewed to determine the general potential for flood control in terms of temporary storage. The sites were classified based on the general size of the existing borrow pits, and the elevation potential between the upstream and downstream banks of the main river at the site to create flood storage. Together, the storage area and elevation potential can help determine the potential volume that can be temporarily detained on each site. Additionally, the 10-yr and 100-yr storm floodplain extents were utilized to determine if the sites were already flooded during those events, or if the sites would provide additional capacity with modifications to the adjacent grading to control flows into and out of the pits. The flood control potential was determined as a combination of storage area and elevation potential (multiplied together), whereby smaller value yielded poor flood control potential and larger values increased flood control potential. However, the classifications for flood control were made based on qualitative measurements using available LiDAR and Imagery. Further modeling would be necessary to determine the actual flood control benefits.



1. Sites situated near a major road provide easier access to transportation corridors
2. Sites situated near populations increases the likelihood of use by community members
3. Good existing vegetation cover decreases cost related to restoration and provides natural aesthetic beauty. It also provides natural resilience to the floodplain habitat and channel banks

Recreational Use Potential

Each site was reviewed to determine the general potential for recreational uses. Key factors in evaluating these sites as further illustrated in Figure 3-9 include:

- Are the sites near each other, and thus can be combined into a larger area to be used for recreation
- Are the sites mostly healed with regards to vegetation and ecology (no need for additional restoration, reducing cost)
- Are the sites situated nearby to populated areas making them conveniently accessible to a wider population
- Are the sites situated nearby to major roads making them readily accessible by car

FIGURE 3-9: EXAMPLE OF NATURAL HEALED ABANDONED GRAVEL PITS AND THE POTENTIAL FOR RECREATION (SOURCE: ARBC)

Sediment Removal Potential

Each site was reviewed to determine the general potential for settling of sediment during flood events. An important factor to determine if the sediment will have time to settle is the amount of time the water will spend flowing through the borrow pit, or the hydraulic retention time. Hydraulic retention time is defined as the average amount of time that water remains in a basin or borrow pit and is calculated as volume of the pit divided by the flow rate. If the same flow rate is assumed across all the pits, a larger volume will yield a larger hydraulic retention time. Both vegetation (surface roughness) and surface area (used to determine a theoretical pit volume) of the borrow pits play a part in settling entrained particles, but it was assumed that if the site was utilized for a sediment sink it would be revegetated as a part of the restoration process. Thus, the main factor utilized for general ranking for sediment sink potential was the surface area of the existing borrow pits. Without detailed information pertaining to borrow pit depth, volume of the borrow pits cannot be determined. Sources detail that the borrow pit depths can typically range from 20-40 ft (LSU 2018, The Hungry River: Designing a Future for the Amite River's Former Sand and Gravel Mines), so a conservative value of 20 ft was used as an assumed depth for the pits, and an assumption of conical shape was used to determine theoretical volumes. The sediment sink potential was determined using the borrow pit volumes whereby smaller values yielded poor sediment settling potential based on a smaller hydraulic residence time that sediment could settle vertically out of the water column, and larger volumes increased sediment sink potential. However, the classifications for sediment settling were made based on qualitative measurements using available LiDAR and Imagery. Further modeling would be necessary to determine the actual sediment benefits.

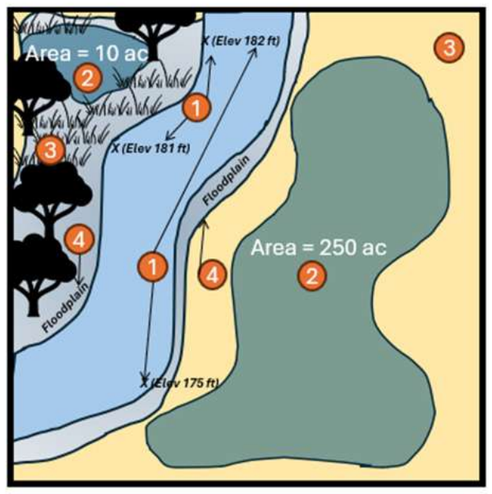


FIGURE 3-10: EXAMPLE OF TWO ABANDONED GRAVEL PITS AND THE POTENTIAL FOR RESTORATION (SOURCE: ARBC)

Figure 3-10 graphically summarizes how this criteria was applied. In this figure, the 10 ac site would not be recommended for restoration, while the 250 ac site would be recommended for restoration. The smaller site has a low potential for flood control as it is small and already in the floodplain and is already vegetated and would not need to be ecologically restored. The larger site has a higher potential for flood control and sediment settling as there is a large volume available that is not already within the floodplain and thus can add additional storage. Also, the larger site has little to no vegetation growth and has the potential to be ecologically restored.

TABLE 3-5: SAND AND GRAVEL PIT RESTORATION POTENTIAL EVALUATION

SITE	ENVIRONMENTAL RESTORATION POTENTIAL	FLOOD CONTROL POTENTIAL	RECREATIONAL USE POTENTIAL	SEDIMENT REMOVAL POTENTIAL
1	Low	Low	High	Low
2	Low	Low	High	Low
3	Low	Low	High	Low
4	Low	Low	High	Low
5	Low	Low	High	Low
6	Low	Low	High	Low
7	Low	Low	High	Low
8	High	Low	High	Low
9	Moderate	Low	High	Low
10	Low	Low	High	Low
11	Low	Low	Moderate	Low
12	Moderate	Low	High	Low
13	Low	Low	High	Moderate
14	Low	Low	High	Low
15	Low	Low	High	Moderate
16	Low	Low	High	Moderate
17	Moderate	Moderate	Low	Moderate
18	High	Low	Low	Moderate
19	Moderate	Low	Moderate	Moderate
20	Moderate	Moderate	Moderate	High
21	Low	Low	Low	High

3.3 PROJECTS

PROJECTS UNDER CONSTRUCTION

This section summarizes predictive modeling results where available and additional key information.

Disclaimer

The information, data, analyses, projections, and recommendations contained in this Master Plan are provided for informational and planning purposes only. The Amite River Basin Commission (ARBC) has compiled this report using available resources, studies, and data; however, the ARBC has not independently verified all information contained herein.

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COMITE RIVER DIVERSION CANAL

KEY PROJECT ATTRIBUTES

PROJECT LOCATION
East Baton Rouge Parish

PROJECT LEAD AGENCY
USACE

PROJECT STATUS
Under construction

PRIMARY AREAS OF PROJECT IMPACT
Portions of East Baton Rouge Parish adjacent to the Comite River

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)
Approximately 10,000

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)
$462M

PROJECT COSTS
$907.8M

FUNDING STATUS
Fully funded

MITIGATION NEEDS

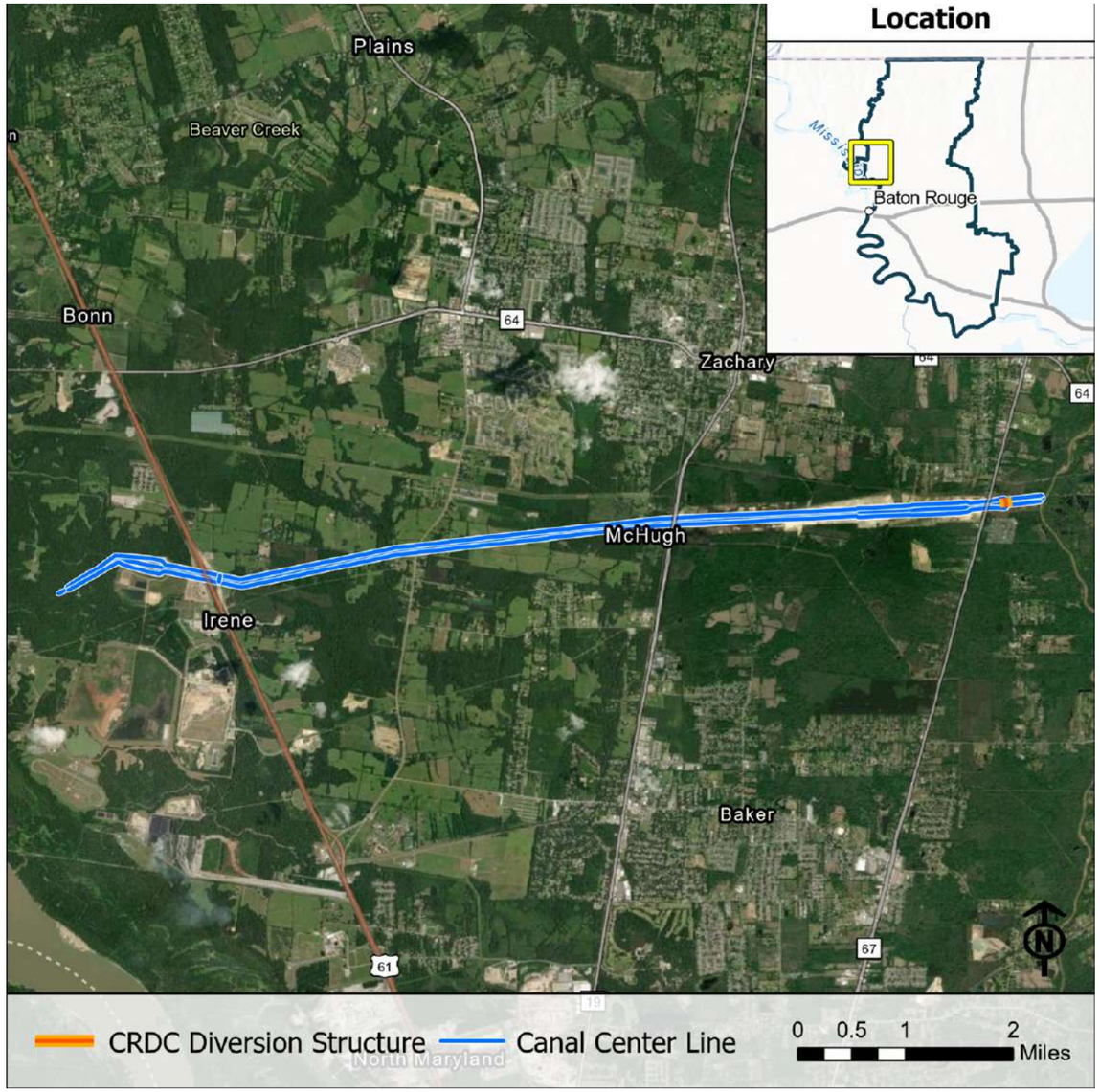
The Comite River is a major tributary of the Amite River, capturing a 348 square miles drainage basin in Mississippi and Louisiana. The Amite River Basin has a long history of major riverine driven flooding. Notable flooding events during the past 50-years include the April 197, April 1983, January 1990, January 1993, June 2001, March 2016 and August 2016 flood of record.

During these events, the metropolitan Baton Rouge and surrounding areas experienced extensive flooding. Estimates for the August 2016 flood indicate that over 70,000 structures were flooded within the basin resulting in over $4B of economic losses and 7 lives lost.

PROJECT SUMMARY

The Comite River Diversion Canal is a 12-mile-long diversion canal currently under construction. It is located on the right over-bank bank of the Comite River between Baker and Zachary and will consist of control structures at the Comite River that diverts flow directly into the canal during flood events. The Lilly Bayou control structure at mile eight of the canal slows down water dropping from it from the channel to swamp bottoms along the Mississippi River, removing it from the Amite River Basin system.

PROJECT LOCATION MAP



COMITE RIVER DIVERSION CANAL

PREDICTIVE MODEL SUMMARY

LWI Models were used to quantify the potential impacts of the Comite River Diversion Canal project for storm events and resultant floods on both the Amite and Comite basins as part of this Master Plan. 95% plans for the the diversion control structure and canal provided by USACE through DOTD were utilized for proposed conditions geometry. Multiple design storms were used to demonstrate the benefits of the canal for floods within the Baton Rouge Metropolitan Area ranging from the 10-year through to the 500-year flood.

PROJECT IMPACTS

Modeling results demonstrated that significant benefits could be realized from the Comite River Diversion Canal project once construction is complete. During the 10-year flood, up to 13,806 cfs of flow was determined to be removed from the Comite River and 21,156 cfs during a 100-year flood.

FLOOD IMPACTS FOR 100-YEAR FLOOD CAUSED BY RAINFALL CENTERED OVER THE COMITE RIVER BASIN

LOCATION	10-YEAR FLOOD ON COMITE RIVER (FT)	100-YEAR FLOOD ON COMITE RIVER (FT)
Confluence with Redwood Creek	- 0.21	- 0.06
Highway 64	- 0.83	- 0.25
Dyer Road	- 3.9	- 1.0
Highway 408 (Hooper Rd.)	- 3.4	- 2.2
Highway 37 (Greenwell Springs Rd.)	- 3.5	- 3.0
Central Throughway	- 2.7	- 2.3

FLOOD IMPACTS FOR 100-YEAR FLOOD CAUSED BY RAINFALL CENTERED OVER THE WHOLE AMITE RIVER BASIN

LOCATION	10-YEAR FLOOD ON AMITE RIVER (FT)	100-YEAR FLOOD ON AMITE RIVER (FT)
Confluence with Redwood Creek	- 0.13	- 0.06
Highway 64	- 0.64	- 0.23

PROJECT IMPACTS

LOCATION	10-YEAR FLOOD ON AMITE RIVER (FT)	100-YEAR FLOOD ON AMITE RIVER (FT)
Dyer Road	- 2.0	- 0.68
Highway 408 (Hooper Rd)	- 1.73	- 0.84
Highway 946 (Joor Rd)	- 1.32	- 0.96
Highway 37 (Greenwell Springs Rd)	- 1.42	- 0.94
Central Throughway	- 0.84	- 0.44
US 190 (Florida Blvd)	- 0.42	- 0.19
Downstream of I-12	- 0.38	- 0.18

STRUCTURE AND ECONOMIC IMPACTS OF THE PROJECT

FLOOD EVENT	STRUCTURES REMOVED	ADDITIONAL STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES AVOIDED
10-year flood	1,450	525	$105,212,000
100-year flood	5,100	4,898	$461,942,000

ENVIRONMENTAL CONSIDERATIONS

This project has been permitted by the corps and is under construction.

REAL ESTATE CONSIDERATIONS

Land acquisition for the remaining sections to be constructed is underway.

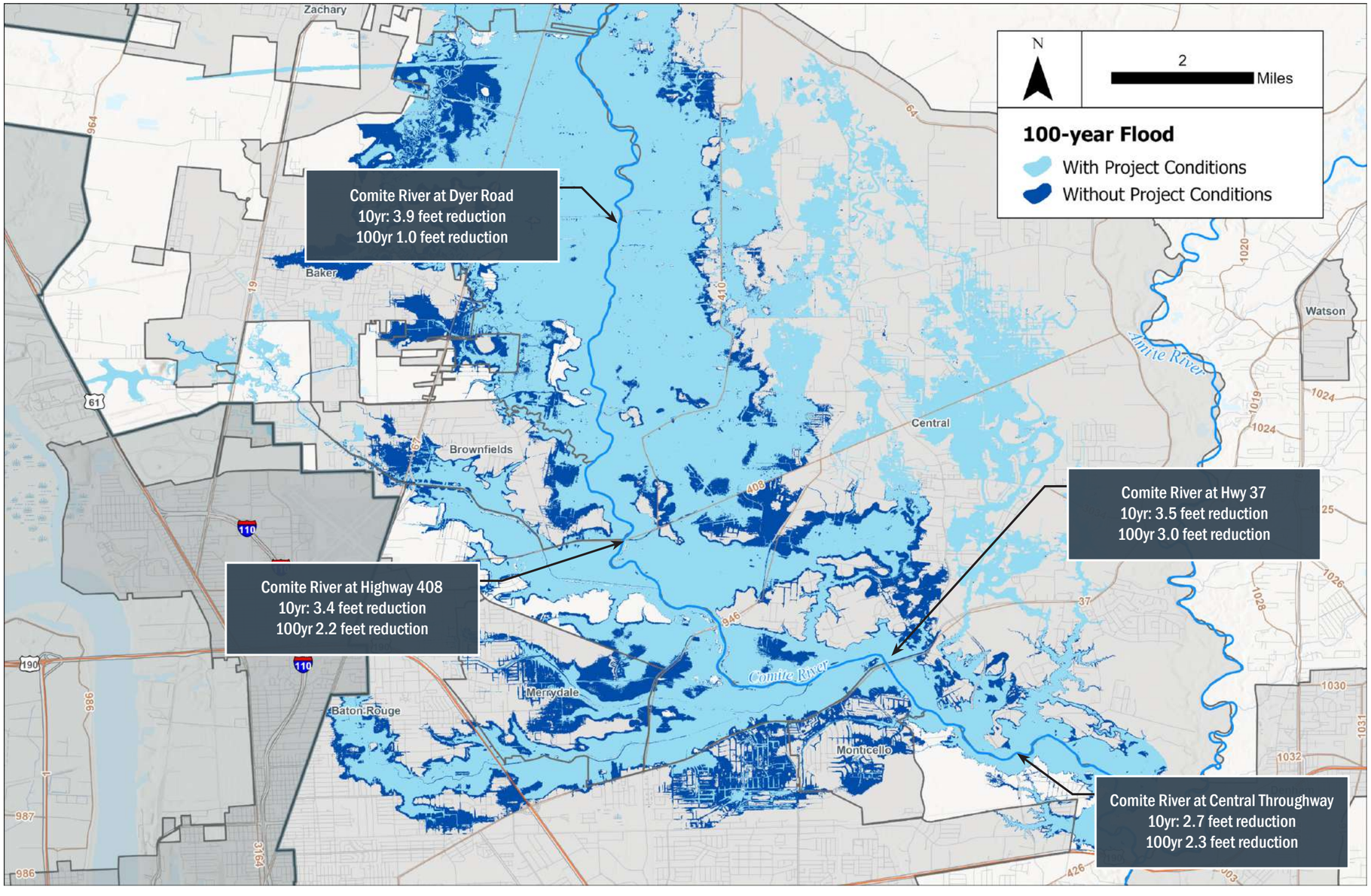
PERMITTING

This project has been permitted by the corps and is under construction.

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

COMITE RIVER DIVERSION CANAL

PROJECT IMPACTS MAP



RAINFALL OVER COMITE RIVER BASIN

COMITE RIVER DIVERSION CANAL

PROJECT COSTS

TOTAL (ESTIMATED): As of July 2023, USACE estimated the total cost to be $907.8M.

FUNDING CONSIDERATIONS

The project is federally funded under the Bipartisan Budget Act of 2018.

The project is funded through a combination of federal and local sources. The federal share was funded under the Bipartisan Budget Act of 2018. Additionally, the ARBC used a tax mileage for the Comite River Diversion Canal Impact to help fund the non-federal share.

BENEFIT COST ANALYSIS

A benefit cost was not performed as part of this Master Plan.

SEQUENCING AND DEPENDENCIES

This project is currently under construction and is not dependent on the completion of other ARBC Master Plan projects.

COMITE RIVER DIVERSION CANAL CONSTRUCTION IMAGES

KCS RAILROAD AND LA HIGHWAY 61 BRIDGES, CHANNEL SEGMENT 1 (PHOTO SOURCE: USACE)

CYPRESS BAYOU, 80% COMPLETE (PHOTO SOURCE: USACE)

CHANNEL SEGMENT 2A, 90% COMPLETE (PHOTO SOURCE: USACE)

LAUREL RIDGE LEVEE EXTENSION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

PLD (in collaboration with Ascension Parish Government)

PROJECT STATUS

Under Construction, completion estimated Summer 2025

PRIMARY AREAS OF PROJECT IMPACT

Portions of eastern Ascension Parish adjacent to the lower Amite River and Amite River Diversion Canal

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

Over 8,500

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

PROJECT COSTS

$24M

FUNDING STATUS

Funded (Ascension Parish and PLD)

MITIGATION NEEDS

The area to be protected by the Laurel Ridge Levee Extension Project experiences major flooding caused by overflow and backwater flooding from the Amite River. In 2016, the area was inundated by flood waters from the Amite River by as much as 5 feet deep which included nearby areas from Galvez to St. Amant, resulting in significant damages to residences and businesses. Many roads were also flooded making them impassable.

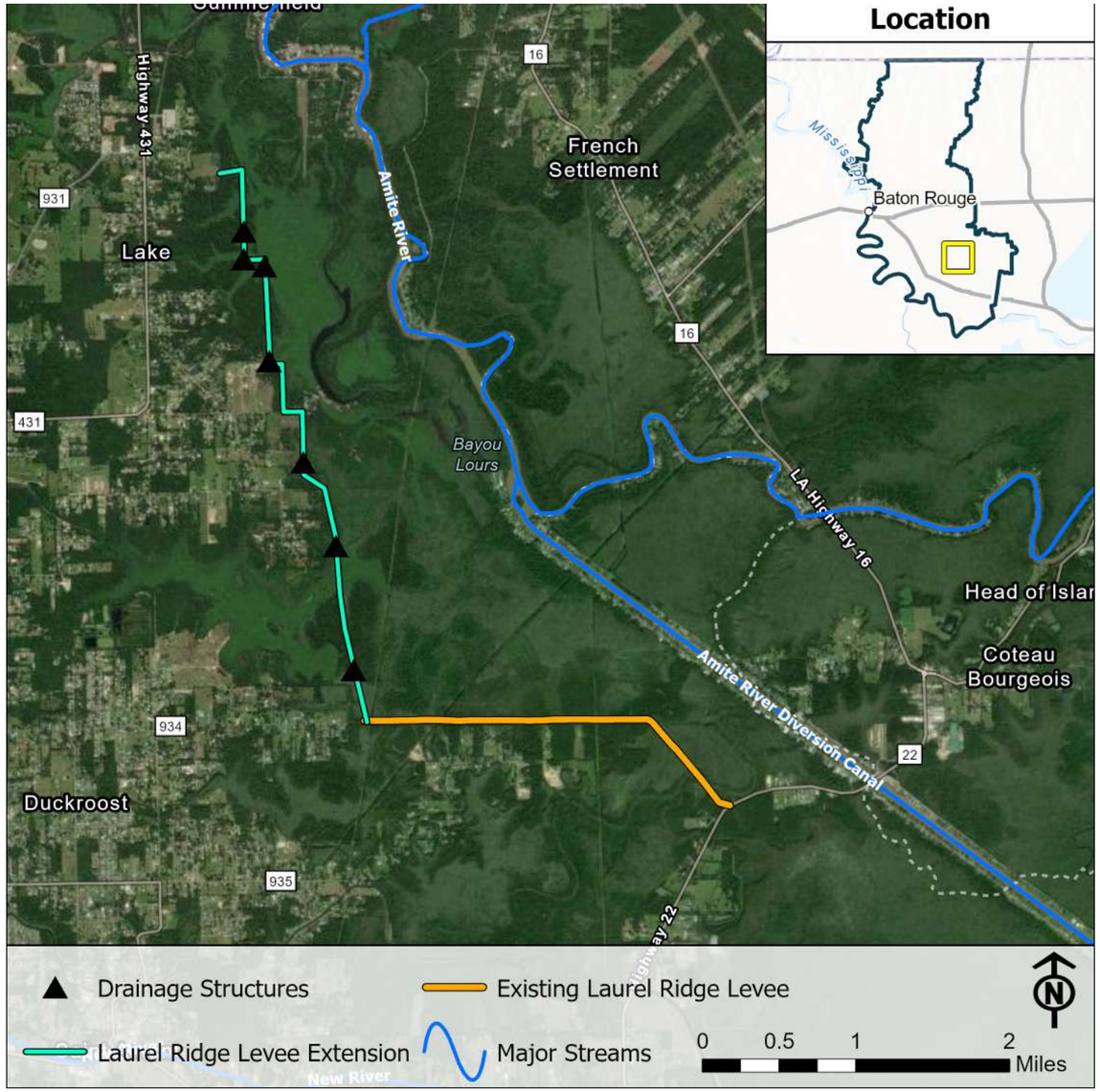
PROJECT SUMMARY

The Laurel Ridge Levee Extension Project will mitigate flooding in the northeastern part of Ascension Parish caused by overflow and backwater flooding from the Amite River. This project consists of a new levee extending north from the west end of the existing Laurel Ridge Levee and terminating at the northern end of Wall Cemetery Road. The Laurel Ridge Levee Extension will be approximately 4.5 miles long, constructed to an elevation ranging between from 13.0 - 17.0 feet, and require approximately 500,000 cy of fill. This project will also have seven gated drainage structures. The gated drainage structures will remain in the open position to allow for natural ebb and flow of waters to maintain the water elevations within the swampland that the levee passes through. The gated drainage structures will be closed ahead of the threat of high water from the Amite River. A stage frequency analysis of the Amite River at the proposed outlet structures indicates that the gates would be closed for a flood event on average once every three years. The gates will then be opened when the high water recedes, and the threat has passed.

This project is currently under construction and was funded by the Pontchartrain Levee District (PLD) and Ascension Parish. PLD was responsible for funding the engineering, design, and permitting phases of the project, and the East Ascension Gravity Drainage District is providing the funds for construction.

LAUREL RIDGE LEVEE EXTENSION UNDER CONSTRUCTION
(PHOTO SOURCE: PLD, ASCENSION PARISH AND MCKIM & CREED)

PROJECT LOCATION MAP



LAUREL RIDGE LEVEE EXTENSION TIED TO EXISTING LAUREL RIDGE LEVEE

LAUREL RIDGE LEVEE EXTENSION

PREDICTIVE MODEL SUMMARY

The levee was designed with a 3-foot freeboard, as required to meet FEMA levee certification requirements under 44CFR §65.10. In February 2006, FEMA released Flood Insurance Rating Maps (FIRMS) for the levee project area, which were based on a hydraulic model of the Amite River Basin performed by USACE. The 100-year flood elevations identified in this FIRM ranged from 9-11 feet, requiring a levee elevation of 12 to 14 feet.

PROJECT IMPACTS

The project is currently under construction and upon completion will reduce the 100-yr flood elevation and provide protection from storm surge and backwater for a over 8,500 structures Ascension Parish (Source: February 2025 communications with PLD). It, along with raising the Laurel Ridge Levee as part of the Marvin Braud Pump Station and Levee project, will provide protection from Amite River and Storm surge flooding to an extensive area of Ascension Parish. During the design phase of the project, concerns were highlighted by Livingston Parish pertaining to the potential for increased flooding within Livingston Parish due to floodwaters being displaced by the levee.

ENVIRONMENTAL CONSIDERATIONS

The levee disrupts nearly 98 acres of land in Ascension Parish with approximately 50.9 acres being forested wetlands. This is a small number compared to the 673 acres of wetlands that will remain in the protected side of the levee. This project requires wetland mitigation due to the amount of wetlands that will be disturbed during construction. The required wetland mitigation was performed by PLD with funding from both PLD and Ascension Parish.

REAL ESTATE CONSIDERATIONS

This project required the purchase of the entire parcels to construct the levee. Additionally, a flowage easement was also acquired for the emergency overflow weir.

PERMITTING

Permits were required from the United States Army Corps of Engineers (Section 404), the Louisiana Department of Environmental Quality (LPDES – LAR100000) and Water Quality section 401, and Department of Natural Resources (Coastal Use Permit).

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

PROJECT COSTS

TOTAL (ESTIMATED): The total construction cost is approximately $25,000,000 based on bid submitted by lowest bidder to PLD in 2023.

FUNDING CONSIDERATIONS

This project is currently under construction and is being funded by Ascension Parish with engineering and design funding being provided by PLD.

BENEFIT COST ANALYSIS

A BCA was completed and submitted for this project during the Section 404 permitting in 2014.
Updates to this BCA have not been performed.

SEQUENCING AND DEPENDENCIES

Due to concerns about potential adverse impacts outside of the area protected by the Laurel Ridge Levee Extension by Livingston Parish through a lawsuit seeking to adjoin the project, a settlement agreement was executed on 3/22/2021 between PLD, East Ascension Consolidated Gravity Drainage District and Livingston Parish. Through this settlement agreement, Livingston Parish agreed to stay prosecution of the lawsuit seeking to adjoin the project whereby all parties agreed that in conjunction with the Comite River Diversion Canal and the Louisiana Highway 22 gapping project would provide additional flood risk benefits to the Lower Amite basin. This also included that Ascension Parish shall not increase pumping capacity in the Marvin Braud Pump Station beyond the current pumping capacity until the Louisiana Highway 22 gapping project and CRDC is completed.

LAUREL RIDGE LEVEE EXTENSION CONSTRUCTION

NORTHERN PORTION OF LAUREL RIDGE LEVEE EXTENSION CONSTRUCTION PHOTOS (OCTOBER 2024)
(PHOTO SOURCE: PLD, MCKIM AND CREED AND ASCENSION PARISH)

LAUREL RIDGE LEVEE EXTENSION CONSTRUCTION PHOTOS OFF LAKE MARTIN ROAD (OCTOBER 2024)
(PHOTO SOURCE: PLD, MCKIM AND CREED AND ASCENSION PARISH)

3.4 PROJECTS

ARBC BOARD OF COMMISSIONERS TOP PRIORITY PROJECTS

This section summarizes predictive modeling results where available and additional key information.

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BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension, East Baton Rouge, and Iberville Parishes

PROJECT LEAD AGENCY

East Baton Rouge per Intergovernmental Agreement with Ascension and Iberville Parishes; and PLD

PROJECT STATUS

Design

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, and Iberville Parishes adjacent to Bayou Manchac, Ward Creek, Spanish Lake and Bluff Swamp

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

392 (storm over Bayou Manchac and Ward Creek)

124 (Amite River Backwater Flood)

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$10.4M (storm over Bayou Manchac and Ward Creek)

- $8.4M (Amite River Backwater Flood)

PROJECT COSTS

$29.9M (Phase 1 and 2)

FUNDING STATUS

Partially Funded by Ascension Parish, by EBR and Iberville Parishes; by PLD; and pending LWI approval for $30M funding for the Tri-Parish's IGA

MITIGATION NEEDS

Bayou Manchac is a major tributary to the Amite River, draining stormwater from Ascension, East Baton Rouge, and Iberville Parishes. Over time, sediment build-up throughout Bayou Manchac has reduced its capacity, and during heavy rainfall events such as Tropical Storm Alison in 2001 and the May 2021 storm event, prevents adequate drainage for Bayou Manchac and nearby tributaries like Bayou Fountain and Alligator Bayou. In addition, Ward Creek's sharp angle confluence with Bayou Manchac inhibits its' ability to drain properly into the Bayou Manchac channel. This results in the channel over-topping its banks and flowing into surrounding communities resulting in flooding of homes and businesses.

The drainage problems in Bayou Manchac cause floodwaters within the watershed and the Spanish Lake/Bluff Swamp Sub-Basin drainage area to pool for extended periods causing anoxic and putrid water quality conditions, stresses native species, public health hazards due to proliferation of mosquito populations, and delays emergency response and recovery efforts.

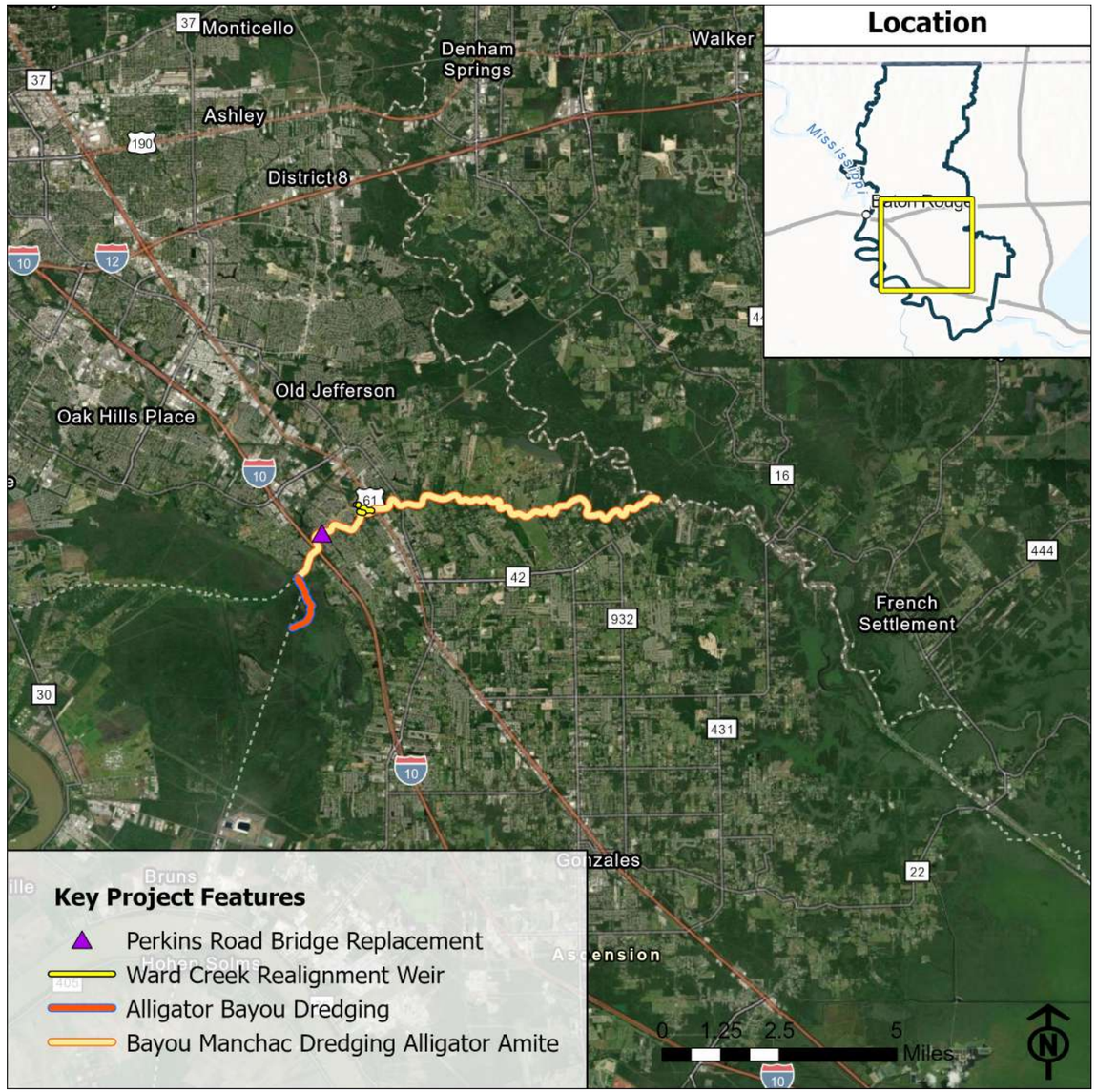
PROJECT SUMMARY

The Bayou Manchac Channel Improvements & Ward Creek Realignment project aims to address riverine flooding for homes and businesses along Bayou Manchac. The proposed project includes 4 key project components: Alligator Bayou dredging, Ward Creek realignment with an overflow weir and Bayou Manchac dredging (by others), from Alligator Bayou to the Amite River confluence.

Dredging components include selective sediment removal along Bayou Manchac to restore historic pre-urbanization conditions, improve the channel slope and cross sections, improving the bi-directional conveyance. The realignment of Ward Creek includes construction of a new, streamlined outlet to Bayou Manchac involving the construction of a channel through BREC's Airline Highway Park. Additionally erosion control measures will be taken along the upstream end of proposed realignment that could involve rip-rap armoring and/or nature-based solutions. The project will mitigate potential wetland impacts. The exact amount will be determined during detail design and jurisdictional determination of impacts. Coordination with BREC regarding the Ward Creek improvement is ongoing, and the proposed channel alignment has been incorporated into their Master Plan for the park.

Perkins Road Bridge replacements is being proposed by others and funding is being sought through DOTD's Statewide Flood Control Program.

PROJECT LOCATION MAP



BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT AND WARD CREEK REALIGNMENT PROJECT LOCATION

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

PREDICTIVE MODELING SUMMARY

The computer modeling software HEC-HMS and HEC-RAS was utilized by PLD and their consultants to evaluate various rainfall driven localized flood storm scenarios over Bayou Manchac for both existing and proposed project conditions by modifying the 2019 DOTD Amite River Basin Numerical Model (ARBNM). As summarized in the undated draft report titled "Bayou Manchac Regional Flood Risk Reduction Plan" and as observed in the digital HEC-RAS model files provided to ARBC by PLD in February 2025, new meteorologic data, was used to evaluate hypothetical 24-hour 10-yr, 25-yr, 50-yr, and 100-yr storm events specifically over the Manchac and Ward Creek basins. A 72-hour storm corresponding to a 5-yr flood on the Amite River was used for the rest of the basin in these simulations. This modeling included the following project features: Alligator Bayou dredging, Ward Creek realignment with an overflow weir and Bayou Manchac dredging from Alligator Bayou to the Amite River confluence.

To assess the potential backwater flooding impacts of the project, ARBC performed additional simulations using the ARBNM HEC-RAS model modified by PLD and their consultants to represent backwater flooding from the Amite River for the 10-year and 100-year flood events as measured at the confluence with Bayou Manchac. To simulate the 10-year and 100-year flood events, ten and twenty inch rainfalls centered upstream over Darlington as documented in the 2019 Amite River Basin Numerical Model, Project Report, were used to simulate these flood conditions using the PLD project conditions model. Review of both the rainfall driven localized flood analysis performed by PLD and the Amite River backwater analysis performed as part of this Master Plan indicated that for most of the project area, backwater flooding conditions from the Amite River were more dominant when compared to rainfall driven localized flood conditions consistent with Chapter 2 findings summarized in Figure 2-10. These projected project flooding conditions show how backwater flooding conditions could have been prior to the excessive build-up of sediment and debris in the channel; however, it should be noted how the project could decrease the time it takes for water levels to return to normal stages and a benefit for the Bayou Manchac Watershed.

HEC-FIA was used to determine economic consequences for both rainfall driven localized flood and Amite River backwater conditions.

PROJECT IMPACTS

Modeling results demonstrated both positive and negative impacts of the project. For rainfall driven localized flood events over the Manchac and Ward Creek , the project benefits were positive, while during a backwater flooding event from the Amite River, impacts were much smaller, and in some locations slightly negative.

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR STORM FLOOD EVENTS FOR STORMS OVER BAYOU MANCHAC AND WARD CREEK (USING THE HEC-RAS MODEL FILES PROVIDED TO ARBC BY PLD IN FEBRUARY 2025)

LOCATION	10-YEAR STORM FLOOD IMPACTS (FEET)	100-YEAR STORM FLOOD IMPACTS (FEET)
Bayou Manchac at Amite River Confluence	-0.08	-0.02
Bayou Manchac, Old Jefferson Highway	-1.21	-0.05
Bayou Manchac at Ward Creek Confluence	-0.93	-0.07
Bayou Manchac Just Downstream of Perkins Road	-0.50	0.04
Bayou Manchac at Alligator Bayou Confluence	-0.15	0.2
Spanish Lake	0.00	0.1
Fountain Bayou Adjacent to S. Mission Hills Avenue	-0.29	0.02
Ward Creek, Just downstream of Highland Road	-0.13	-0.08
Ward Creek just downstream of Barringer Foreman Road	-0.08	-0.08

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

PROJECT IMPACTS

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS (USING THE HEC-RAS MODEL FILES PROVIDED TO ARBC BY PLD IN FEBRUARY 2025, UPDATED TO INCLUDE AMITE RIVER BACKWATER FLOODING CONDITIONS BY ARBC)

LOCATION	10-YEAR STORM FLOOD IMPACTS (FEET)	100-YEAR STORM FLOOD IMPACTS (FEET)
Bayou Manchac at Amite River Confluence	-0.02	-0.03
Bayou Manchac, Old Jefferson Highway	-0.01	-0.05
Bayou Manchac at Ward Creek Confluence	-0.07	-0.08
Bayou Manchac Just Downstream of Perkins Road	0.04	0.04
Bayou Manchac at Alligator Bayou Confluence	0.05	0.19
Spanish Lake	-0.01	0.13
Fountain Bayou Adjacent to S. Mission Hills Avenue	0.06	0.02
Ward Creek, Just downstream of Highland Road	-0.15	-0.08
Ward Creek just downstream of Barringer Foreman Road	-0.1	-0.08

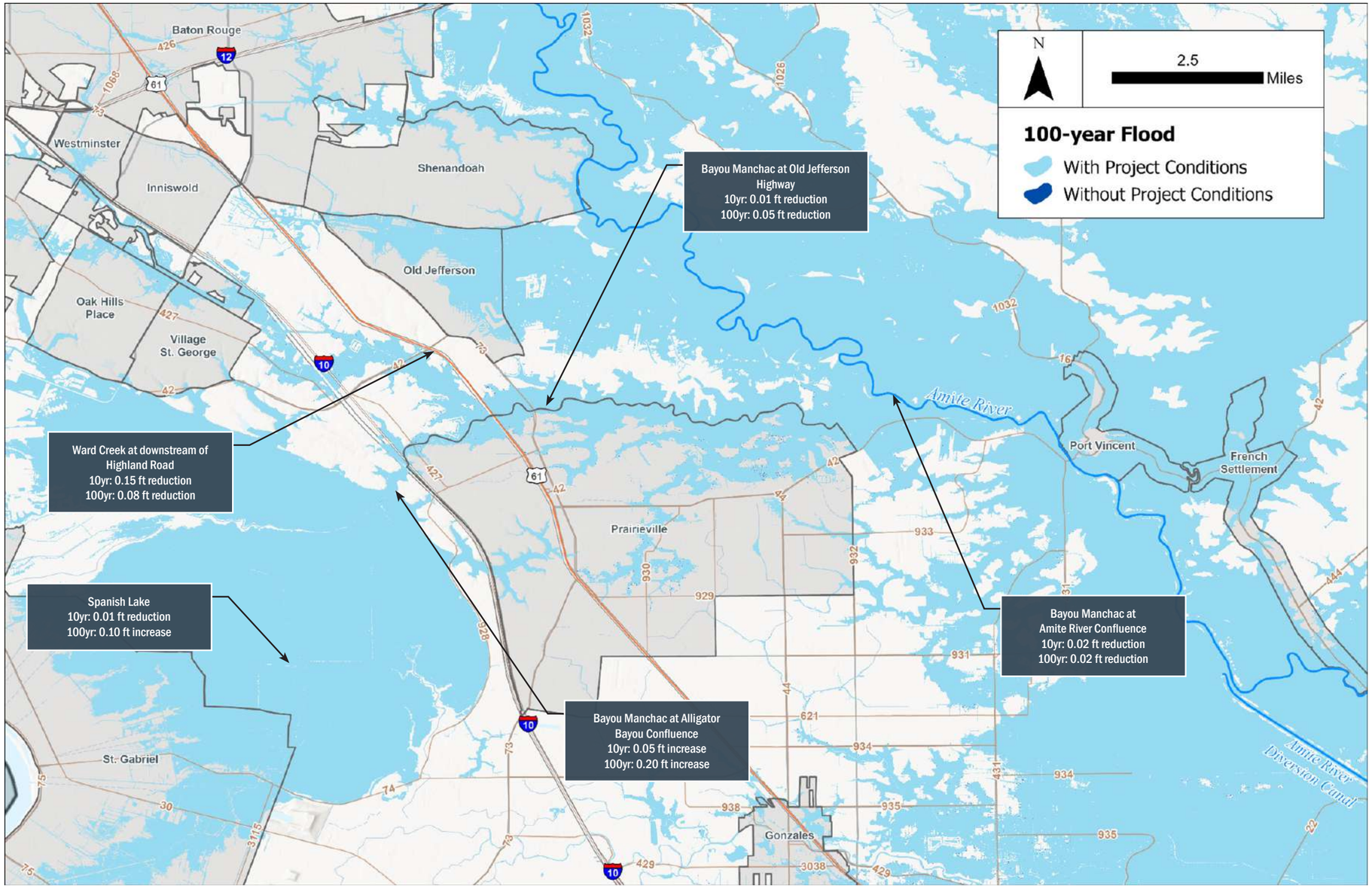
PROJECT IMPACTS

STRUCTURE AND ECONOMIC IMPACTS OF THE PROJECT

FLOOD EVENTS	NET STRUCTURES IMPACTED	NET ECONOMIC IMPACTS
10-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU MANCHAC AND WARD CREEK	217	$2,789,000
100-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU MANCHAC AND WARD CREEK	392	$10,373,000
10-YEAR AMITE RIVER BACKWATER FLOODING EVENT	2	$-127,664
100-YEAR AMITE RIVER BACKWATER FLOODING EVENT	124	$-8,367,810

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

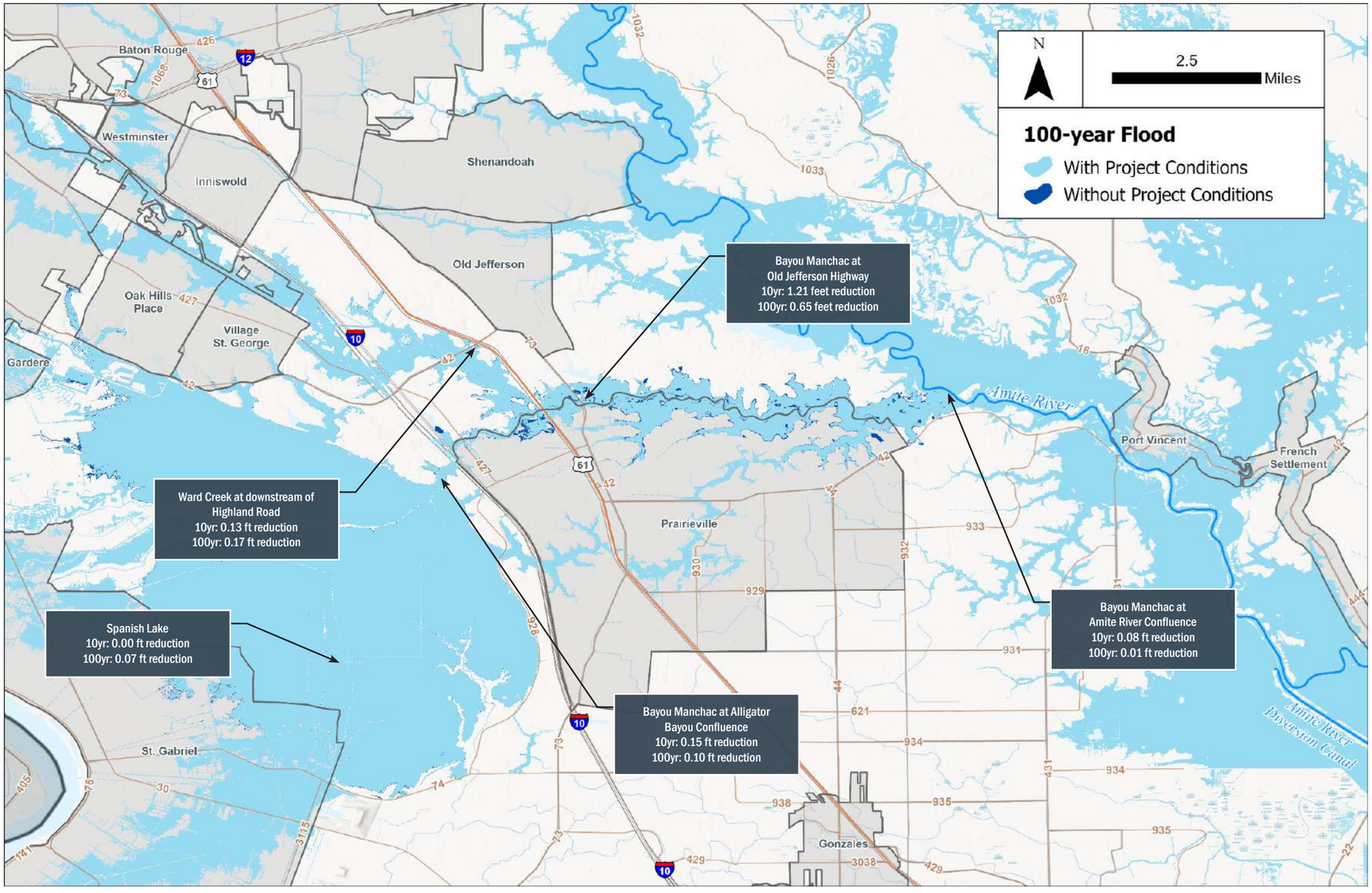
PROJECT IMPACTS MAP



AMITE RIVER BACKWATER FLOODING

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

PROJECT IMPACTS MAP



BAYOU MANCHAC AND WARD CREEK RAINFALL DRIVE LOCALIZED FLOOD STORM EVENT

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

ENVIRONMENTAL CONSIDERATIONS

Bayou Manchac has a state Scenic River designation which has restrictions on work that can be completed in the bayou. However, the scenic river designation as assigned by the DWF was temporarily suspended until 2026 through R.S. 56:1849. This revised statute states that “beginning May 1, 2021, through August 1, 2026, no provision shall require a permit for a local government to conduct clearing and snagging and dredging operations for drainage purposes in Bayou Manchac”. The proposed work in the bayou will need to be completed in this time-frame or the statute extended to allow the project to proceed.

The Ward Creek channel re-alignment work could require some wetland mitigation.

Projects that remove sediment or restore natural conditions have the potential to improve water quality, fisheries and natural habitats.

REAL ESTATE CONSIDERATIONS

Temporary acquisition will be required for the completion of the channel improvements of Bayou Manchac. Temporary acquisition will be required to provide areas for construction staging, equipment storage, and construction access to Bayou Manchac. The exact number of acres required will be determined during detailed design development. It is anticipated that the Ward Creek realignment work will be completed on Parish BREC property and therefore no cost for any acquisition will be required. However, an agreement between BREC and the East Baton Rouge Parish will be required to allow the parish an easement to maintain the realigned channel. PLD has prepared an access study and is in the process of evaluating access servitudes for construction utilizing its acquisition team.

UTILITY RELOCATION

A review of aerial imagery revealed transmission lines crossing Bayou Manchac in two locations near the intersection of Oakland Crossing Blvd and Oakland Dr and near Cotton Bayou’s confluence with Bayou Manchac. However, in both locations, the utility poles appear to be set back far enough from the top of bank to avoid interference with the proposed sediment removal limits. Construction should exercise caution at these crossings to ensure no interference with the overhead clearance.

Additionally, a pipeline running under Bayou Manchac near Camp Drive was discovered. Sediment removal should not extend deep enough to impact the pipeline; however, the exact depth and extents will need to be verified during subsurface utility investigations. During final design, efforts will need to be made to avoid disturbance of this pipeline.

PERMITTING

Permits will include: a Section 401 water quality permit, Section 404 permit for wetlands, potential Section 10 Rivers and Harbors Act permit, potential grading permit from the East Baton Rouge Department of Public Works, and a stormwater pollution prevention permit in accordance with LAR100000 from the Louisiana Department of Environmental Quality. In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

PROJECT COSTS

PHASE 1 COSTS (ENGINEERING)

SERVICE	COST
Grant Management (3% of Phase 1 costs)	$40,600.00
H&H Design Study	$70,000.00
Subsurface Utility Engineering	$80,000.00
Surveying	$145,000.00
Geotechnical Analysis	$80,000.00
Permitting and Environmental	$100,000.00
Preliminary Design	$350,900.00
Final Design	$526,300.00
Phase 1 Cost	**$1,392,800.00**

PHASE 2 COSTS (CONSTRUCTION)

SERVICE	COST
Mobilization	$2,000,000.00
Land Clearing: Realignment	$64,500.00
Drainage Excavation (Realignment)	$369,600.00
Selective Sediment Removal (Manchac)	$22,594,400.00
Seeding/Landscaping	$38,000.00
Riprap (130 lb)	$23,750.00
SWPP	$10,000.00
Traffic Control	$10,000.00
Erosion Control	$20,000.00
Construction Management & Inspection	$2,400,000.00
Grant Management (3% of Phase 2 costs)	$753,910.00
Wetland Mitigation	$75,000.00
Temporary Easement	$100,000.00
Utility Relocation	$40,000.00
Phase 2 Cost	**$28,499,160.00**
Total Project Cost	**$29,891,960.00**

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

FUNDING CONSIDERATIONS

The Bayou Manchac Channel Improvements & Ward Creek Realignment project was selected as one of the priority projects for LWI Round 2 grant funding with $30M allocated. This will fund both Phase 1 design and Phase 2 construction. This project will be completely funded through LWI and will not require a cost share. The project application is in review at this time.

BENEFIT COST ANALYSIS

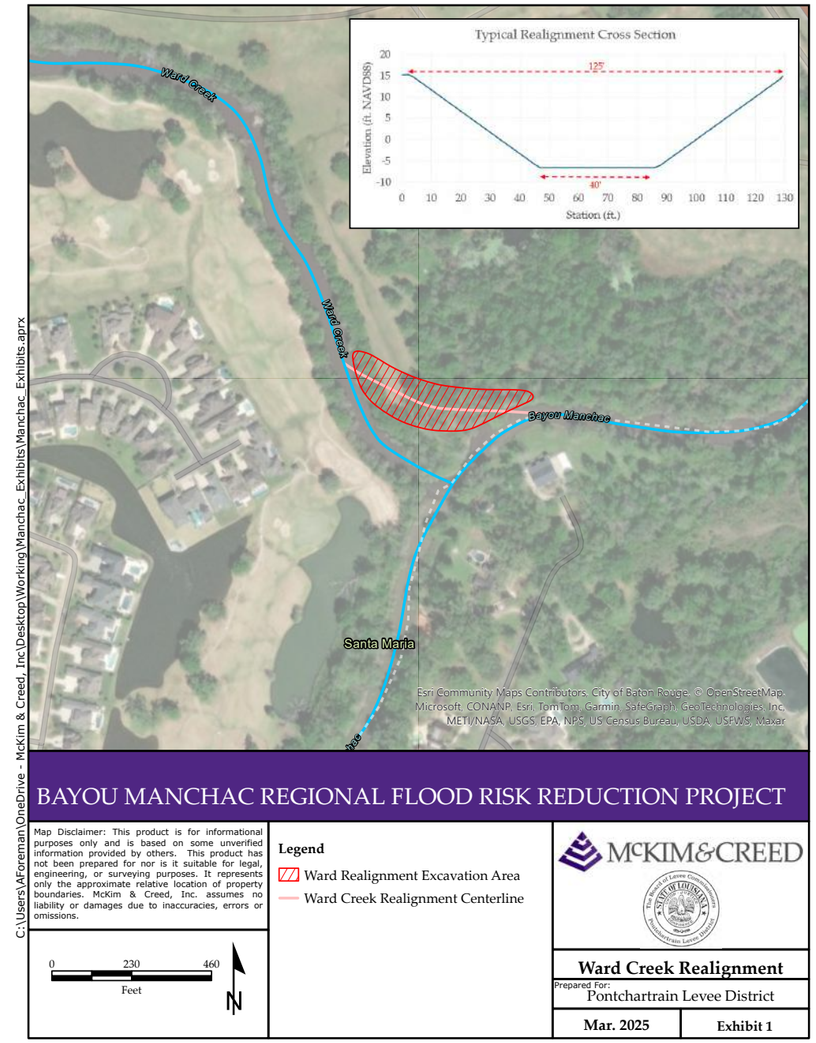
A benefit cost analysis was not required as part of the LWI Round 2 grant funding requirements. However, the project is anticipated to drastically reduce the time it takes for the Bayou Manchac Watershed to return to normal stages after flood events, which shows benefits for local emergency preparedness, response, and recovery efforts at residential sites; improves public health and safety issues related to mosquito outbreaks and noxious conditions caused by prolonged periods of standing water in the watershed (See Page 3-25: Graph for the Bayou Manchac Watershed – August 2016: Backwater Flooding versus Drainage).

SEQUENCING AND DEPENDENCIES

The Bayou Manchac Channel Improvements and Ward Creek Realignment, like all projects in this Master Plan, show opportunities for optimization of flood risk reduction across the entire basin.

There have been project concepts developed for several projects (i.e., New River Pump Station, Willow Glen Pump Station, Upper Amite River Detention/Retention, Bayou Manchac Backflow Prevention Gates, Lower Amite Sediment Removal, Upper Amite River Flood Risk Reduction and Restoration, etc.) in the Amite River Basin that, if built in conjunction with this project, could potentially have additional positive impacts.

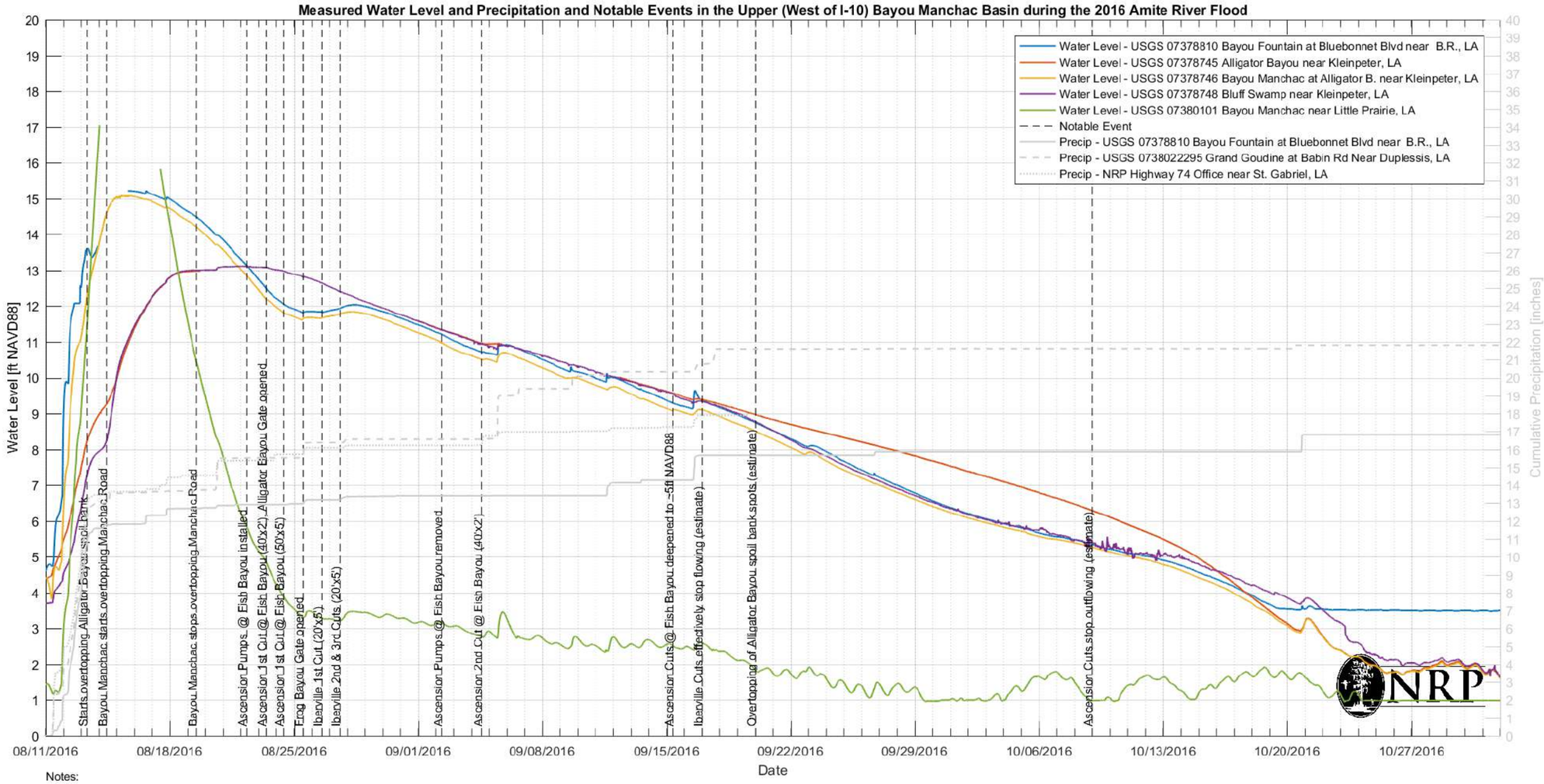
WARD CREEK REALIGNMENT



WARD CREEK REALIGNMENT (SOURCE: MCKIM & CREED ON BEHALF OF PLD)

BAYOU MANCHAC CHANNEL IMPROVEMENTS AND WARD CREEK REALIGNMENT

2016 AMITE RIVER BACKWATER FLOODING AND DRAINAGE OF THE BAYOU MANCHAC BASIN



Notes:
* United States Geological Survey (USGS) water level and precipitation data obtained from waterdata.usgs.gov
* Natural Resource Professionals, LLC (NRP) precipitation data collected by NRP personell
* USGS 07380101 Bayou Manchac near Little Prairie, LA missing data between 8/14/2016 01:30 and 8/17/2016 12:15
* USGS 07378745 Alligator Bayou near Kleinpeter, LA missing data between 8/19/2016 19:15 and 8/26/2016 22:30
* USGS 07378810 Bayou Fountain at Bluebonnet Blvd near B.R., LA missing data between 8/13/2016 23:00 and 8/15/2016 15:00

LOCAL PARISH GOVERNMENTS HAVE HIGHLIGHTED THEIR CONCERNS WITH THE EXTENDED PERIOD FOR BAYOU MANCHAC AND SPANISH LAKE WATER STAGES TO RETURN TO NORMAL AFTER THE AMITE RIVER HAS ALREADY RECEDED FROM FLOOD STAGE. AFTER THE AUGUST 2016 FLOOD, IT TOOK OVER 60-DAYS FOR WATER LEVELS TO RETURN TO NORMAL LEVELS AFTER THE AMITE RIVER HAD ALREADY RECEDED. ANY PROJECT THAT HELPS TO ACCELERATE THE RETURN TO NORMAL STAGES WOULD SHOW OVERWHELMING POSITIVE BENEFITS (SOURCE: NATURAL RESOURCES PROFESSIONALS, LLC)

LOWER AMITE RIVER SEDIMENT REMOVAL

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension, East Baton Rouge and Livingston Parishes

PROJECT LEAD AGENCY

ARBC/Livingston Parish

PROJECT STATUS

Design Phase (near-term) and Concept Phase (long-term)

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, and Livingston Parishes adjacent to the lower Amite River.

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

Undetermined

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

Undetermined

ENVIRONMENTAL BENEFITS

Removal of unnatural sediment deposits. Improved flow on portions of the lower Amite River

PROJECT COSTS

$60M (ROM - Diversion Weir to Whitehall)

$20M (Highway 22 to Lake Maurepas)

Undetermined (alternative long-term)

FUNDING STATUS

Funded
(LWI from Highway 22 to Lake Maurepas)

MITIGATION NEEDS

Since the completion of the Amite River and Tributaries project in the early 1960's that resulted in the construction of the Amite River Diversion Canal, weir, and associated channel modifications upstream on the Amite River to the confluence with Bayou Manchac, historic and recent bathymetric survey has indicated that sediment has been continuously accumulating in portions of the river. In some places, accumulations appear to be as high as approximately 20 feet, reducing the conveyance potential of the channel. Sediment transport modeling has demonstrated that the construction of the Amite River Diversion Canal and Weir has accelerated sediment deposition.

Section 2.4 discussed the existing 1963 O&M Manual for the Amite River and Tributaries project which outlined agreements between USACE and local police juries.

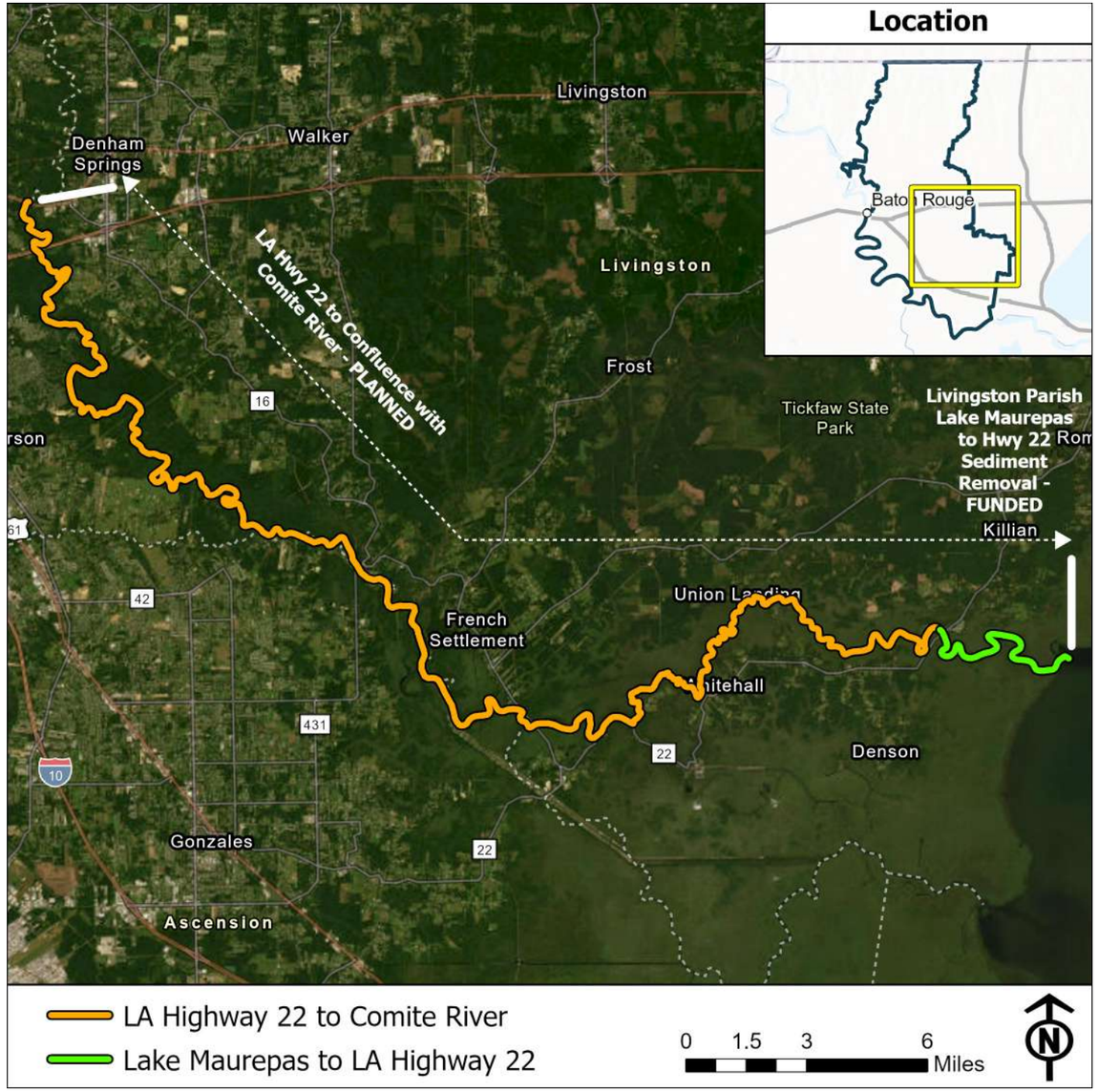
PROJECT SUMMARY

This concept project proposes to strategically remove sediment from the Amite River to restore the channel closer to the pre-USACE Amite River and Tributaries Project design conditions. This will address the historic deposition of sediment artificially accelerated by the Amite River and Tributaries project. This would be accomplished by removal of sediment in high spots, consequentially increasing channel conveyance.

Livingston Parish is in the final design phase to perform sediment removal from Lake Maurepas to LA Highway 22 using $20M of LWI funding. Sediment removal from LA Highway 22 to the confluence with the Comite River is currently in planning.

Section 4.4 discusses how ARBC will collaborate with relevant agencies and jurisdictions to conduct a comprehensive review and update to the 1963 O&M Manual for the Amite Rivers and Tributaries Project.

PROJECT LOCATION MAP



LOWER AMITE RIVER SEDIMENT REMOVAL

PREDICTIVE MODEL SUMMARY

The 2019 Investigation into the Potential Hydraulic Impacts of Dredging the Lower Amite River, performed by Dewberry on behalf of DOTD included predictive models using a simplified version of the ARBNM for various sediment removal projects. This study demonstrated generally very low sensitivity of the Amite River to sediment removal in the lower 20 miles of river upstream from the mouth of Lake Maurepas. From the Amite River Diversion Canal Weir to a point approximately 6 miles downstream, significant sediment build up was observed and removal of this sediment was determined to provide greater benefits when compared to dredging further downstream where elevations were predominantly controlled by Lake Maurepas, even when hypothetically assuming dredging of Lake Maurepas and beyond to an elevation of -35 feet below sea level. This study was used to inform the development of the Lower Amite River Sediment Removal project. The LWI HEC-RAS hydraulic model was used to simulate the removal of sediment from the Lower Amite River for the 10- and 100-year floods. A Mean Higher High Water boundary condition was assumed for these simulations. Utilizing this more detail approach when compared to the 2019 study, very low sensitivities were observed with both increases and decreases in water surface elevation occurring.

Predictive modeling of the more extensive long-term alternative sediment removal concept from the Comite River confluence to Lake Maurepas, and the sediment removal from Highway 22 to Lake Maurepas has not been performed at this time.

PROJECT IMPACTS

When comparing the more detailed LWI model used to simulate sediment removal from the Amite River Diversion Weir to Whitehall, less sensitivity was observed when compared to the 2019 study. This resulted in both increases and decreases in water surface elevation in the general order of +/-0.1 feet. Due to the low sensitivity and inherent uncertainty, results have not been included.

ENVIRONMENTAL CONSIDERATIONS

Removal of sediment will help to restore original design conditions and reduce the unnatural build up of sediment adjacent to the weir.

Projects that remove sediment or restore natural conditions have the potential to improve water quality, fisheries and natural habitats.

REAL ESTATE CONSIDERATIONS

This project would take place within the River channel and would therefore not require real estate acquisition. Temporary construction easements and staging areas will be needed in the vicinity of the project.

PERMITTING

Required permits include but are not limited to the USACE & LDNR Joint Permit (Section 404 Permit, Rivers and Harbors Act). While a Section 408 permit is generally not required for maintenance, coordination with USACE will be required to determine maintenance versus alteration to a Federal project requiring a Section 408 permit.

PROJECT COSTS

For the lower Amite River sediment removal from the Amite River Diversion Canal Weir to Whitehall, excavation of 1.4M CY of material is estimated to be in the order of $15M with sediment disposal expected to be in the order of $30-45M.

The removal of sediment from Highway 22 to Lake Maurepas is estimated to be $20M.

The estimated cost of the ARBC Master Plan long-term alternative sediment removal from the Comite River confluence to Lake Maurepas has not been determined.

FUNDING CONSIDERATIONS

The Lower Amite River Sediment Removal Project has been identified by the ARBC Board of Commissioners as a priority project using LWI Round 2 funding where $20M of LWI funding is planned to be used to remove sediment for Highway 22 to Lake Maurepas.

BENEFIT COST ANALYSIS

A benefit cost analysis has not been performed for this project.

SEQUENCING AND DEPENDENCIES

This project would help to restore the Lower Amite River to conditions closer to the natural and design conditions of the Amite River and Tributaries project. The project should be performed before or concurrent with the Amite River Diversion Canal Weir Rehabilitation.

NEW RIVER STORMWATER MANAGEMENT PUMP STATION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

Ascension Parish

PROJECT STATUS

Feasibility and Planning

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension Parish in the upper New River basin, Spanish Lake and Bluff Swamp areas. Portions of East Baton Rouge and Iberville Parishes in the Spanish Lake and Bayou Manchac basin.

STRUCTURES REMOVED (100-YEAR FLOOD)

Amite Backwater - 388

Localized Rainfall - 503

ADDITIONAL STRUCTURES WITH DECREASED FLOODING (100-YEAR FLOOD)

Amite Backwater - 890

Localized Rainfall - 3,376

ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

Amite Backwater- $33M

Localized Rainfall- $66M

PROJECT COSTS

$61M (Phase 1)

$48M (Phase 2)

FUNDING STATUS

Funded (Ascension Parish and LWI)

MITIGATION NEEDS

The Spanish Lake and Bluff Swamp Area (SLBSA) is a 17,000-acre bowl like swamp that can detain large volumes of water during both backwater flooding events driven by the Amite River and intense localized rainfall. However, the area suffers from flat topography and limited outflow through gated structures at Alligator, Frog and Fish Bayous; all of which drain into Bayou Manchac and eventually to the Amite River. During backwater events, like the August 2016 flood, and heavy localized rainfall events, like in May 2021, water levels in the SLBSA increase until the area fills up with water. As rising water fills the SLBSA, water flows across LA Highway 74 towards New River and overwhelms drainage in the area which creates flooding issues in Geismar, Dutchtown and St. Gabriel. Additionally, this water must travel 17 miles to the Marvin Braud Pump Station to be pumped out.

PROJECT SUMMARY

The proposed project includes four key improvements for water management and flood control: Conveyance channel improvements, water control structures, a pump station at the Mississippi River to remove stormwater from the system, and an improved rain gauge network to inform the operation of system features. The channel improvements consist of excavating over 6 miles of channels to connect Bluff Swamp to New River. The water control structures include construction of multi-barrel box culverts with sluice gates at Highway 74 south of Bluff Swamp to manage water flow. The pump station at the Mississippi River will have a capacity of 1,200 cfs and will pump water from a new pump at New River over the Mississippi River Levees into the Mississippi River. The new pump station will enable both pre- and post-event drawn downs of the swamps, creating additional flood storage potential and help to manage peak water levels during flood events. This project will also reduce the amount of water that has to be pumped at the Marvin Braud Pump Station. The installation of new gauges at four locations, connected to a Supervisory Control and Data Acquisition (SCADA) system for real-time monitoring of rainfall and water levels will give a better operational ability to manage storage and optimize the use of the pump station to remove stormwater from the system and mitigate flooding.

PROJECT LOCATION MAP

NEW RIVER STORMWATER MANAGEMENT PUMP STATION PROJECT (SOURCE: ARBC)

NEW RIVER STORMWATER MANAGEMENT PUMP STATION

PREDICTIVE MODELING SUMMARY

The scenarios were modeled on behalf of Ascension Parish, using the updated and modified Marvin Braud and Bayou Manchac Watershed 2D HEC-RAS models developed during the preparation of Ascension Parish Floodplain Management Plan in 2022. Following these simulations, project costs and a preliminary benefit-cost analysis were conducted based on the model results and building information.

Additionally, LWI has utilized the New River Stormwater Management Pump Station as a proof of concept demonstration project for the new high detailed HEC-HMS and HEC-RAS hydrologic and hydraulic models for the Amite River Basin and Lake Maurepas basin which have been used to assess the performance of the system for both rainfall driven and Amite River backwater flooding conditions and provided to Ascension Parish as a tool for further assessment.

The LWI modeling modified the original concept provided by Ascension Parish to include a wider gate system under Highway 74 which significantly decreased the draw down times for Spanish Lake.

PROJECT IMPACTS

The project's main benefits are the ability to manage water levels, decrease water surface elevations in the swamp before storms, and facilitate faster drainage during flood emergencies. The project directly benefits 41 square miles and indirectly benefits 205 square miles. This project is anticipated to remove 4,000 – 7,100 acre-feet (1.3 to 2.3 billion gallons) of water from the Bayou Manchac / Marvin Braud Basins in a 10-year and 500-year storm event, respectively. This is a critical benefit to Ascension, Iberville, East Baton Rouge, Livingston, and St. James Parishes.

The following project impacts were determined using the LWI Proof of Concept demonstration project modeling which included the use of LWI HEC-FIA economic consequences model that utilized AI derived finished floor elevation information for structures. The proposed canal demonstrated adequate capacity to convey flows equivalent to the pump capacity. Therefore this project demonstrates the potential for a second phase whereby the pumping capacity is increased to provide further project benefits. This would likely require additional culverts under Highway 74 to equal the pump and canal capacity.

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR STORM FLOOD EVENTS FOR STORMS OVER BAYOU MANCHAC AND NEW RIVER BASIN

LOCATION	10-YEAR STORM FLOOD IMPACTS (FT)	100-YEAR STORM FLOOD IMPACTS (FT)
Downstream of Confluence with Grand Goudine Bayou	- 0.3	- 0.16
New River at Old Jefferson Highway	- 3.79	- 2.92
New River just downstream of Interstate 10	- 2.09	- 1.3
Spanish Lake/Bluff Swamp	- 0.48	- 0.68
New River just upstream of Airline Highway	- 0.19	- 0.03

PROJECT IMPACTS

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS

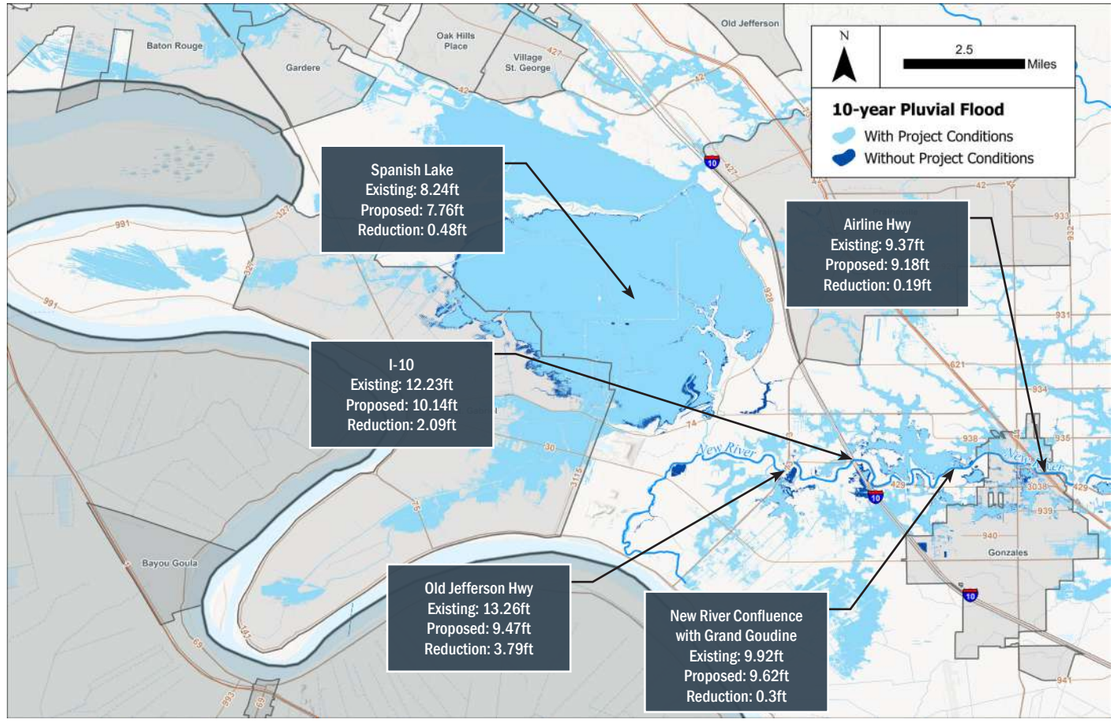
LOCATION	10-YEAR STORM FLOOD IMPACTS (FT)	100-YEAR STORM FLOOD IMPACTS (FT)
Downstream of Confluence with Grand Goudine Bayou	- 0.44	- 0.69
New River at Old Jefferson Highway	- 3.29	- 3.99
New River just downstream of Interstate 10	- 1.71	- 2.25
Spanish Lake/Bluff Swamp	- 0.61	- 0.87
New River just upstream of Airline Highway	- 0.43	- 0.73

STRUCTURE AND ECONOMIC IMPACTS OF THE PROJECT

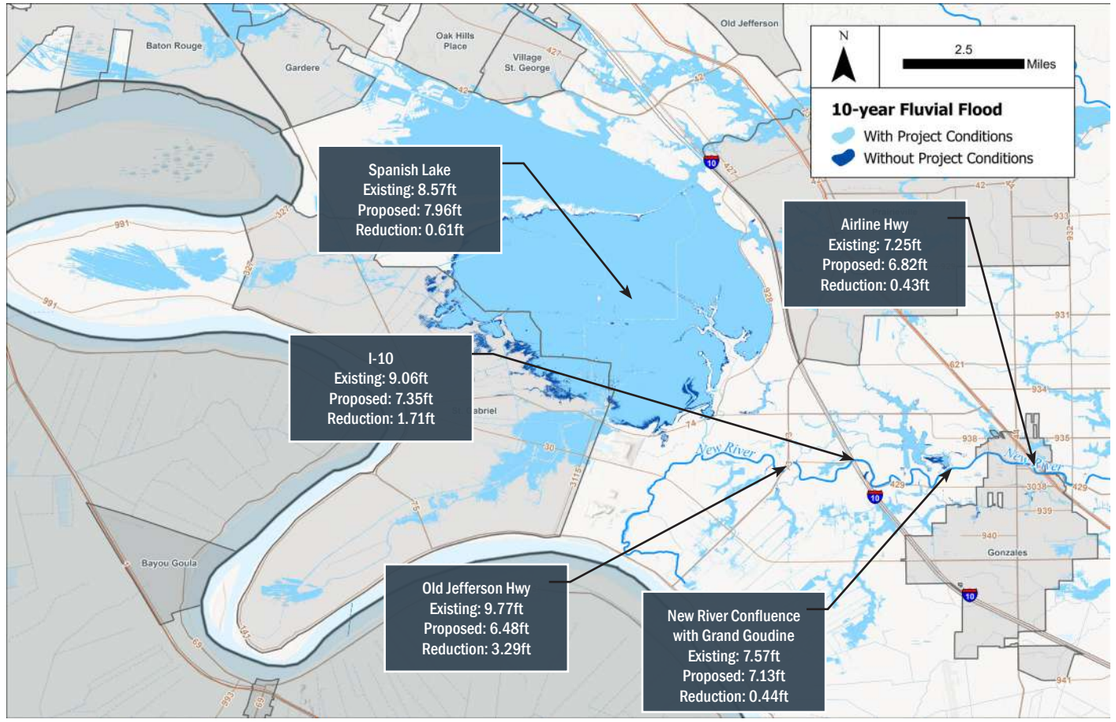
FLOOD EVENT	STRUCTURES REMOVED	ADDITIONAL STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES AVOIDED
10-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU MANCHAC AND NEW RIVER BASIN – (RAINFALL DRIVEN LOCALIZED FLOODING)	280	814	$19,234,000
100-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU MANCHAC AND NEW RIVER BASIN – (RAINFALL DRIVEN LOCALIZED FLOODING)	503	3,376	$65,903,000
10-YEAR AMITE RIVER BACKWATER FLOODING EVENTS – (AMITE BACKWATER CONDITIONS)	58	349	$4,438,000
100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS – (AMITE BACKWATER CONDITIONS)	388	890	$33,424,000

NEW RIVER STORMWATER MANAGEMENT PUMP STATION

PROJECT IMPACTS MAP



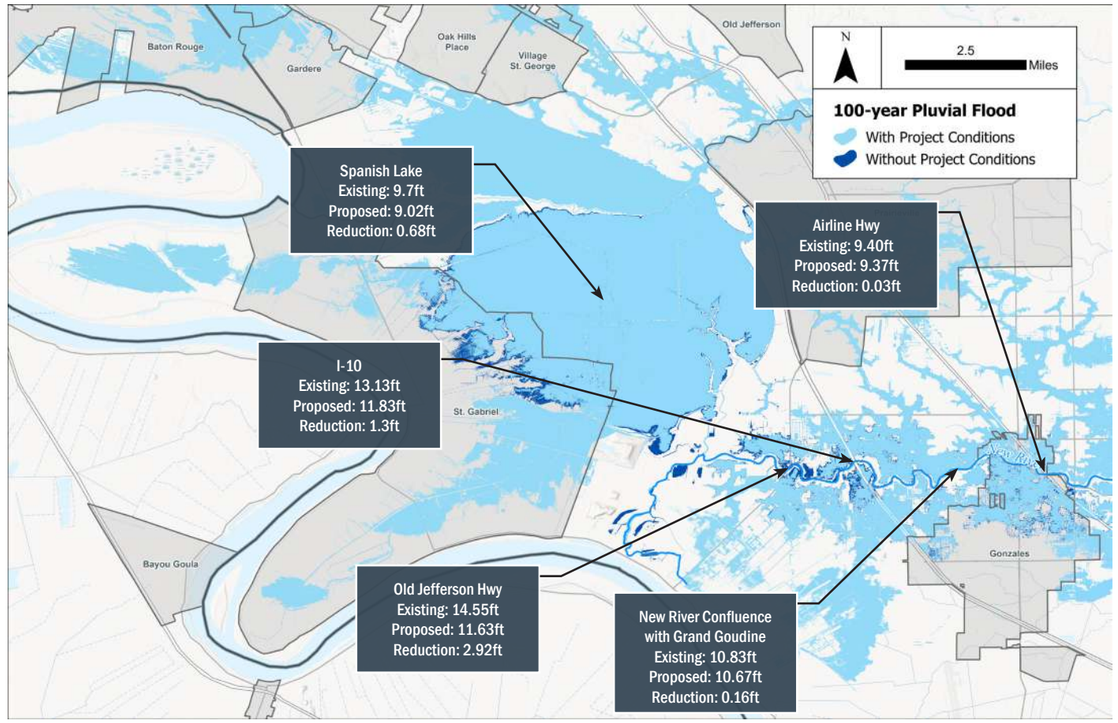
FLOOD IMPACTS FOR THE 10-YEAR STORM FLOOD EVENTS FOR STORMS OVER BAYOU MANCHAC AND NEW RIVER BASIN



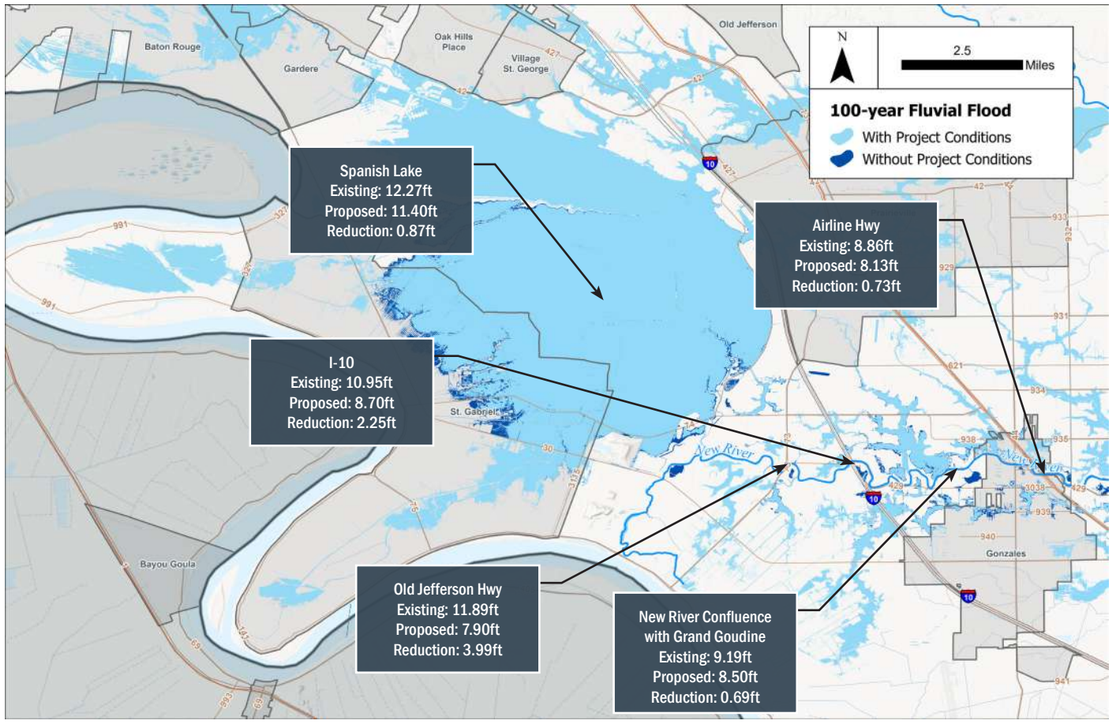
FLOOD IMPACTS FOR THE 10-YEAR AMITE RIVER BACKWATER FLOODING EVENTS

NEW RIVER STORMWATER MANAGEMENT PUMP STATION

PROJECT IMPACTS MAP



FLOOD IMPACTS FOR THE 100-YEAR STORM FLOOD EVENTS FOR STORMS OVER BAYOU MANCHAC AND NEW RIVER BASIN



FLOOD IMPACTS FOR THE 100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS

NEW RIVER STORMWATER MANAGEMENT PUMP STATION

ENVIRONMENTAL CONSIDERATIONS

The proposed project promotes various nature-based components benefiting the ecosystem throughout the area. The project uses a combination of grey and green infrastructure to leverage natural features, reduce flood risk and improve water quality. This project maximizes the utilization of existing ecological systems to manage flood risks effectively. The installation of a pumping station at the Mississippi River will allow regulation of water in the SLBSA and help to stabilize the ecosystem. This promotes better water quality and provides a more stable environment for wildlife throughout the region. By utilizing the natural infrastructure and integrating it with conventional infrastructure, the project aims to achieve sustainable and resilient flood management while preserving and restoring natural systems. The pump station will regulate water levels and help reduce anoxic conditions in stagnated water.
The SLBSA has several mitigation banks within its 17,000-Acre area that will also benefit from water management by allowing vegetation to return to more stable wetting and drying periods. There are approximately 7.5 acres of mitigation that will be required for a total of $600,000.00.

REAL ESTATE CONSIDERATIONS

Acquisition of land will be required to construct, operate, and maintain the project. Ascension Parish will provide funding for property acquisitions including drainage servitudes, flowage easements and right-of-way. Ascension Parish, through the East Ascension Consolidated Gravity Drainage District No.1, is currently exploring acquisition of properties within the project limits. The parish has completed agreements and fully acquired property for a portion of the project limits. Other parcels of property have been donated. There are continuing discussions regarding acquiring additional property within the project limits. There is an estimated 10.0 acres of land acquisition that will be required. The average cost per acre is $80,000, which totals to $800,000 for land acquisition. NOTE: this may come down if property owners donate the land.

PERMITTING

This project will require permitting from USACE (Section 10, 401 and 404), the Louisiana Department of Natural Resources (Coastal Use Permit), the Department of Transportation, and Department of Environmental Quality (LPDES - LAR100000).

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

Additional approval will be required from PLD for the levee crossing and DWF.

PROJECT COSTS (FOR PHASE 1)

SERVICE	COST
Project Management	$48,379.81
Topographic Survey	$107,403.74
Geotechnical Analysis	$107,403.74
H&H Analysis	$53,701.87
Engineering & Permitting	$5,370,186.80
Resident Inspection	$537,018.68
Construction Management	$1,074,037.36
Wetland Mitigation	$600,000.00
Right of Way	$800,000.00
Construction Cost	$52,301,868.00
Total Cost	$61,000,000.00

The project will have an annual operation and maintenance cost of $150,000 per year. These figures were generated by HNTB in 2024 as an estimate prepared for an LWI grant application on behalf of Ascension Parish.

FUNDING CONSIDERATIONS

Funding sources for Phase 1 include LWI ($40M) and Ascension Parish ($21M). Funding for Phase 2 may include LWI Round 2 Funding and BRIC grants. Funding required for Phase 2 is approximately $48M. Additionally funding may potentially be provided through collaboration with other parishes that would benefits from the project.

BENEFIT COST ANALYSIS

The total project benefits of this project are estimated to be $178,006,358.00 which gives a BCA of 1.7. The project's useful life is 50 years. This information was generated by Hartman Engineering and FTN as part of a BRIC Application in 2024.

SEQUENCING AND DEPENDENCIES

This project can be a standalone project and will not depend on any other projects since it takes water out of the Amite River Basin system into the Mississippi River. However, it can potentially mitigate negative impacts of other projects, making them feasible and furthering flood risk reduction benefits in other areas of the Amite River Basin.

WEST SHORE CONNECTOR LEVEE

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

St. James Parish

PROJECT LEAD AGENCY

St. James Parish

PROJECT STATUS

Design Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Grand Point, Lutcher and Gramercy within St. James Parish

PROJECT COSTS

$104M

FUNDING STATUS

Partially funded (LWI, PLD, St. James, CPRA and GOMESA)

MITIGATION NEEDS

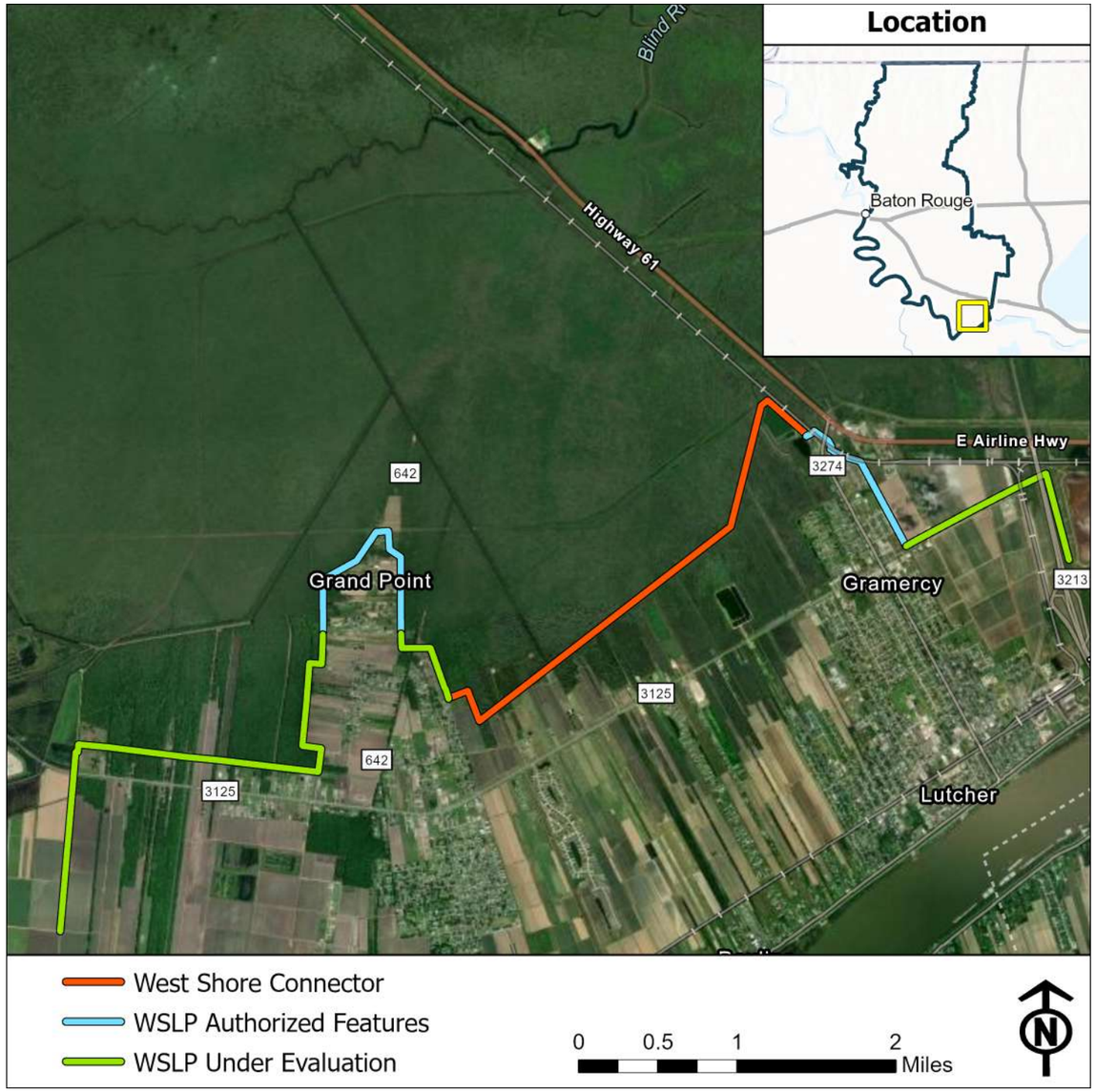
The East Bank of St. James Parish has faced severe flooding from storm surge including Hurricane Isaac in 2012 and Hurricane Ida in 2021, as well as riverine flooding during the flood of 2016. These events caused widespread damage to communities near Lutcher and Gramercy, which lack hurricane levee protection, resulting in millions of dollars in losses.

PROJECT SUMMARY

The West Shore Connector Levee Project establishes a continuous, sustainable levee corridor for St. James Parish, while also creating viable, long-term community resiliency by providing additional flood protection. This project installs a connector levee that will connect the two WSLP ring levees protecting Grand Point and Gramercy in St. James Parish. The proposed plan includes approximately 3.55 miles of levee, two pump stations with a combined capacity of 975 CFS, two drainage structures with six 6-ft by 6-ft gated openings, three environmental water control structures, and proposed access road improvements. This project is currently in the planning and design phase by St. James Parish.

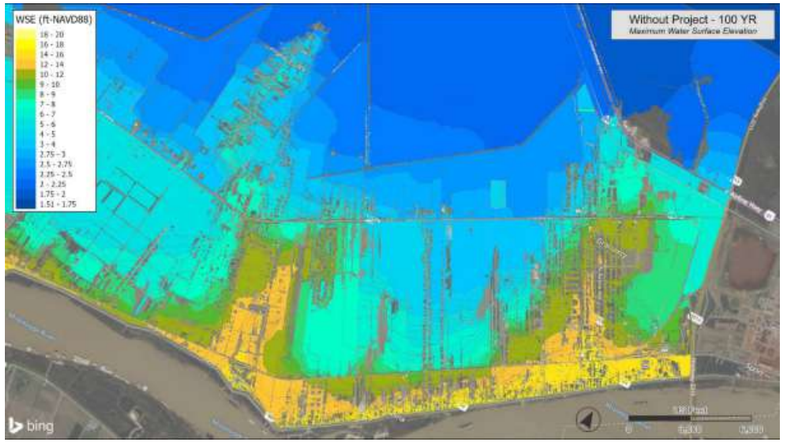
The project is designed for the projected year 2070 100-year wind driven flooding at elevation 13.0 ft NAVD88. Initial levee construction will provide protection from the 2027 100-year flood at elevation 6.2 ft NAVD 88 with a final levee height of 7.5 ft. Planned raises over the 50-year life of the project will continue to provide a 100-year level of protection through 2070.

PROJECT LOCATION MAP

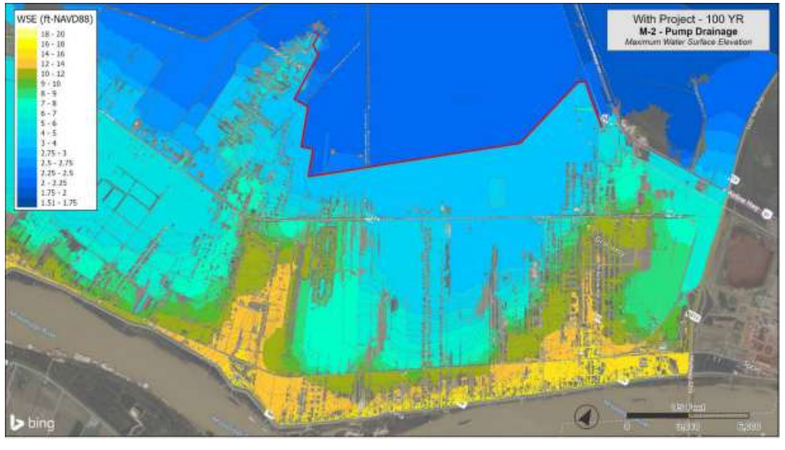


WEST SHORE CONNECTOR LEVEE

PROJECT IMPACTS MAP



INTRACOASTAL CONSULTANTS' WEST SHORE CONNECTOR LEVEE INTERIOR DRAINAGE ANALYSIS ON BEHALF OF ST. JAMES PARISH
FIGURE 23: WITHOUT PROJECT 100-YR RESULTS: MAXIMUM WATER SURFACE ELEVATION



INTRACOASTAL CONSULTANTS' WEST SHORE CONNECTOR LEVEE INTERIOR DRAINAGE ANALYSIS ON BEHALF OF ST. JAMES PARISH
FIGURE 29: WITH PROJECT M-2 (PUMP) 100-YR: MAXIMUM WATER SURFACE ELEVATION

PREDICTIVE MODELING SUMMARY

A March 2024 study prepared by Intracoastal Consultants on behalf of St. James Parish utilized HEC-RAS and HEC-HMS to model 10-year and 100-year flood events for existing (without project) proposed (with project) conditions. The proposed conditions included the levee connection, pump stations, and drainage structures. A key objective of this study was to determine the size of pumps required to ensure that the project does not worsen rainfall driven flooding behind the proposed levee system.

To support the development of this Master Plan, LWI Modeling for the Lake Maurepas basin was used to determine existing flood elevations from rainfall driven flooding events. Additionally wind driven surge elevations from the Coastal Master Plan were used to determine flood risk. The LWI HEC-FIA model was then utilized to determine economic losses with and without wind driven surge to determine the potential benefits of the project.

PROJECT IMPACTS

The map is taken from Intracoastal Consultants' West Shore Connector Levee Interior Drainage Analysis report dated January 2024. The map is based on the interior drainage analysis for the system, aimed at estimating the required capacity to maintain consistent maximum water surface elevation (WSE) values on the protected side of the proposed alignments. This analysis compares conditions with and without the project (WOP) under a 100-year design storm event to ensure the desired level of protection is achieved. The results show minimal changes in WSE across the project area, with no increases on the interior basin, however, the area is currently not protected from wind driven surge which poses a greater risk of flooding. Overall, the map demonstrates that the project effectively enhances interior drainage and provides improved flood protection from wind driven flooding.

ENVIRONMENTAL CONSIDERATIONS

The West Shore Connector Levee Project is expected to impact 24.7 acres of forested wetlands. These wetlands are primarily cypress swamp and hardwood bottom. Therefore, wetland mitigation actions will be required during construction of the levee to offset impacts. Additionally, these wetlands serve as potential habitats for both the bald eagle and colonial nesting water birds, which are listed as threatened or endangered.

It should be noted that once operational, the environmental water control structures will allow water to flow through the levee alignment and be redistributed on the flood side, thus ensuring the freshwater connectivity for the remaining wetlands.

REAL ESTATE CONSIDERATIONS

A Capital Outlay Request was signed into law in 2023 for an amount of $18.6 million. Included in that request were cost considerations for land acquisition, including required right-of-way acquisitions and construction staging. In total, about 70 acres owned by 60 different landowners was required for this project. Currently, acquisition is ongoing.

PERMITTING

Permits will be required from the United States Army Corps of Engineers (Section 404, Section 408, and Section 10), the Louisiana Department of Environmental Quality (LPDES – LAR100000) and Water Quality section 401, Department of Natural Resources (Coastal Use Permit), and Department of Transportation. With real estate acquisition and some easement needs, permits will be required for land use.

WEST SHORE CONNECTOR LEVEE

PROJECT COSTS

PROJECT COST: Intracoastal Consultants' June 11th, 2024 Project Status Update PowerPoint Presentation

PROJECT COSTS	
SERVICE	**COST**
Pre-Construction Engineering (Design and Inspection)	$10,909,238
Wetland Mitigation	$1,482,000
ROW Acquisition	$668,675
Construction for Pump Stations and Drainage Structures (w/ Contingency)	$70,080,000
Construction for Levees, Environmental Water Control Structures, etc. (w/ Contingency)	$20,830,320
Total Cost	**$103,970,233**

FUNDING CONSIDERATIONS

Total estimated Project cost is approximately $104M. Identified Funding sources for the project include $10M from LWI round 2, $33M from a combination of State Capital Outlay Funds, PLD, CPRA, and St. James Parish Local Funds for a total of $43M. Additional funding will be needed to construct the project and there is the possibility that the USACE may construct one of the pump stations.

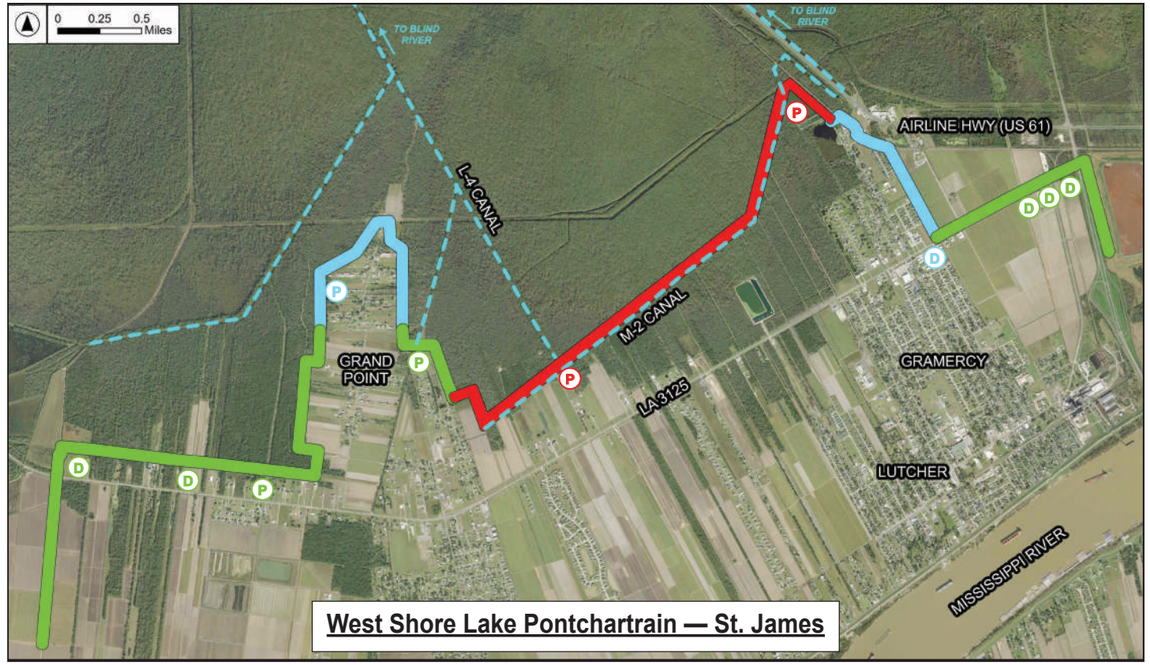
BENEFIT COST ANALYSIS

A BCA was not applicable for this project.

SEQUENCING AND DEPENDENCIES

This project is dependent on the completion of the two ring levees on either side of the West Shore Connector Levee. This project is not dependent on any other projects in the area.

PROJECT LOCATION MAP



West Shore Connector (St. James Parish)
- Levee
- Pump Stations and Drainage Structures

WSLP Authorized Features (USACE)
- Levee
- Pump Stations
- Drainage Structures

WSLP Under Evaluation (USACE)
- Levee
- Pump Stations
- Drainage Structures

INTRACOASTAL CONSULTANTS ON BEHALF OF ST. JAMES PARISH
(SOURCE: INTRACOASTAL CONSULTANTS ON BEHALF OF ST. JAMES PARISH)

3.5 PROJECTS

MAJOR REGIONAL PROJECTS

This section summarizes predictive modeling results where available and additional key information.

Disclaimer

The information, data, analyses, projections, and recommendations contained in this Master Plan are provided for informational and planning purposes only. The Amite River Basin Commission (ARBC) has compiled this report using available resources, studies, and data; however, the ARBC has not independently verified all information contained herein.

The content of this report should not be relied upon as a sole basis for making legal, financial, or real estate decisions, including but not limited to property purchases, development planning, or flood risk assessments. Any individual, entity, or agency utilizing this report or any of its components should conduct independent verification and consult with appropriate professionals before making decisions based on the information contained in this document.

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UPPER AMITE DETENTION (MINOR) SITE 1

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Feliciana and St. Helena Parishes

PROJECT LEAD AGENCY

Undetermined

PROJECT STATUS

Concept phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, East Feliciana, Livingston, and St. Helena Parishes adjacent to the Amite River

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

3,800/14,770 (Alternative 1/2 after mitigation of flood pool area)

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$21M/$116M (Alternative 1/2 after mitigation of flood pool area)

PROJECT COSTS

$200M-$500M (ROM)

FUNDING STATUS

N/A

MITIGATION NEEDS

The Amite River Basin has a long history of major riverine driven flooding. Notable flooding events during the past 50-years include the April 1977, April 1983, January 1990, January 1993, June 2001, March 2016 and August 2016 flood of record.

During these events, the metropolitan Baton Rouge and surrounding areas experienced extensive flooding. Estimates for the August 2016 flood indicate that over 70,000 structures were flooded within the basin resulting in over $4B of economic losses and 7 lives lost.

PROJECT SUMMARY

The dam would be located on the Amite River, approximately 5 miles west-northwest of Pine Grove. It is designed as an overflow dam with uncontrolled passive outlet structures, featuring multi-stage over-topping weirs intended to reduce downstream flow by temporarily detaining flood discharges. Two alternative dam designs are evaluated for their effectiveness in flow reduction.

The location of the dam would allow it to intercept rainfall runoff of approximately 802 square miles of upstream watershed. The Amite River Basin upstream of the Comite River confluence, just north of downtown Baton Rouge, is 900 square miles demonstrating that the flood pool would intercept 89% of the watershed. Just downstream of the Comite River confluence in Denham Springs, the basin is 1,300 square miles demonstrating that the flood pool would intercept 62% of the watershed.

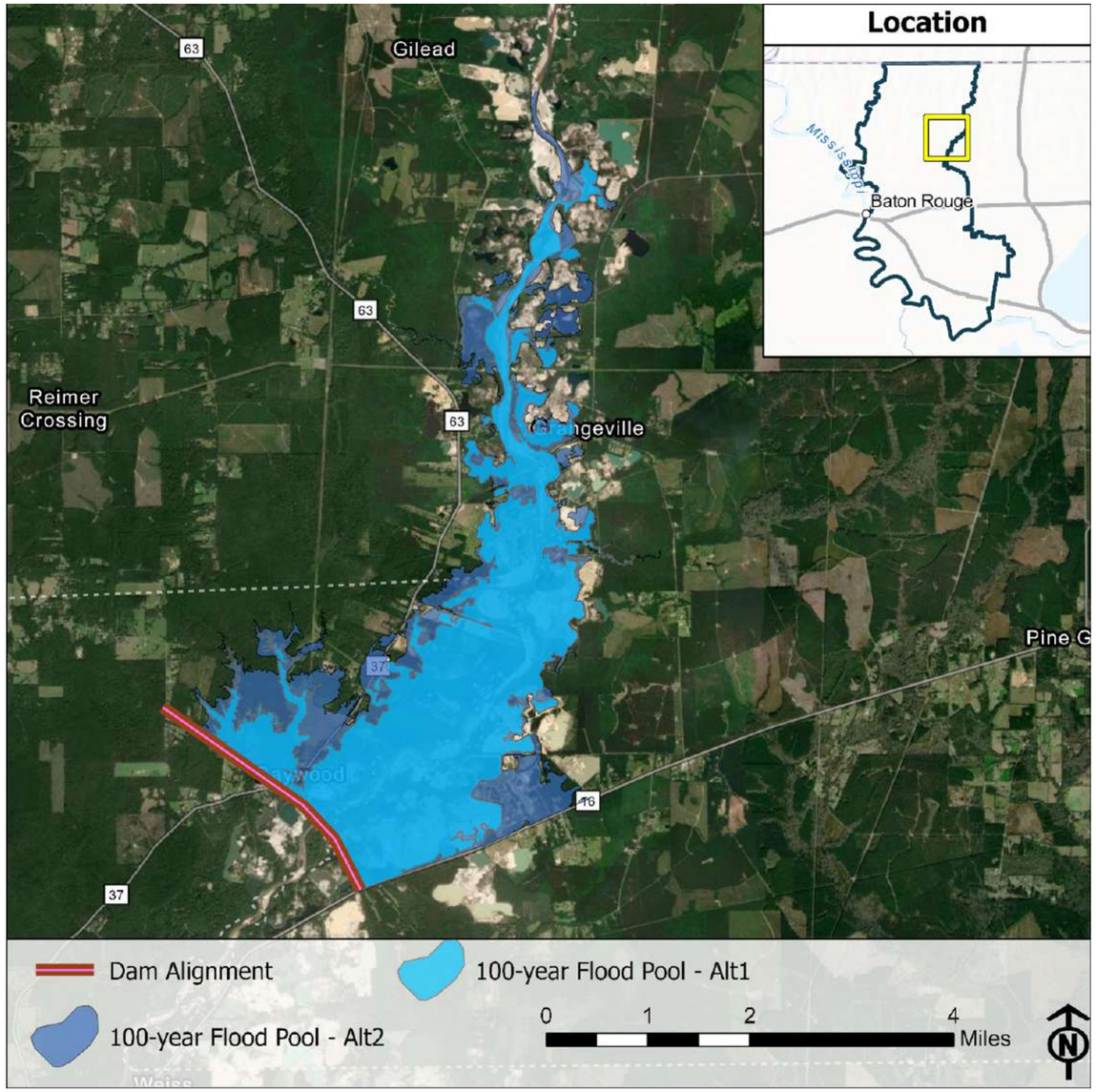
Two design alternatives of this concept project were studied as an LWI Proof of Concept demonstration in December 2024.
Key geometric information for the two alternatives include:

GEOMETRIC DATA FOR BAYWOOD DETENTION DAM

DESIGN ALTERNATIVE	DAM LENGTH (FT)	DAM CREST ELEVATION (FT)	STAGE 1 – WEIR LENGTH (FT)
Alternative 1	14,245	106	200
Alternative 2	14,245	114.2	200

STAGE 1 – WEIR CREST ELEVATION (FT)	STAGE 2 – WEIR LENGTH (FT)	STAGE 2 – WEIR CREST ELEVATION (FT)
80	200	90
80	200	103.5

PROJECT LOCATION MAP



UPPER AMITE DETENTION (MINOR) SITE 1

PREDICTIVE MODELING SUMMARY

The LWI HEC-RAS Proof of Concept demonstration was used to assess the potential impacts of the project as previously identified in DOTD's response to HR 290 of the 2023 regular legislative session. In this study, multiple design storms were used to demonstrate the benefits of the reservoir for floods within the Baton Rouge Metropolitan Area ranging from the 10-year through to the 500-year flood.

These models were developed using 2018 quality level 1 LiDAR collected by DOTD and supplemented by 2017 USACE bathymetry and included additional ground-based survey collected by DOTD between 2017 and 2024.

PROJECT IMPACTS

Modeling results demonstrated that some small benefits could be realized from the concept. In design alternative 1, during the 100-year flood, downstream of the reservoir approximately 975 structures are expected to be prevented from flooding and a further 17,862 structures would experience minor reductions reduced flooding.

Estimated reductions in flood elevations.

LOCATIONS	ALTERNATIVE 1– 10YR FLOOD ELEVATION IMPACTS (FEET)	ALTERNATIVE 1– 100YR FLOOD ELEVATION IMPACTS (FEET)	ALTERNATIVE 2 – 10YR FLOOD IMPACTS (FEET)	ALTERNATIVE 2 – 100YR FLOOD ELEVATION IMPACTS (FEET)
Amite River at Magnolia Bridge Road	- 0.12	- 0.32	- 0.73	- 1.35
Amite River at Florida Avenue, Denham Springs	- 0.17	- 0.04	- 0.63	- 0.59
Amite River just downstream of Interstate 12	- 0.08	- 0.14	- 0.5	- 0.5
Amite River at Highway 42 in Port Vincent	- 0.18	- 0.06	- 0.14	- 0.34
Amite River at Highway 16 in French Settlement	- 0.03	- 0.03	- 0.06	- 0.1
Amite River Diversion Canal at Highway 22	- 0.06	- 0.03	- 0.07	- 0.03
Comite River at Central Throughway	- 0.25	- 0.14	- 0.58	- 0.61
Amite River Bayou Manchac confluence	- 0.09	- 0.1	- 0.07	- 0.47

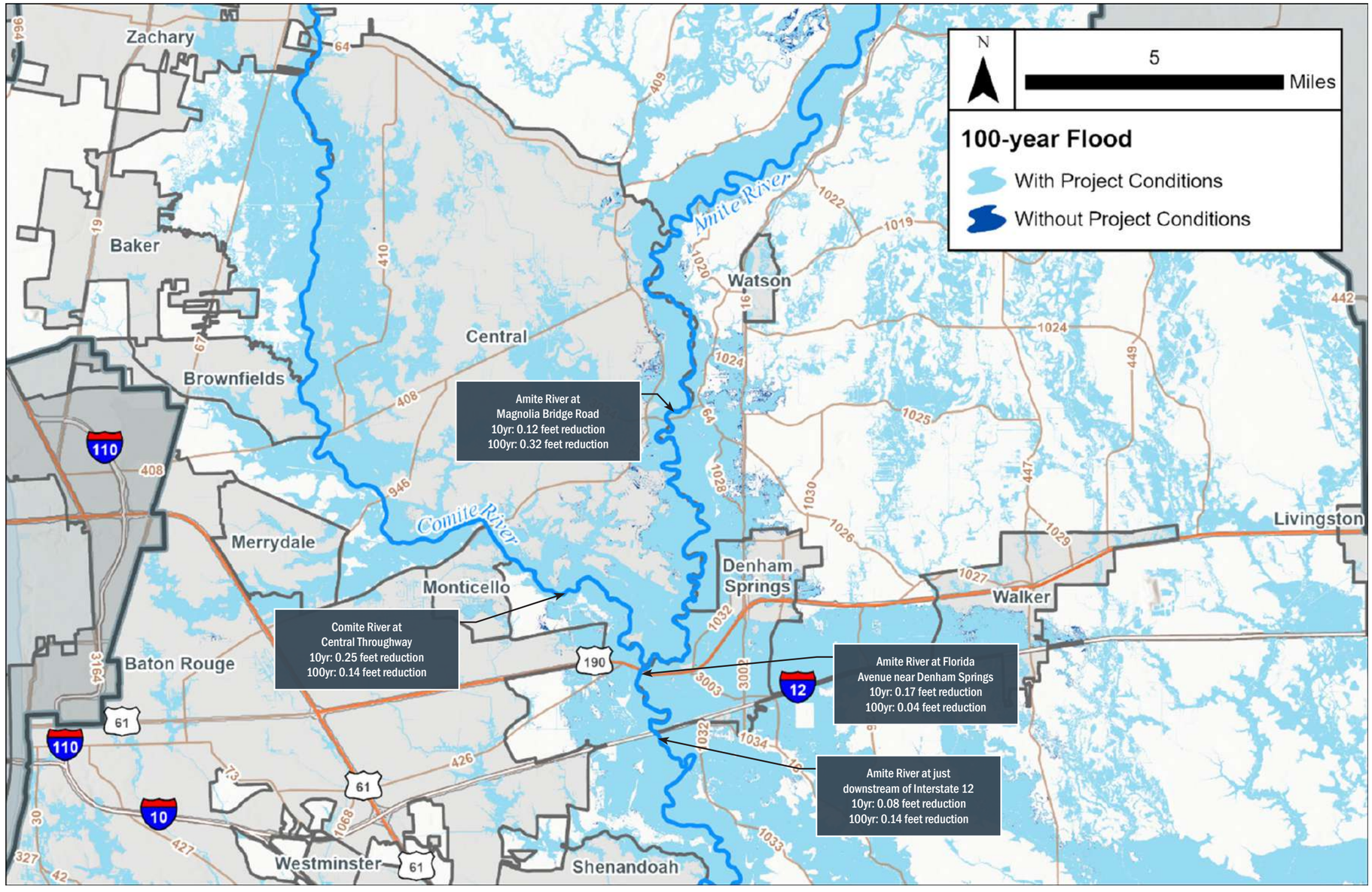
PROJECT IMPACTS

Through LWI, these results were run using the 2024 LWI HEC-FIA consequences models which demonstrated minor reductions in structures flooded and economic losses avoided as summarized below.

	FLOOD EVENT	STRUCTURES REMOVED OR ADDED	STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES
Design Alternative 1				
Upstream of Dam	10-year flood	9 added	0	$1.72M added
Downstream of Dam		77 removed	4,163	$11.75M avoided
Upstream of Dam	100-year flood	20 added	0	$2.98M added
Downstream of Dam		N/A	17,862	$95.25M avoided
Design Alternative 2				
Upstream of Dam	10-year flood	20 added	0	$3.37M added
Downstream of Dam		188 removed	3,853	$20.75M avoided
Upstream of Dam	100-year flood	86 added	0	$8.6M added
Downstream of Dam		N/A	14,766	$116.4M avoided

UPPER AMITE DETENTION (MINOR) SITE 1

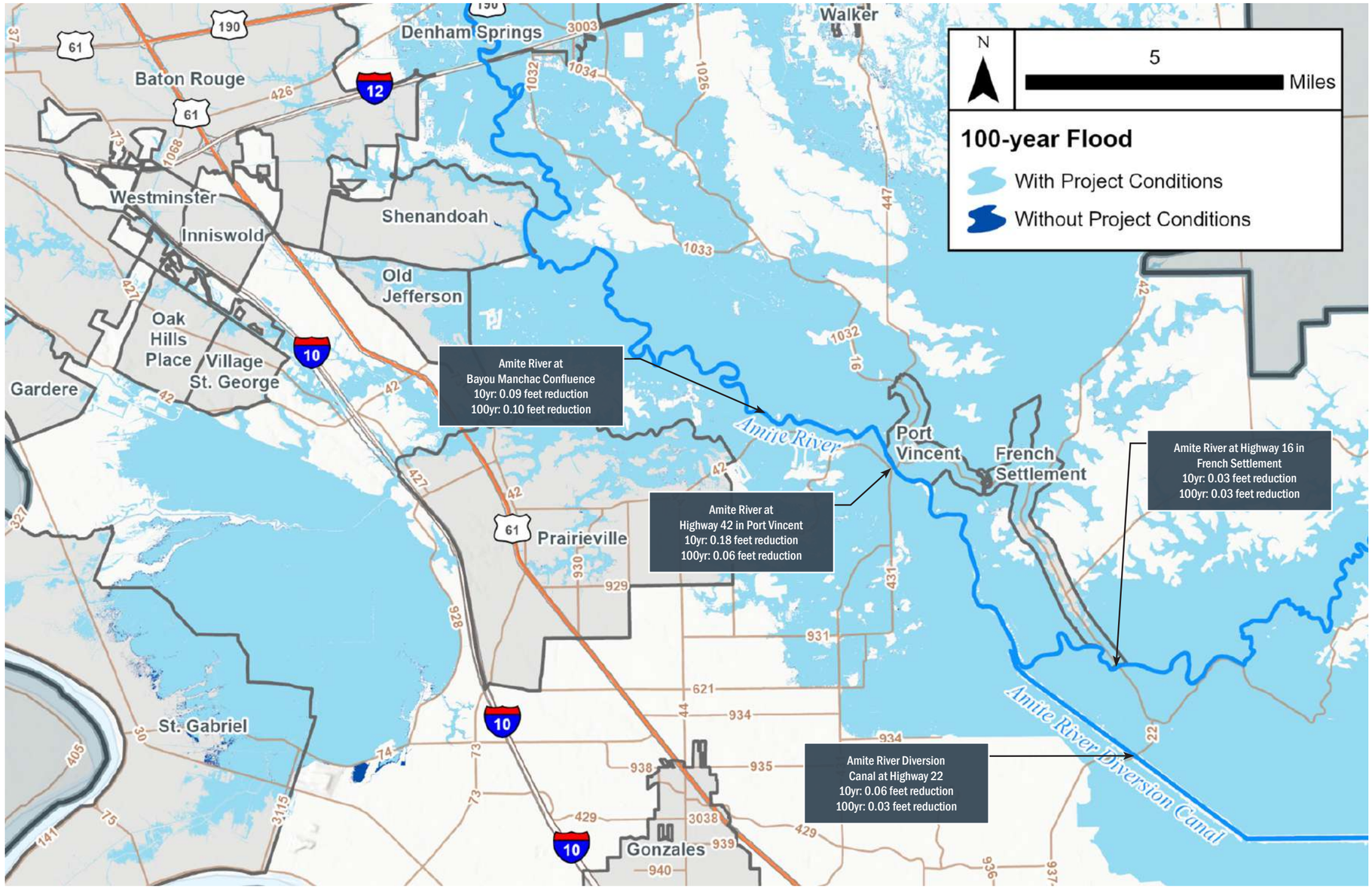
PROJECT IMPACTS MAP



UPSTREAM IMPACT MAP – FLOOD ELEVATION REDUCTION (ALT1)

UPPER AMITE DETENTION (MINOR) SITE 1

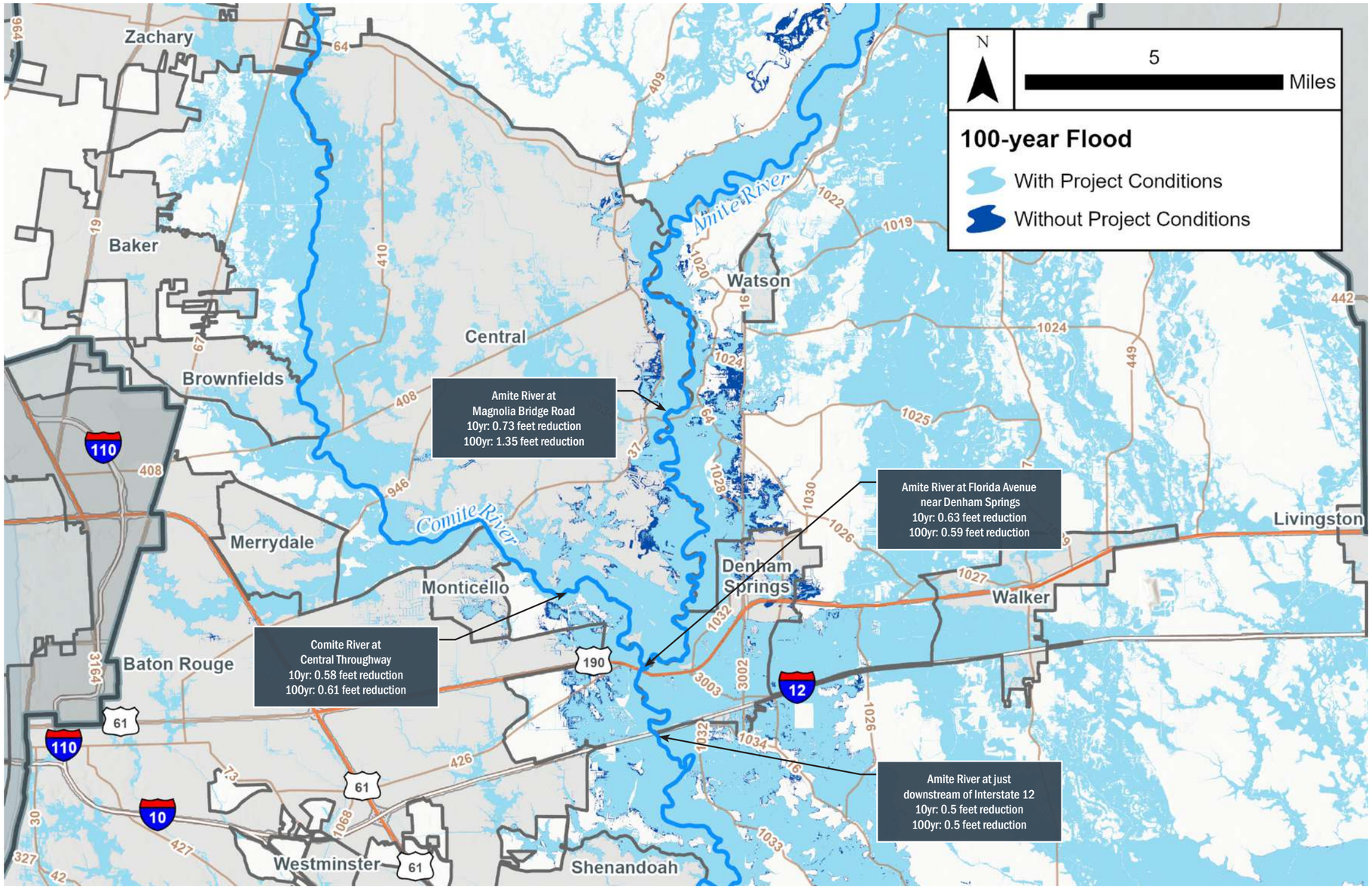
PROJECT IMPACTS MAP



DOWNSTREAM IMPACT MAP – FLOOD ELEVATION REDUCTION (ALT1)

UPPER AMITE DETENTION (MINOR) SITE 1

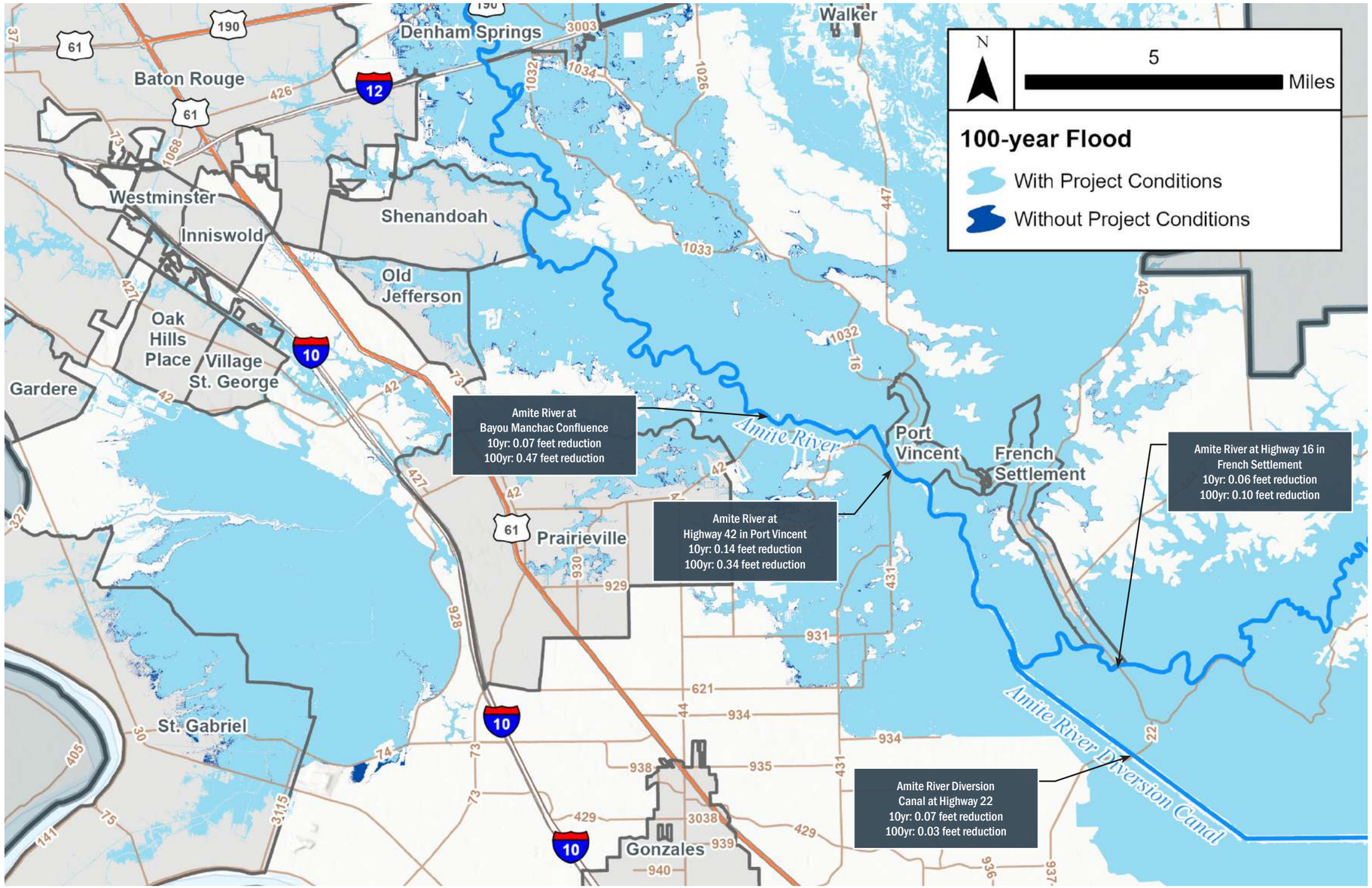
PROJECT IMPACTS MAP



UPSTREAM IMPACT MAP – FLOOD ELEVATION REDUCTION (ALT2)

UPPER AMITE DETENTION (MINOR) SITE 1

PROJECT IMPACTS MAP



DOWNSTREAM IMPACT MAP – FLOOD ELEVATION REDUCTION (ALT2)

UPPER AMITE DETENTION (MINOR) SITE 1

ENVIRONMENTAL CONSIDERATIONS

The reservoir pool will create a waterway barrier preventing upstream and downstream movement of fish. During rare extreme flooding events, the flood pool area will experience extended periods of deeper water which will temporarily displace wildlife for a wider extent than that naturally occurring floodplain.

There would be a need for wetland mitigation to include purchasing of bottom land hardwood mitigation bank credits, creation and enhancement of bottom land hardwood habitats to mitigate the impact of the creation of the dam and associated borrow pits and staging areas. There would also be a potential need to mitigate the inflated heelsplitter mussel if found within the footprint of the project during field survey.

REAL ESTATE CONSIDERATIONS

Real estate will have to be acquired to build the dam feature, and areas within the flood pool would need to either be acquired or easements purchased. In design alternative 1, it is estimated that approximately 38 structures are located within the 100-year flood pool based on the National Structure Inventory, whereas design alternative 2 includes 119 structures within the 100-year flood pool. The type of structures is undetermined and may include residential, accessory structures or non-permanent residences.

Several potential relocations would need to occur including several roads, and utility lines.

PERMITTING

Permits will be required from the United States Army Corps of Engineers (Section 404, (b)(1)), LDEQ Section 401.
If built by a non-federal entity, a Dam Construction permit will be required from DOTD in accordance with LA R.S. 38:21-28.

Construction would require a stormwater General Permit from LDEQ

- ESA compliance
- Section 106 of the National Historic Preservation Act

The dam and reservoir are located within a FEMA AE flood zones with regulatory flood-way. A FEMA Conditional Letter of Map Revision will be required in accordance with 44 CFR Part 60.3(d)(4). Following construction of the dam, a Letter of Map Revision will be required in accordance with 44 CFR Part 65.3

The construction of the dam will require a permit through the DOTD Dam Safety Program in accordance with R.S. 38:21-28

PROJECT COSTS (FOR PHASE I)

TOTAL (ESTIMATED): $200M-$500M (ROM)

FUNDING CONSIDERATIONS

Due to the large size of this project, funding will likely require multiple sources and partnerships including ARBC, DOTD, and USACE.

BENEFIT COST ANALYSIS

A benefit cost analysis has not been performed at this time.

SEQUENCING AND DEPENDENCIES

The project can standalone and is not dependent on any other projects. Impacts to upstream real estate and structures would require mitigation and would be considered part of the overall project.

While downstream impacts are relatively small, these impacts are potentially large enough to mitigate negative impacts of other downstream concept projects, allowing them to be constructed with no negative impacts. These projects may potentially include Bayou Manchac Backflow Prevention Gates, clearing and snagging of the Amite River channel, rehabilitation of the Amite River Diversion Canal Weir and sediment removal.

UPPER AMITE DETENTION (MAJOR) SITE 2

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Feliciana and St. Helena Parishes

PROJECT LEAD AGENCY

Undetermined

PROJECT STATUS

Concept phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, East Feliciana, Livingston, and St. Helena Parishes adjacent to the Amite River

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

20,700
(After mitigation of flood pool area)

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$642M
(After mitigation of flood pool area)

ENVIRONMENTAL BENEFITS

Potential for water supply (if built with a wet pool), reducing the regional dependency on ground water)

PROJECT COSTS

$1-2B (ROM)

FUNDING STATUS

N/A

MITIGATION NEEDS

The Amite River Basin has a long history of major riverine driven flooding. Notable flooding events during the past 50-years include the April 1977, April 1983, January 1990, January 1993, June 2001, March 2016 and August 2016 flood of record.

During these events, the metropolitan Baton Rouge and surrounding areas experienced extensive flooding. Estimates for the August 2016 flood indicate that over 70,000 structures were flooded within the basin resulting in over $4B of economic losses and 7 lives lost.

PROJECT SUMMARY

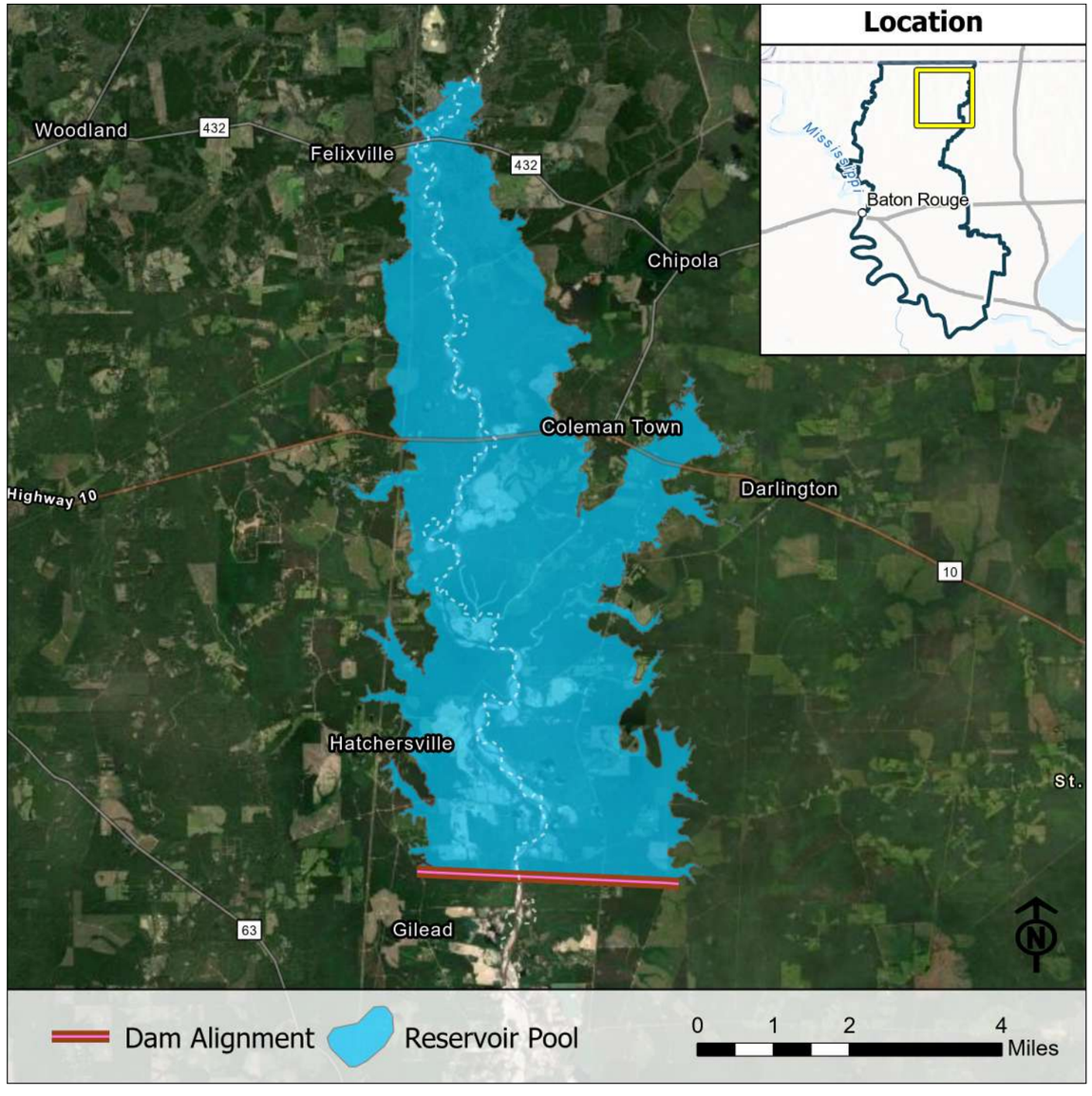
The proposed dam would be located on the Amite River just west of the town of Darlington. It would consist of an approximately 3 miles long dam with a maximum height of 90-feet at the channel and would be designed to withhold flood discharges up to the 100-year flood before engaging the emergency spillway.

The location of the dam would allow it to intercept rainfall runoff of approximately 700 square miles of upstream watershed. The Amite River Basin upstream of the Comite River confluence, just north of downtown Baton Rouge, is 900 square miles demonstrating that the reservoir would intercept and detain 78% of the watershed. Just downstream of the Comite River confluence in Denham Springs, the basin is 1,300 square miles demonstrating that the reservoir would intercept and detain 54% of the watershed.

The August 1992 USACE report Amite River Tributaries Flood Control Darlington Reservoir Feasibility Study Plan Sheets and Specifications: Alternative 13, Dry Reservoir, was utilized to obtain sizing information for the proposed structure to provide a 100-year level of protection. Key geometric information used to model the dam within HEC-RAS was obtained from Table 26 of the 1992 Feasibility Study unless noted and included:

- Top of dam elevation 208.0 feet NAVD with crest width of 24 feet
- 1,000 feet long concrete chute emergency spillway at elevation 178.7 NAVD
- 1,150 feet long triple nine feet by ten feet culverts for low level outlet structure

PROJECT LOCATION MAP



UPPER AMITE DETENTION (MAJOR) SITE 2

UPPER AMITE DETENTION (MAJOR) SITE 2

PREDICTIVE MODEL SUMMARY

The LWI Models were used to assess the potential impacts of the Upper Amite Detention (Major) Site 2 concept. In this study, multiple design storms were used to demonstrate the benefits of the reservoir for floods within the Baton Rouge Metropolitan Area ranging from the 10-year through to the 500-year flood.

These models were developed using 2018 quality level 1 LiDAR collected by DOTD and supplemented by 2017 USACE bathymetry and included additional ground-based survey collected by DOTD between 2017 and 2024.

PROJECT IMPACTS

Modeling results demonstrated that major benefits could be realized from the project. This included over 20,500 downstream structures that would not have flooded during the August 2016 flood if the proposed structure had been constructed. During the 100-year flood, 7,500 structures downstream of the reservoir are expected to be prevented from flooding.

SUMMARY OF THE ESTIMATED REDUCTIONS IN FLOOD ELEVATIONS.

LOCATION	10-YEAR FLOOD ELEVATION IMPACTS (FEET)	100-YEAR FLOOD ELEVATION IMPACTS (FEET)
Amite River at Magnolia Bridge Road	- 7.9	- 8.8
Amite River at Florida Avenue, Denham Springs	- 6.1	- 6.3
Amite River just downstream of Interstate 12	- 5.7	- 6.0
Amite River at LA Highway 42 in Port Vincent	- 2.6	- 2.3
Amite River at LA Highway 16 in French Settlement	- 1.5	- 1.0
Amite River Diversion Canal at LA Highway 22	- 1.5	- 0.9
Comite River at Central Throughway	- 2.9	- 4.5
Grays Creek just upstream of Interstate 12 (due to Amite River overflows)	- 0.0	- 5.2

As part of the Master Plan development, these results were run using the 2024 LWI HEC-FIA models which demonstrated major reductions in structures flooded and economic losses avoided as summarized below.

STRUCTURE AND ECONOMIC BENEFITS ASSOCIATED WITH THE CONCEPT.

FLOOD EVENT	STRUCTURES BENEFITING	ECONOMIC LOSSES AVOIDED	ECONOMIC LOSSES AVOIDED
10-year flood	4,401	1,424	$200,325,000
100-year flood	11,602	9,293	$641,870,000

ENVIRONMENTAL CONSIDERATIONS

A dry reservoir will minimize the environmental impacts compared to a wet reservoir. A dry reservoir will maintain existing environmental conditions, except during rare extreme flooding events when the reservoir pool area will experience extended periods of deeper water. During these events, wildlife will be temporarily displaced for a longer period of time than what naturally occurs in a floodplain. However, a wet reservoir displaces wildlife permanently.

The 2019 ART study identified the need for mitigation and presented options including purchasing of bottom land hardwood mitigation bank credits, creation and enhancement of bottom land hardwood habitats to mitigate the impact of creation the dam and associated borrow pits and staging areas. It also indicated a potential need to mitigate the inflated heelsplitter mussel if found within the footprint of the project during field survey.

REAL ESTATE CONSIDERATIONS

Real estate will have to be acquired to build the dam feature, and areas within the reservoir pool would need to either be acquired or easements purchased.

Numerous relocations would be required including several roads, utility lines, and one cemetery.

PERMITTING

Permits will be required from the United States Army Corps of Engineers (Section 404, (b)(1)) and LDEQ Section 401. If built by a non-federal entity, a Dam Construction permit will be required from DOTD in accordance with LA R.S. 38:21-28.

Construction would require a stormwater General Permit from LDEQ

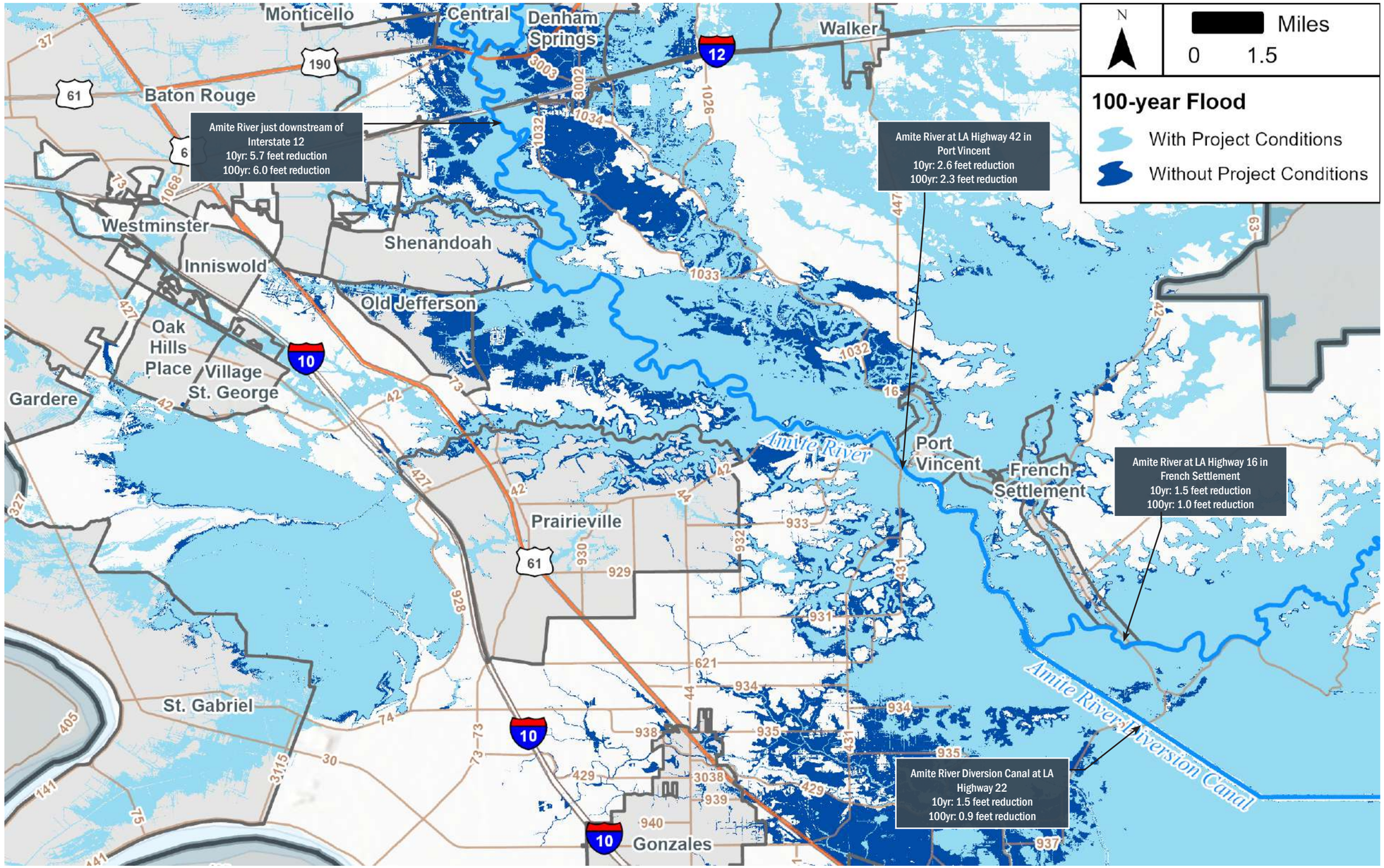
- ESA compliance
- Section 106 consultation

The dam and reservoir are located within a FEMA AE flood zones with regulatory flood-way. A FEMA Conditional Letter of Map Revision will be required in accordance with 44 CFR Part 60.3(d)(4). Following construction of the dam, a Letter of Map Revision will be required in accordance with 44 CFR Part 65.3

The construction of the dam will require a permit through the DOTD Dam Safety Program in accordance with R.S. 38:21-28

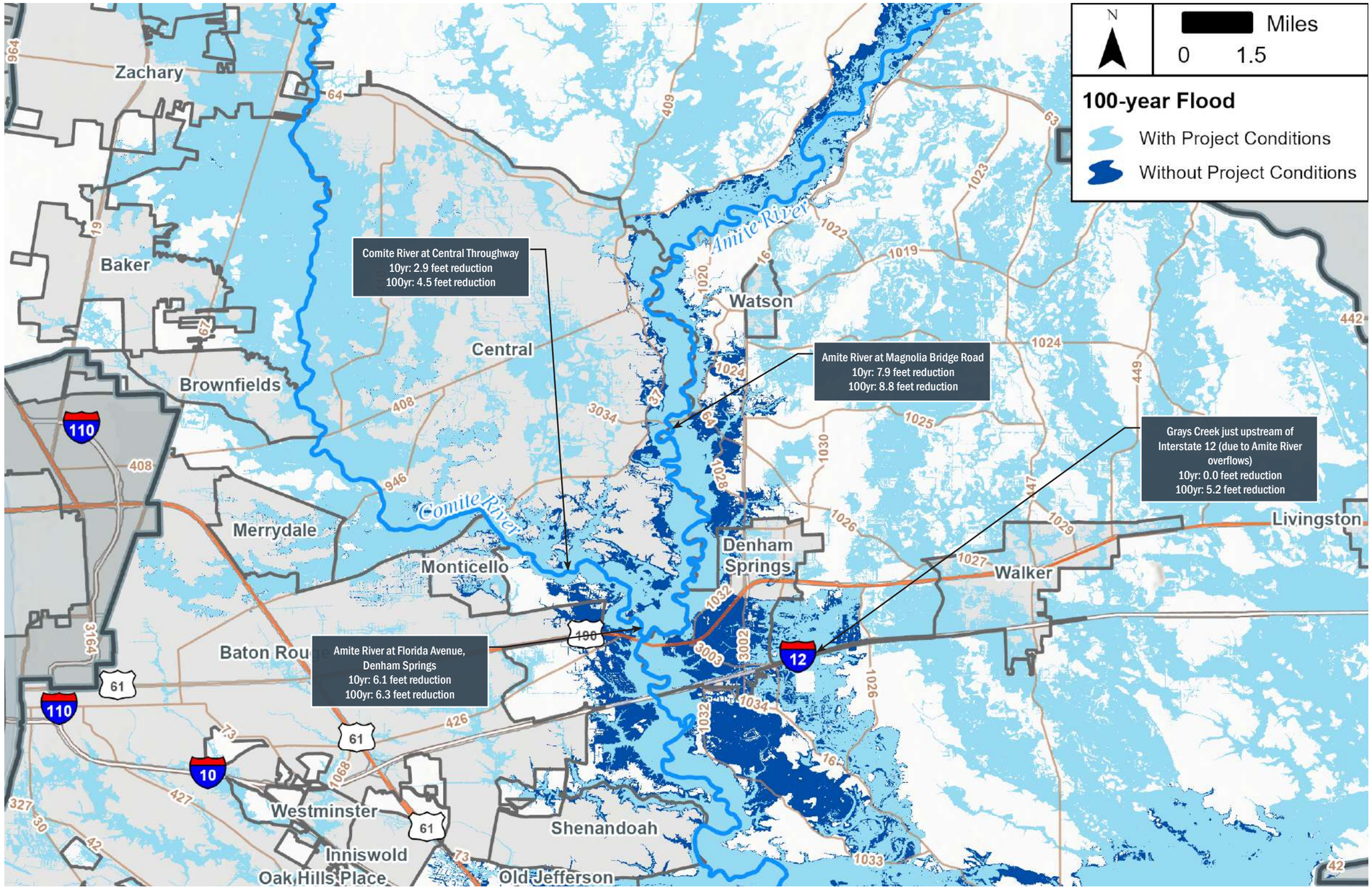
UPPER AMITE DETENTION (MAJOR) SITE 2

PROJECT IMPACTS MAP (DOWNSTREAM OF INTERSTATE 12)



UPPER AMITE DETENTION (MAJOR) SITE 2

PROJECT IMPACTS MAP (UPSTREAM OF INTERSTATE 12)



UPPER AMITE DETENTION (MAJOR) SITE 2

PROJECT COSTS

TOTAL (ESTIMATED): > $1B (estimated)

FUNDING CONSIDERATIONS

Due to the large size of this project, funding will likely require multiple sources and partnerships including ARBC, DOTD, and USACE.

BENEFIT COST ANALYSIS

A benefit cost analysis has not been performed for this concept project.

SEQUENCING AND DEPENDENCIES

The project can be standalone and is not dependent on any other projects. Impacts to upstream real estate and structure would require mitigation and would be considered part of the overall project.

There have been project concepts developed for several projects (i.e., New River Pump Station, Upper Amite River Detention/ Retention, Bayou Manchac Backflow Prevention Gates, Lower Amite Sediment Removal, Upper Amite River Flood Risk Reduction and Restoration, Willow Glen Pump Station, etc.) in the Amite River Basin that, if built in conjunction with this project, could potentially offset any negative impacts.

RENDERING OF THE UPPER AMITE DETENTION (MAJOR) SITE 2 CONCEPT

UPPER AMITE DETENTION AND RETENTION (MAJOR) SITE 3

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Feliciana and St. Helena Parishes

PROJECT LEAD AGENCY

Undetermined

PROJECT STATUS

Concept phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, East Feliciana, Livingston, and St. Helena Parishes adjacent to the Amite River

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

18,630 (After mitigation of flood pool area)

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$1.1B (After mitigation of flood pool area)

ENVIRONMENTAL BENEFITS

Potential for water supply, reducing the regional dependency on ground water)

PROJECT COSTS

$1-2B (ROM)

FUNDING STATUS

N/A

MITIGATION NEEDS

The Amite River Basin has a long history of major riverine driven flooding. Notable flooding events during the past 50-years include the April 1977, April 1983, January 1990, January 1993, June 2001, March 2016 and August 2016 flood of record.

Within the Amite River Basin, there is a well-known dependency on ground water supplied through the Southern Hills Aquifer for both drinking water and industrial use. According to the Capital Area Groundwater Conservation District, large volumes of groundwater withdrawals have caused saltwater from the south to encroach into the freshwater sands at Baton Rouge.

PROJECT SUMMARY

The dam would be located on the Amite River in the vicinity of LA Highway 432 and would consist of an approximately 3.25 miles (or 18,300 Feet) long dam with a maximum height of 112.2-feet at the channel. It would be designed to withhold flood discharges up to the 100-year flood before engaging the auxiliary spillway. The reservoir would have a wet pool capable of being used for water supply.

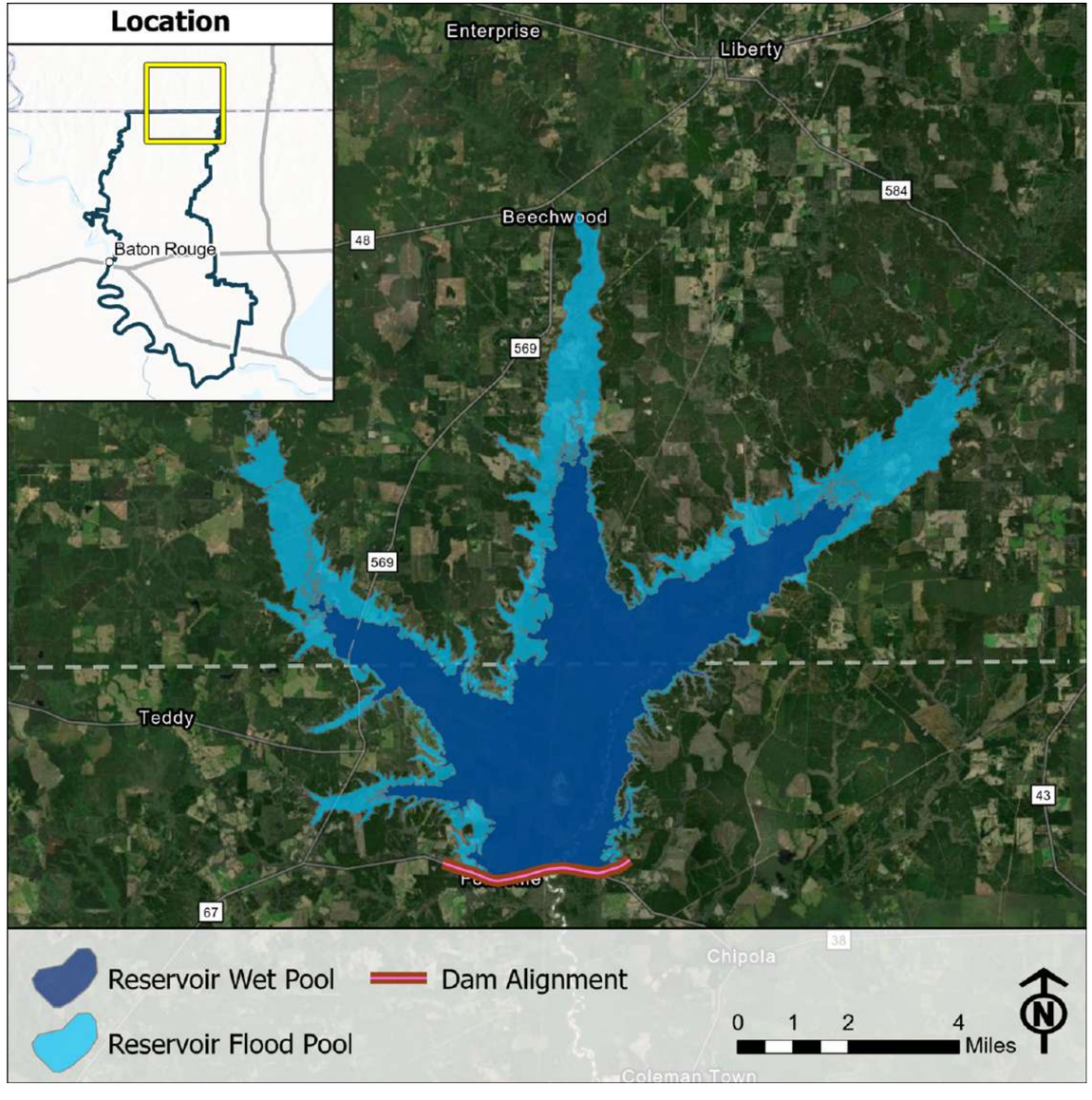
The location of the dam would allow it to intercept rainfall runoff of approximately 545 square miles of upstream watershed. The Amite River Basin upstream of the Comite River confluence, just north of downtown Baton Rouge, is 900 square miles demonstrating that the reservoir would intercept and detain 61% of the watershed. Just downstream of the Comite River confluence in Denham Springs, the basin is 1,300 square miles demonstrating that the reservoir would intercept and detain 42% of the watershed.

This project was studied as an LWI Proof of Concept demonstration in December 2024, Key geometric information used to model the dam within HEC-RAS was obtained from Table 26 of the 1992 Feasibility Study unless noted and included:

- Top of dam elevation 276 feet with crest width of 24 feet and maximum height of 110 feet at the channel and 90 feet in the over-banks immediately adjacent to the channel.
- Upstream slope of 4:1 downstream slope of 5:1
- Wet conservation pool at elevation 225 feet and storage capacity of 303,000 acre-feet
- Flood pool at elevation of 247 feet and storage capacity of 743,000 acre-feet
- 500 feet wide concrete chute emergency spillway at elevation 247 feet
- 1,000 feet long triple 9 feet by 9 feet culverts for low level outlet structure under the dam
- Riser structure with low level drain for maintaining low flows and performing reservoir drawn-down

The project wet detention would be located within the Southern Hills Aquifer recharge area whereby the reservoir pool would potentially increase the recharge of the aquifer while offering an alternative water source to groundwater withdrawal supplying the surrounding towns including Clinton and Greensburg Louisiana and Liberty and Centreville Mississippi. Additionally, the dam could be used to regulate downstream flows for potential downstream water withdrawals in the lower Amite River Basin.

PROJECT LOCATION MAP



UPPER AMITE DETENTION AND RETENTION (MAJOR) SITE 3

PREDICTIVE MODEL SUMMARY

The LWI Proof of Concept demonstration was used to assess the potential impacts of the concept. In this study, multiple design storms were used to demonstrate the benefits of the reservoir for floods within the Baton Rouge Metropolitan Area ranging from the 10-year through to the 500-year flood.

These models were developed using 2018 quality level 1 LiDAR collected by DOTD and supplemented by 2017 USACE bathymetry and included additional ground-based survey collected by DOTD between 2017 and 2024.

PROJECT IMPACTS

Modeling results demonstrated that major benefits could be realized from the concept. During the 100-year flood, downstream of the reservoir approximately 13,000 structures are expected to be prevented from flooding and a further 5,700 would experience reduced flooding.

Estimated reductions in flood elevations.

LOCATION	10-YEAR FLOOD ELEVATION IMPACT (FEET)	100-YEAR FLOOD ELEVATION IMPACT (FEET)
Amite River at Magnolia Bridge Road	- 6.9	- 9.3
Amite River at Florida Avenue, Denham Springs	- 5.9	- 6.3
Amite River just downstream of Interstate 12	- 5.4	- 6.0
Amite River at Bayou Manchac Confluence	- 3.3	- 3.2
Amite River at LA Highway 42 in Port Vincent	- 2.5	- 2.4
Amite River at LA Highway 16 in French Settlement	- 1.5	- 1.1
Amite River Diversion Canal at LA Highway 22	- 1.4	- 1.0
Comite River at Central Throughway	- 2.8	- 4.1

Through LWI, these results were run using the 2024 LWI HEC-FIA consequences models which demonstrated major reductions in structures flooded and economic losses avoided as summarized below.

STRUCTURE AND ECONOMIC BENEFITS ASSOCIATED WITH THE DRY DARLINGTON RESERVOIR CONCEPT

FLOOD EVENT	STRUCTURES BENEFITING	ADDITIONAL STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES AVOIDED
10-year flood	1,965	2,705	$167,993,991
100-year flood	12,932	5,702	$1,085,752,000

ENVIRONMENTAL CONSIDERATIONS

The wet reservoir pool will create a waterway barrier preventing upstream and downstream movement of fish. During rare extreme flooding events, the flood pool area will experience extended periods of deeper water which will temporarily displace wildlife for a wider extent than that naturally occurring floodplain.

There would be a need for mitigation to include purchasing of bottom land hardwood mitigation bank credits, creation and enhancement of bottom land hardwood habitats to mitigate the impact of the creation of the reservoir, dam and associated borrow pits and staging areas. There would also be a potential need to mitigate the inflated heelsplitter mussel if found within the footprint of the project during field survey.

REAL ESTATE CONSIDERATIONS

Real estate will have to be acquired to build the dam feature, and areas within the reservoir and flood pool would need to either be acquired or easements purchased. It is estimated approximately 30 structures are located within the reservoir pool based on the National Structure Inventory, and an additional 45 in the flood pool. The type of structures are undetermined and may include residential, accessory structures or non-permanent residences.

Numerous relocations would need to occur including several roads, and utility lines.

PERMITTING

Permits will be required from the United States Army Corps of Engineers (Section 404, (b)(1)), LDEQ Section 401. If built by a non-federal entity, a Dam Construction permit will be required from DOTD in accordance with LA R.S. 38:21-28.

Construction would require a stormwater General Permit from LDEQ

- ESA compliance
- Section 106 of the National Historic Preservation Act

The dam and reservoir are located within a FEMA AE flood zone with regulatory flood-way. A FEMA Conditional Letter of Map Revision will be required in accordance with 44 CFR Part 60.3(d)(4). Following construction of the dam, a Letter of Map Revision will be required in accordance with 44 CFR Part 65.3

PROJECT COSTS (FOR PHASE 1)

TOTAL (ESTIMATED): > $1B (estimated)

FUNDING CONSIDERATIONS

Due to the large size of this project, funding will likely require multiple sources and partnerships including ARBC, DOTD, and USACE.

BENEFIT COST ANALYSIS

A benefit cost analysis has not been performed for this concept project.

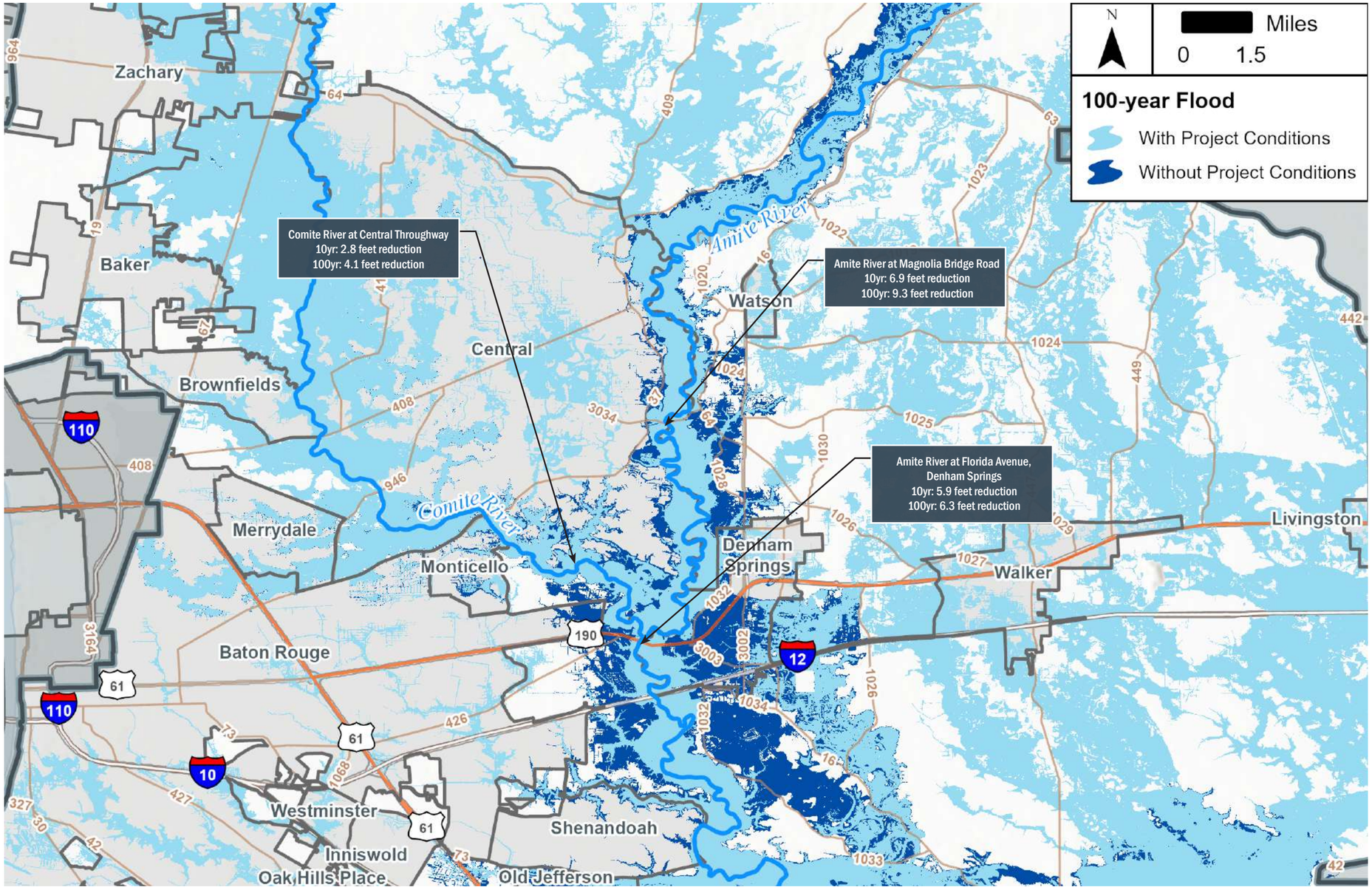
SEQUENCING AND DEPENDENCIES

The project can standalone and is not dependent on any other projects. Impacts to upstream real estate and structure would require mitigation and would be considered part of the overall project.

There have been project concepts developed for several projects (i.e., New River Pump Station, Upper Amite River Detention/Retention, Bayou Manchac Backflow Prevention Gates, Lower Amite Sediment Removal, Upper Amite River Flood Risk Reduction and Restoration, Willow Glen Pump Station, etc.) in the Amite River Basin that, if built in conjunction with this project, could potentially offset any negative impacts.

UPPER AMITE DETENTION AND RETENTION (MAJOR) SITE 3

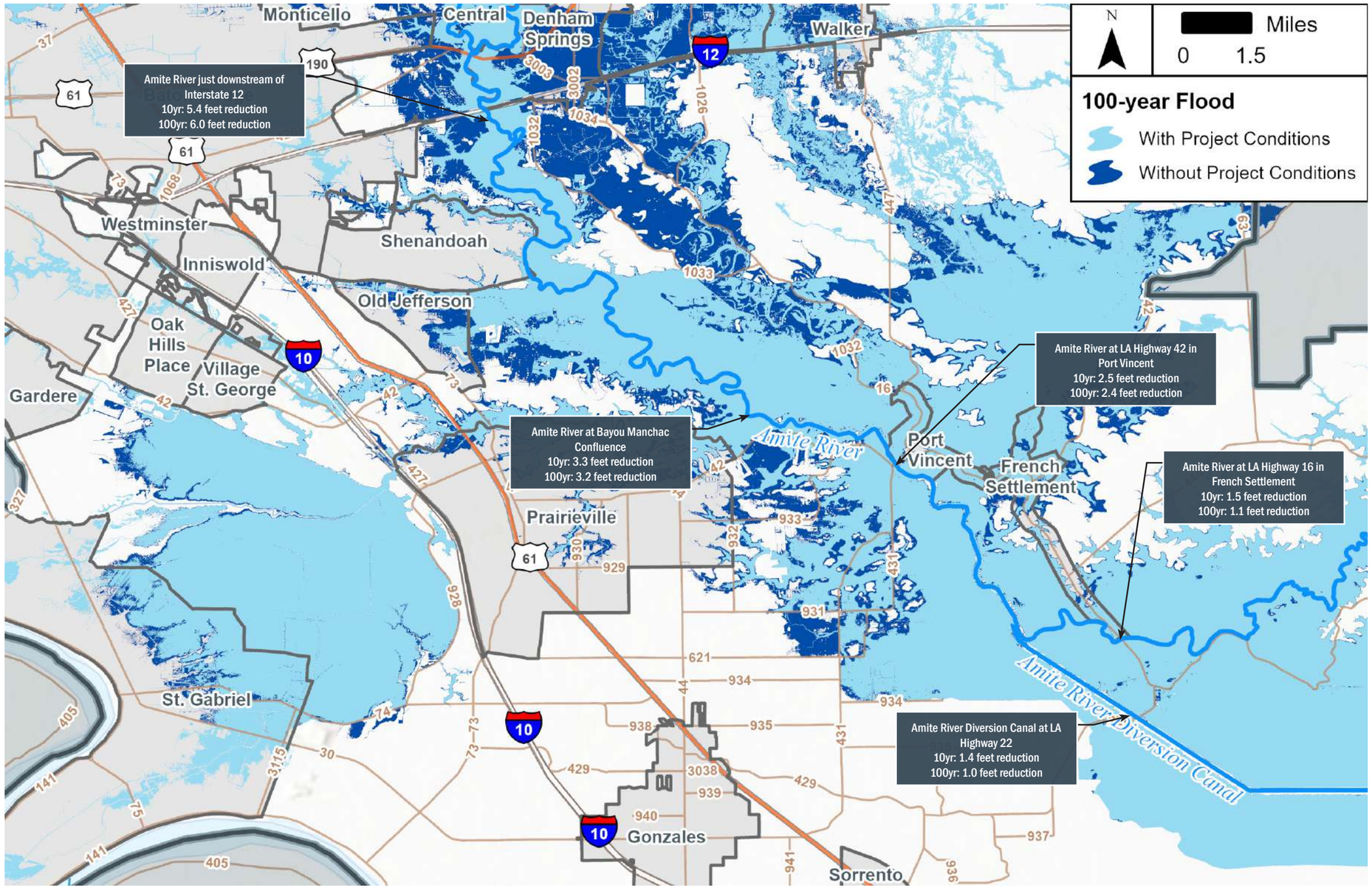
PROJECT IMPACTS MAP (UPSTREAM OF INTERSTATE 12)



Over 13,000 downstream structures in St. Helena, East Feliciana, Livingston, East Baton Rouge, Iberville and Ascension Parishes would be removed from the 100-year floodplain and an additional 5,700 would realize reduced flood elevations

UPPER AMITE DETENTION AND RETENTION (MAJOR) SITE 3

PROJECT IMPACTS MAP (DOWNSTREAM OF INTERSTATE 12)



The wet reservoir shows the potential to reliably supply over 300 MGD for potable water use, reducing the dependency on and depletion of the Southern Hills Aquifer.

3.6 PROJECTS

ADDITIONAL PROJECTS

This section summarizes predictive modeling results where available and additional key information.

Disclaimer

The information, data, analyses, projections, and recommendations contained in this Master Plan are provided for informational and planning purposes only. The Amite River Basin Commission (ARBC) has compiled this report using available resources, studies, and data; however, the ARBC has not independently verified all information contained herein.

The content of this report should not be relied upon as a sole basis for making legal, financial, or real estate decisions, including but not limited to property purchases, development planning, or flood risk assessments. Any individual, entity, or agency utilizing this report or any of its components should conduct independent verification and consult with appropriate professionals before making decisions based on the information contained in this document.

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AMITE RIVER DIVERSION CANAL WEIR REHABILITATION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

PLD (diversion weir) and Livingston Parish (sediment removal)

PROJECT STATUS

Design Phase

PRIMARY AREAS OF PROJECT IMPACT

Livingston Parish

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

N/A

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

N/A

ENVIRONMENTAL BENEFITS

Removal of unnatural sediment deposits. Improved flow on lower Amite River downstream of Amite River Diversion Canal Weir

PROJECT COSTS

$69M (LWI)

FUNDING STATUS

Funded $60M (LWI for sediment removal), $5M (Capital Outlay for weir rehabilitation)

MAINTENANCE NEEDS

The Amite River Diversion Canal Weir has been observed to be deteriorating. Recent surveys show extensive erosion adjacent to the rock weir structure and settlement of the weir crest when compared to 1955 and 1963 documentation from the USACE. The deterioration includes downstream head cutting and scour holes which threatens the structural stability through imminent undercutting of the rock weir as previously highlighted in Section 2.4. Additionally, the Amite River experiences diminished flows due to increased flows over the Amite River Diversion Canal Weir into the Amite River Diversion Canal. Since the weir skims flows from the top of the water column, sediment generally remains in the main channel while most of the flow is lost to the Amite River Diversion Canal, reducing the sediment carrying potential of the downstream channel. Analysis of sediment models and samples show that the weir results in increased sedimentation on the Amite River, with finer sediments being deposited in the Amite River Diversion Canal.

Section 2.4 discussed the existing 1963 O&M Manual for the Amite River and Tributaries project which outlined agreements between USACE and local police juries.

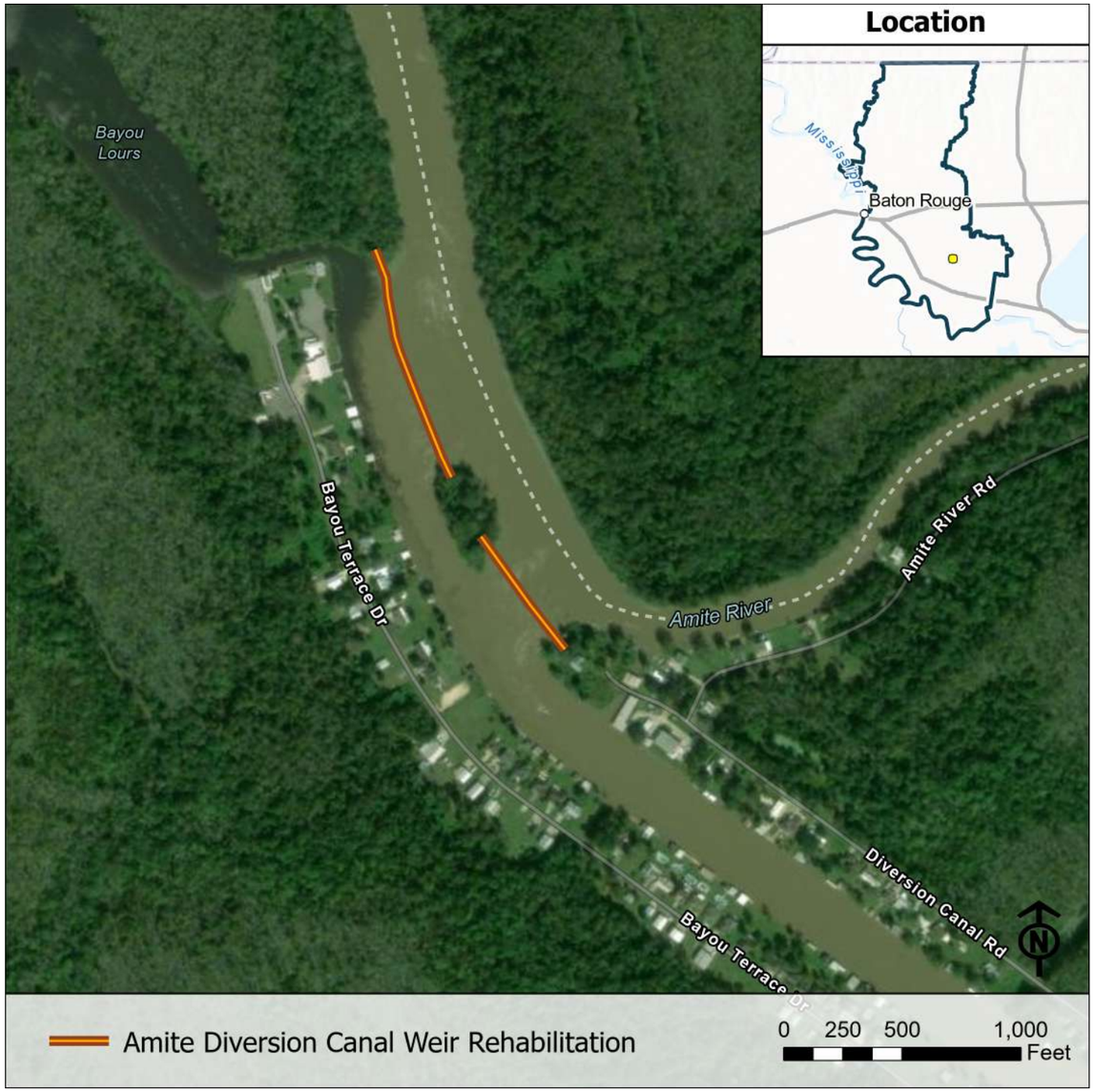
PROJECT SUMMARY

This concept project proposes to rehabilitate the structure to the original design conditions previously described in Section 2.4 including restoring the weir crest to an elevation of 0.0 feet MSL, restoration of the boat way, and repairs to stabilize eroded portions of the weir and adjacent features through the backfilling of eroded areas and use of erosion countermeasures. This will help to restore original design flows on the Amite River, prevent head cutting from propagating through the weir, and aid the long-term restoration of the Amite River. A key goal of this approach is to rehabilitate, rather than modify the weir performance, potentially simplifying permitting requirements including a USACE Section 408 permit.

Section 4.4 discusses how ARBC will collaborate with relevant agencies and jurisdictions to conduct a comprehensive review and update to the 1963 O&M Manual for the Amite Rivers and Tributaries Project.

THE COMMISSION EMPHATICALLY CONTENDS THAT THE NEAR-TERM AND LONG-TERM SUCCESS OF THIS PROJECT DEPENDS ENTIRELY ON SEDIMENT REMOVAL FROM THE MOUTH OF THE AMITE RIVER TO ITS CONFLUENCE WITH THE COMITE RIVER.

PROJECT LOCATION MAP



AMITE RIVER DIVERSION CANAL WEIR REHABILITATION

PREDICTIVE MODEL SUMMARY

The May 9, 2021 Amite River Diversion Canal Weir Investigation performed for Livingston Parish researched the original information for the Amite River Diversion Canal and Weir. According to the June 1955 U.S. Army Corps of Engineers (USACE) report entitled Survey of Amite River and Tributaries Louisiana (USACE 1955) and November 1956, USACE report entitled Amite River and Tributaries, LA., the original design called for a 1,500 feet long single stage weir which would have resulted in 40% of flow going down the Amite River and 60% of flow going down the Amite River Diversion Canal during the design flow. According to the 1963 Operation and Maintenance Manual for Amite River and Tributaries, Louisiana, prior to construction, the plan was modified at the request of the Ascension Parish Police Jury to add a boat way from the Amite River to the Amite River Diversion Canal.

During the development of this Master Plan, the LWI HEC-RAS model was used to simulate the existing 2024 weir conditions and the 1964 single stage weir design with boat passage. These simulations assumed current 2024 channel conditions on both the Amite River and Amite River Diversion Canal adjacent to the Amite River Diversion Canal Weir.

PROJECT IMPACTS

Summary of project impacts during 1% AEP flood from the May 9, 2021 Amite River Diversion Canal Weir Investigation which assume a Mean Higher High Water boundary conditions

Max WSE decrease: 0.18 ft

Max WSE increase: 0.18 ft

ENVIRONMENTAL CONSIDERATIONS

Rehabilitation of the weir will support restoring flows on the Amite River closers to the original levels, which will help to improve water quality and maintain the originally intended downstream flows for fish and wildlife benefits.

REAL ESTATE CONSIDERATIONS

The concept proposed weir rehabilitation will take place within the footprint of the existing weir, so no land acquisition is foreseen. Temporary construction easements and staging areas will be needed in the vicinity of the project.

PERMITTING

Required permits include but are not limited to the USACE & LDNR Joint Permit (Section 404 Permit, Rivers and Harbors Act). While a Section 408 permit is generally not required for maintenance, coordination with USACE will be required to determine maintenance versus alteration to a Federal project requiring a Section 408 permit.

PROJECT COSTS

Conceptual design of the restoration of the weir was performed during this Master Plan to determine required material volumes and to create a conceptual opinion of probable costs. It estimated that approximately 4,834 cubic yards of stone rip-rap would need to be placed to rehabilitate the existing weir to a crest elevation of 0.0 feet MSL. Sheet piles walls were proposed to be erected at the proposed navigable boat channel that is to be constructed into the proposed weir rehabilitation alignment to help arrest head cutting. In addition, approximately 8,433 cubic yards of stone rip-rap was estimated to be required to be placed within the Amite River Diversion Canal to armor the existing scour area to prevent undermining of the boat channel and weir.

The estimated project cost are listed below.

- Design Cost: $610,000.00
- Real Estate Cost $0.00
- Permitting Cost $100,000
- Construction Cost $8,900,000.00

FUNDING CONSIDERATIONS

The FY2024 Capital Outlay includes $5M as Priority 2 appropriation for PLD to perform planning and construction of the Amite River Diversion Canal Weir with a further $1M Priority 5 appropriation for FY25.

BENEFIT COST ANALYSIS

A benefit cost analysis has not been performed for this project.

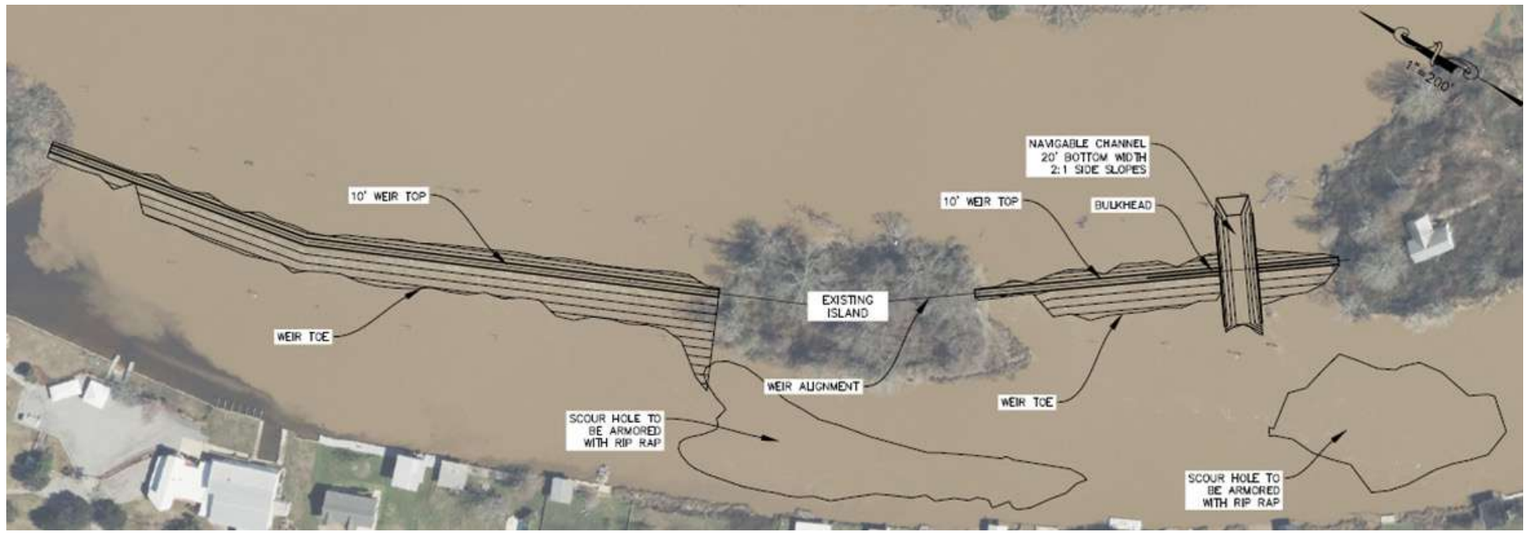
SEQUENCING AND DEPENDENCIES

Since the original design and construction of the Amite River Diversion Canal Weir, significant deposition of sediment along the Amite River has been observed adjacent to and downstream of the Amite River Diversion Canal Weir as highlighted in Section 2.4. The general raising of the weir to original design conditions will help to restore original design flows, however, this will result in increases in flood elevations along the main river, partially as a result of sediment build up which reduces channel capacity. To help offset these and restore the original conditions consistent with the original design, it is recommended that this project be performed in conjunction with the Lower Amite River Sediment Removal project, whereby targeted high spots including the Amite River adjacent to and just downstream of the Amite River Diversion Canal Weir have sediment removed to restore the Amite River to a condition closer to the original project design conditions.

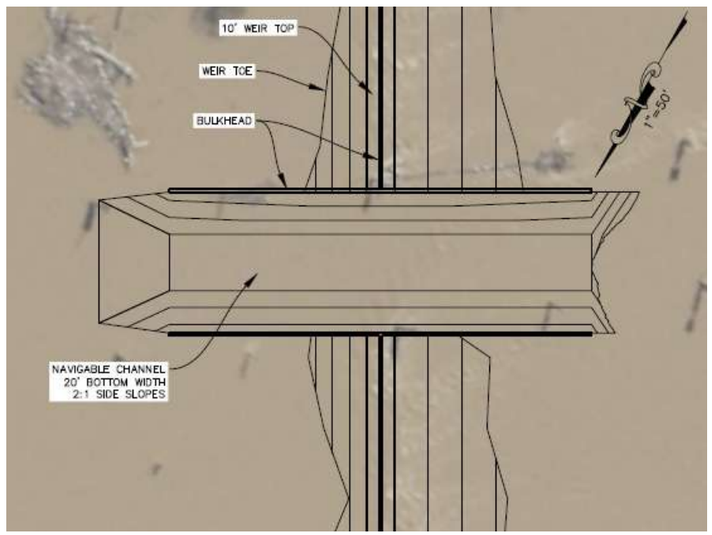
As an alternative, if the Lower Amite River Sediment Removal project cannot be performed concurrently with or prior to the rehabilitation of the Amite River Diversion Canal Weir to design conditions, then the Amite River Diversion Canal Weir should only be shored up to reinforce the remaining structure without altering hydraulic performance (i.e., maintaining existing crest and boat way), preventing further deterioration until sediment removal can be performed. This is expected to save nearly $1,000,000 in construction costs.

AMITE RIVER DIVERSION CANAL WEIR REHABILITATION

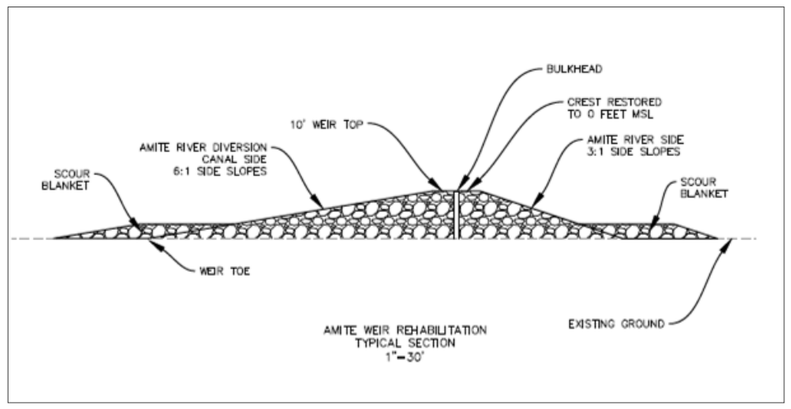
CONCEPT ILLUSTRATIONS



PLAN VIEW OF AMITE RIVER DIVERSION CANAL WEIR REHABILITATION CONCEPT (SOURCE: ARBC)



PLAN VIEW OF
AMITE RIVER DIVERSION
CANAL WEIR BOAT WAY
REHABILITATION CONCEPT
(SOURCE: ARBC)



PLAN VIEW OF
AMITE RIVER DIVERSION
CANAL WEIR BOAT WAY
REHABILITATION CONCEPT
(SOURCE: ARBC)

ASCENSION (SORRENTO) STORM SURGE

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

Ascension Parish

PROJECT STATUS

Design Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension Parish in the vicinity of Sorrento.

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

Unknown

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

Unknown

PROJECT COSTS

$70M (Phase 1), $80M (Phase 2)

FUNDING STATUS

Partial

MITIGATION NEEDS

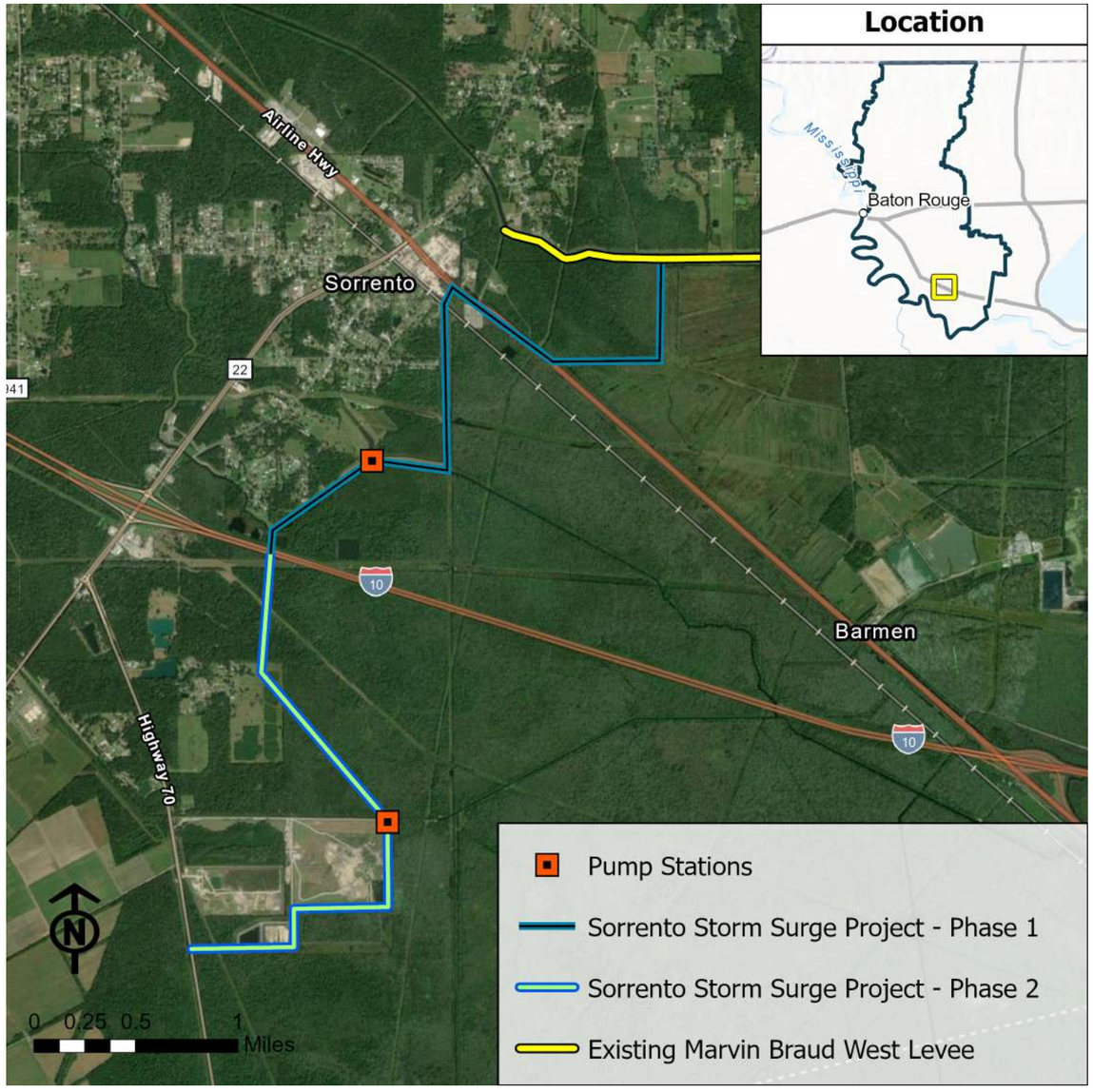
The town of Sorrento, the City of Gonzales, and unincorporated parts of southeast Ascension Parish are subject to flooding from storm surge caused by tropical cyclone activity such as recent hurricanes including Gustav in 2008, Issac in 2012, Barry in 2019, and Ida in 2021. This area was also impacted by backwater flooding from the Amite River in 2016.

PROJECT SUMMARY

The Ascension (Sorrento) Storm Surge Protection project which is currently in design phase, will mitigate flooding in the southeastern portion of the parish from inundation resulting from storm surge and backwater events. The 2020 Ascension Parish Hazard Mitigation Plan estimates that a 100-year flood event causes $1.386B in losses.

The project is located near the Town of Sorrento, east of LA 22, and south of New River Canal. It will provide additional storm surge protection to the Sorrento area by raising existing levees and constructing new levees to an elevation of 8 feet, as well as constructing two new pump stations: one at Bayou Conway and one at Panama Canal. Each location will have, floodgates, a boat-way, and flood-walls. Phase 1 will tie into the existing Marvin Braud Levee system, beginning north of Airline Hwy (US-61) and ending at I-10. Phase 2 will begin at I-10 and end at LA-70. Levee improvements will consist of raising existing levees on the northern end and building new levees on the southern end as well as channel work to optimize drainage near the two new pump stations. During normal conditions, the floodgates and boat-ways will remain open so water can gravity drain out of the system. During the threat of storm surge or high water, the floodgates and boat-ways will be closed and the new pump stations turned on to drain the interior.

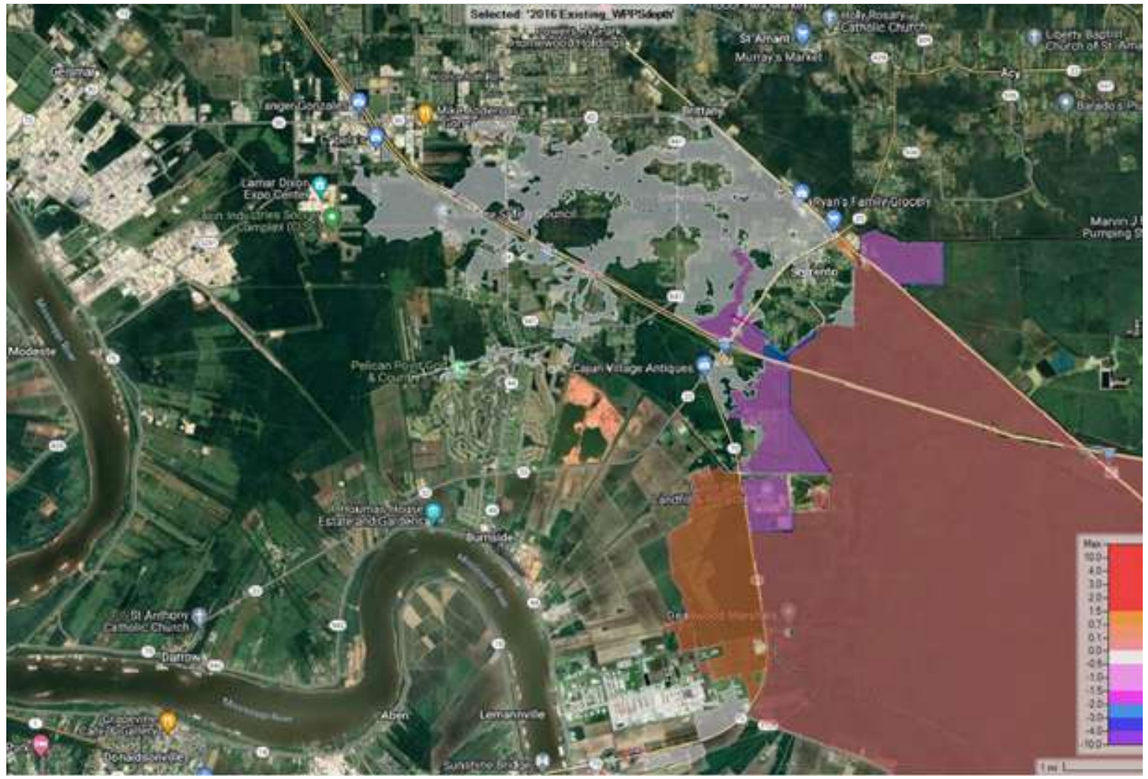
PROJECT LOCATION MAP



ASCENSION (SORRENTO) STORM SURGE PROJECT

ASCENSION (SORRENTO) STORM SURGE

PROJECT IMPACTS MAP



PRELIMINARY DIFFERENCES IN INUNDATION WITH AND WITHOUT PROJECT
(SOURCE: PLD)

PREDICTIVE MODEL SUMMARY

To determine project feasibility, existing conditions (without project) and proposed conditions (with project) were analyzed using HEC-RAS modeling (source 2021 Ascension Parish Floodplain Management Plan). The existing and proposed model geometry were simulated with 10, 25 and 100-year rainfall events with a static water elevation on the flood side of +6.0 feet to simulate backwater or storm surge. The difference (delta) in water surface elevations between existing and proposed was mapped (see below) and shows water surface elevation reductions. A more detailed benefit analysis utilizing HEC-FIA will be completed during final design development.

PROJECT IMPACTS

Preliminary model results for the 100-year rainfall event with the project in place and pump stations running with a flood side static water surface elevation of +6.0 show a reduction in flooding on the protected side near the Town of Sorrento. The flood reductions denote the difference between existing and proposed conditions with the project in place. The reductions range from 4 to 10 feet south of I-10 near the Town of Sorrento, and between 0 to 0.5 feet as far as Gonzales. Water surface elevation increases are experienced on the flood side. However, these impacts are contained in the predominantly swamp area. The Sorrento Levee System protects approximately 928 people and 357 structures with a property value of $179M, taken from the National Levee Database 2023. Final water surface elevation decreases and number of benefiting structures are still being calculated by the design firm.

ENVIRONMENTAL CONSIDERATIONS

There is a landfill located near the southern end of the Phase 2 proposed levee section that will require environmental considerations, particularly during construction. Considerations include best management practices to avoid possible contamination from the landfill site. Additionally, the proposed levees will cross the McElroy Swamp which will require approximately 17 acres of wetland mitigation.

REAL ESTATE CONSIDERATIONS

Real estate will have to be acquired to build new levee sections. It is estimated that approximately 20 acres will be required but will be confirmed at a later date when the design plans are completed.

PERMITTING

Permits will be required from the United States Army Corps of Engineers (Section 404, Section 10), the Louisiana Department of Environmental Quality (LPDES – LAR100000) and Water Quality section 401, Department of Natural Resources (Coastal Use Permit), and Department of Transportation.

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

ASCENSION (SORRENTO) STORM SURGE

PROJECT COSTS (FOR PHASE 1)

TOTAL (ESTIMATED):

Total Phase 1 (estimated): $70,859,320

Total Phase 2 (estimated): $80,000,000

FUNDING CONSIDERATIONS

Funding sources may include Ascension Parish, East Ascension Consolidated Gravity Drainage District No. 1, Pontchartrain Levee District/Capital Outlay.

BENEFIT COST ANALYSIS

The benefit cost analysis for Phase 1 has been completed by BKI on behalf of PLD and is provided below. It should be noted that Burk Kleinpeter plans to complete the Phase 2 benefit cost analysis in the future. Therefore, no numbers have been finalized at this time.

TOTAL ESTIMATED PROJECT BENEFITS (BASED ON PLD PRELIMINARY MODEL RUNS): $94,617,865

BENEFIT COST RATIO (BCR): 1.34

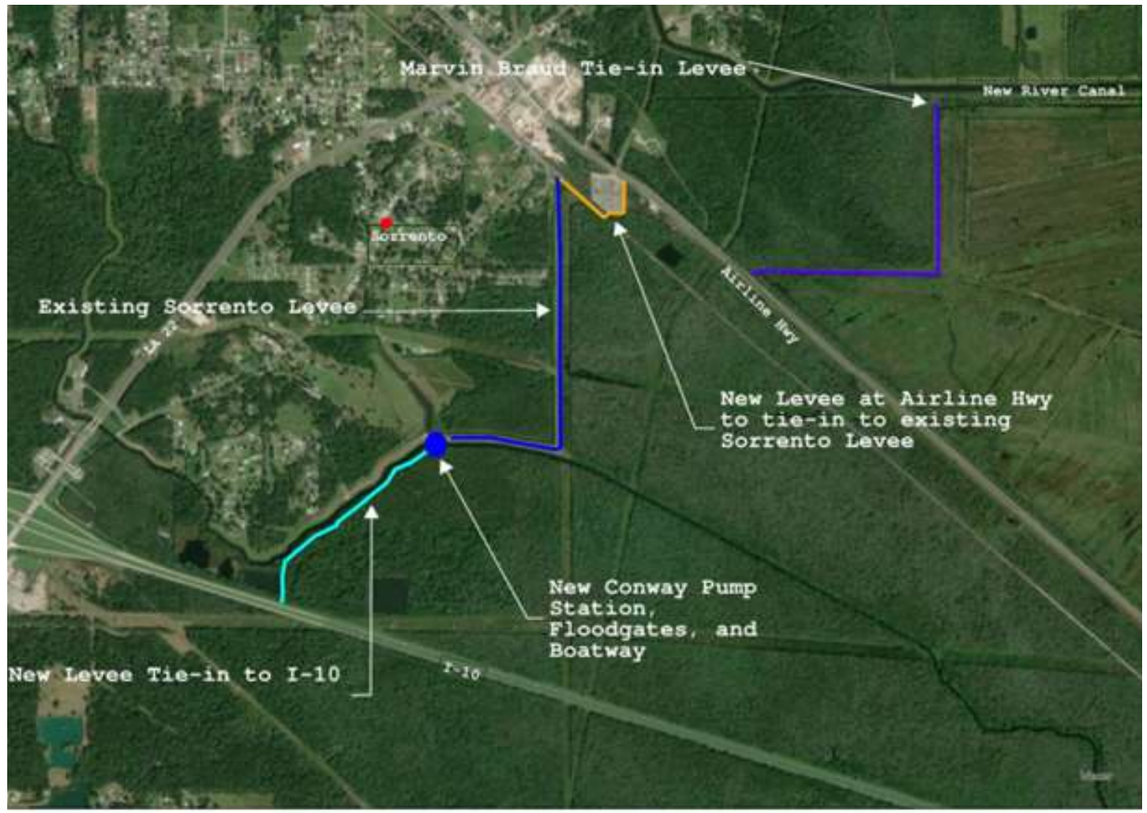
PROJECT USEFUL LIFE (YEARS): 50

ANNUAL MAINTENANCE COST: $250,000 as estimated during the submission of a BRIC grant for Ascension Parish

SEQUENCING AND DEPENDENCIES

Project can stand alone and is not dependent on any other projects.

ASCENSION (SORRENTO) STORM SURGE PROJECT - PHASE 1



BAYOU MANCHAC BACKFLOW PREVENTION GATE

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Baton Rouge and Ascension Parish

PROJECT LEAD AGENCY

Undetermined

PROJECT STATUS

Concept Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, and Iberville Parishes adjacent to Bayou Manchac and Spanish Lake

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

390

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$37.6M

PROJECT COSTS

$79.4M

FUNDING STATUS

N/A

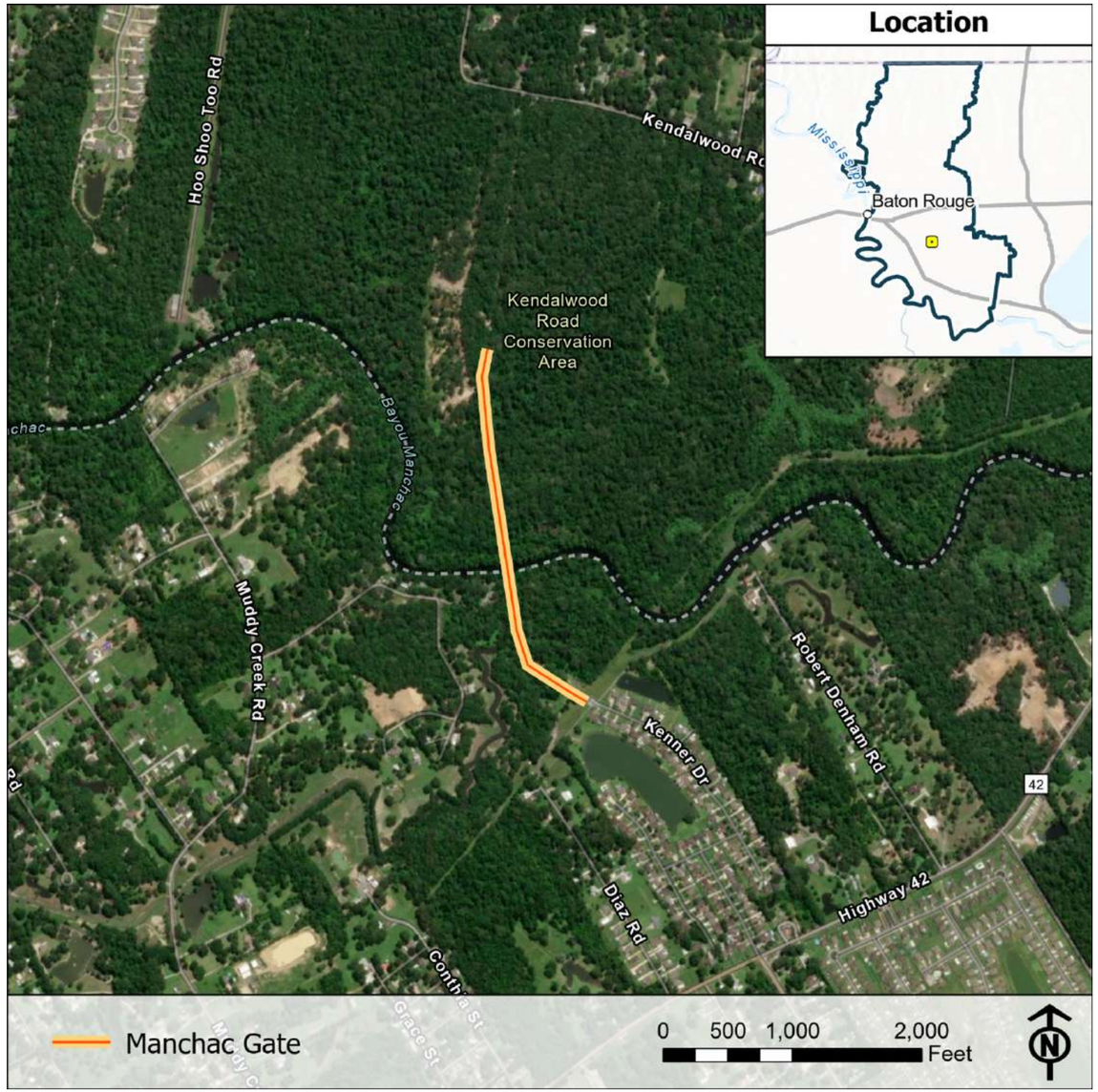
MITIGATION NEEDS

Bayou Manchac is a major tributary to the Amite River, draining stormwater from portions of Ascension, East Baton Rouge, and Iberville Parishes. Historic observations have shown that flooding along Bayou Manchac and its major tributaries including the lower reaches of Ward Creek, and the Spanish Lake basin has predominantly been driven by backwater riverine flooding from the Amite River as occurred in August 2016 rather than direct rainfall driven flooding over the Bayou Manchac basin. The most notable rainfall driven flooding on Bayou Manchac occurred during Tropical Storm Allison in 2001 and again during the May 2021 extreme rainfall event.

PROJECT SUMMARY

The Bayou Manchac Backflow Prevention Gate is a long-term conceptual project aimed to address risks associated with backwater flooding of homes and businesses along Bayou Manchac. The concept project is located along Bayou Manchac at the confluence with Muddy Creek. It includes the installation of a gate structure across Bayou Manchac to prevent Amite River backwater from propagating upstream into the upper reaches of Bayou Manchac and tributaries including Ward Creek and Spanish Lake. The concept gate structure would be a combination of a sector gate and sluice gates, tying into Manchac's natural overbank high ground. Backflow prevention will be installed at the gate opening to continue to allow Bayou Manchac to flow eastward while preventing westward backwater flow from the Amite River.

PROJECT LOCATION MAP



BAYOU MANCHAC BACKFLOW PREVENTION GATE

PREDICTIVE MODEL SUMMARY

The computer modeling software HEC-RAS was used to evaluate the proposed project as part of the development of this Master Plan. The analysis was performed using the ARBNM. Several events, including the 5-, 10-, 25-, 50-, 100-, 200-, and 500-year flood events were evaluated. For the concept level project conditions, the gates were set to allow only positive, easterly flow. Additionally, the LWI HEC-FIA consequences model was used to assess the impacts of the project.

PROJECT IMPACTS

Preliminary results indicate significant water surface elevation reductions along Bayou Manchac. Water surface elevation reductions near the project area can reach up to 2.50 feet immediately west of the structure during the 10-year flood and 2.0 feet during the 100-year flood. Additional benefits are expected to extend into Iberville and Ascension Parishes, particularly in areas near Spanish Lake.

It should be noted that backflow prevention installed on Bayou Manchac is expected to cause negative impacts extending into Livingston Parish, primarily contained in the undeveloped floodplain of Colyell Creek, but extending past LA 42 in some areas. Preliminary results indicate that these rises will not exceed 0.1 foot during the 100-yr event.

LOCATION	PROJECT IMPACTS 10-YEAR FLOOD (FT)	PROJECT IMPACTS 100-YEAR FLOOD (FT)
Just west of Gate on Bayou Manchac	-2.50	-2.00
Just downstream of Airline Highway	-0.90	-2.00
Ward Creek Confluence	-0.01	-1.44
Perkins Road	-0.15	-1.12
Just downstream of I10	-0.70	-0.60
Adjacent to Alligator Bayou Flood Gates	-0.72	-0.20
Ward Creek Just Downstream of Highland Road	-0.03	-0.15
Spanish Lake	-0.02	-0.51
Confluence of Amite River and Bayou Manchac	0.08	0.08
Colyell Bay (Livingston Parish)	0.08	0.08

Using the LWI HEC-FIA Model, these results were run to determine the number of structures impacted and direct economic impacts

PROJECT IMPACTS (CONT.)

PROJECT IMPACTS WEST OF GATE STRUCTURE (POSITIVE BENEFITS)

FLOOD EVENT	STRUCTURES REMOVED	ADDITIONAL STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES AVOIDED
10-year	82	105	$5,599,000
100-year	413	43	$37,758,000

PROJECT IMPACTS EAST OF GATE STRUCTURE (NEGATIVE IMPACTS)

FLOOD EVENT	STRUCTURES IMPACTED	ADDITIONAL STRUCTURE WITH INCREASED FLOODING	ECONOMIC LOSSES INCURRED
10-year	30	513	$1,934,862
100-year	43	26	$211,989

ENVIRONMENTAL CONSIDERATIONS

It should be noted that the scenic river designation as assigned by the Louisiana Department of Wildlife and Fisheries has been temporarily suspended until 2026 through R.S. 56:1849. This revised statute states that beginning May 1, 2021, through August 1, 2026, no provision shall require a permit for a local government to conduct clearing and snagging and dredging operations for drainage purposes in Bayou Manchac.

The project will require wetland mitigation which will be determined during more detailed design.

REAL ESTATE CONSIDERATIONS

The construction of the gate, T-wall section and earthen embankment will require acquisition of property and/or permanent easements in addition to temporary construction easements.

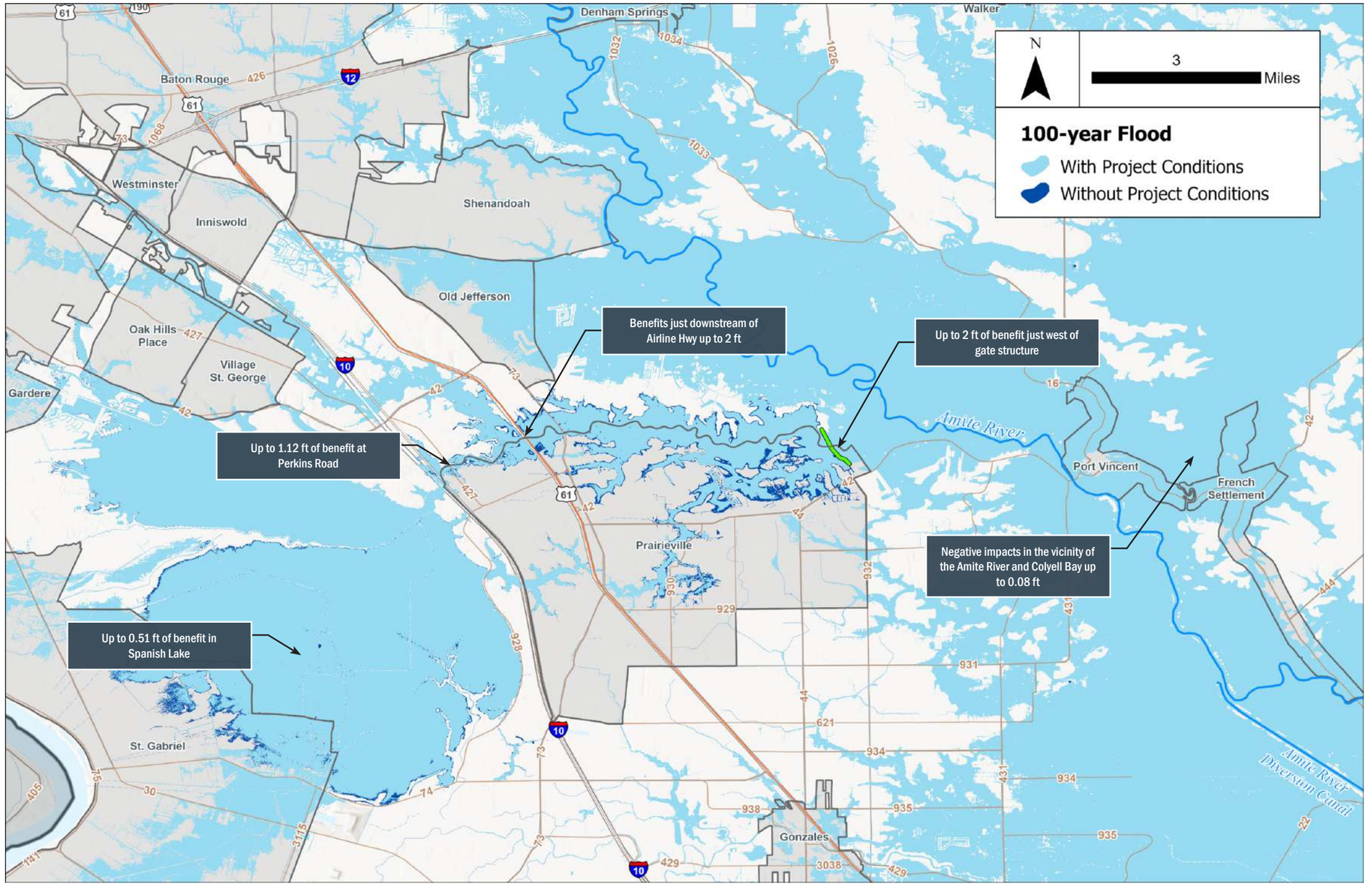
PERMITTING

Permits may include: a Section 401 water quality permit, Section 404 permit for wetlands, potential Section 10 Rivers and Harbors Act permit, and a stormwater pollution prevention permit in accordance with LAR100000 from the Louisiana Department of Environmental Quality.

The gates are located on a FEMA Zone A flood zones with additional impacts on Zone AE and Zone AE with flood-way areas. Since increases on the Amite River or Bayou Manchac are less than 1 foot, a Conditional Letter of Map Revision is not required in accordance with 44 CFR Part 60.3(C)(10). Following construction of the gates, a Letter of Map Revision will be required in accordance with 44 CFR Part 65.3

BAYOU MANCHAC BACKFLOW PREVENTION GATE

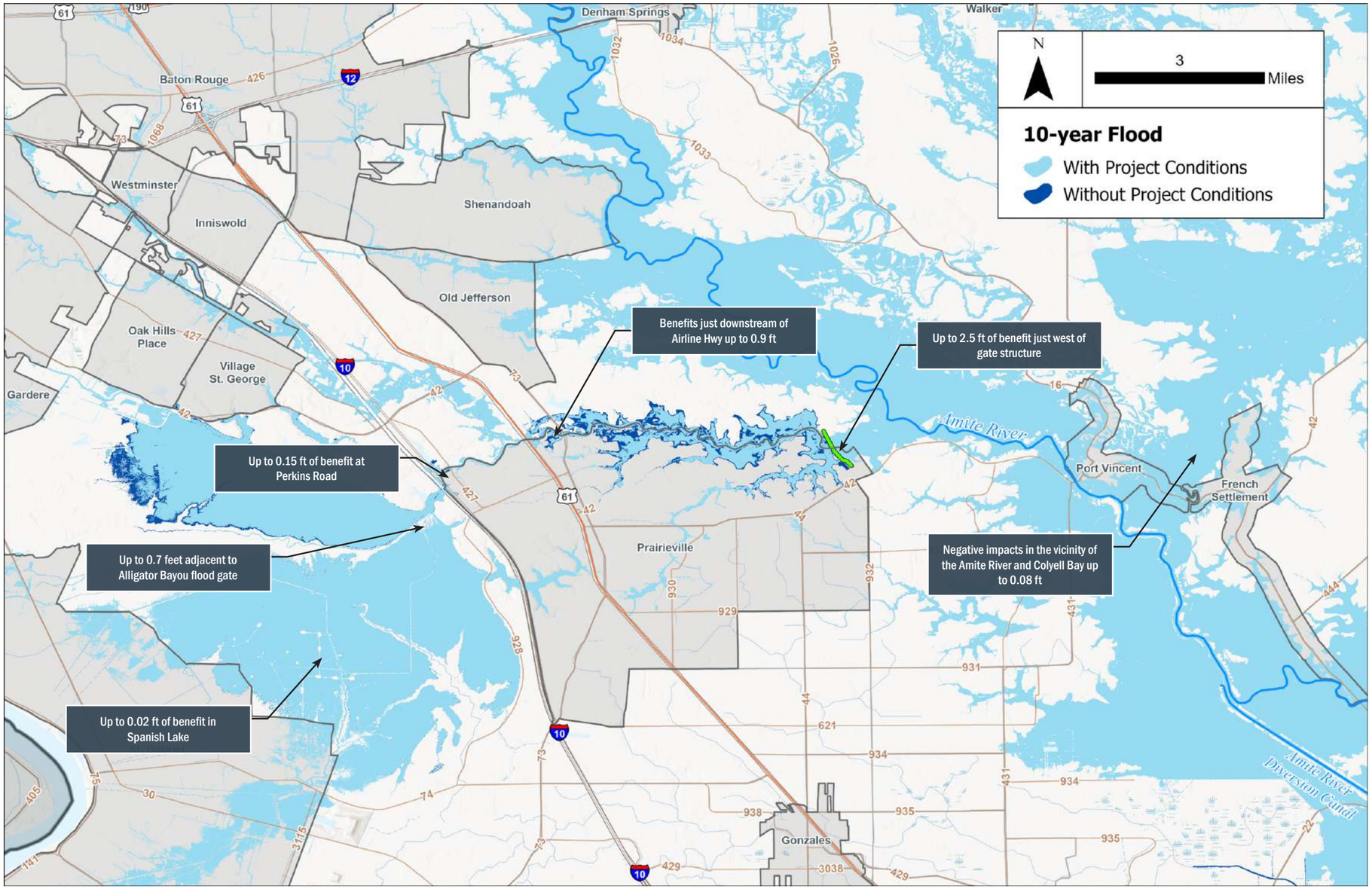
PROJECT IMPACTS MAP



WITH AND WITHOUT BACKFLOW PREVENTION 100-YEAR FLOOD (AMITE RIVER BACKWATER DRIVEN) PROJECT CONDITIONS

BAYOU MANCHAC BACKFLOW PREVENTION GATE

PROJECT IMPACTS MAP



WITH AND WITHOUT BACKFLOW PREVENTION 10-YEAR FLOOD (AMITE RIVER BACKWATER DRIVEN) PROJECT CONDITIONS

BAYOU MANCHAC BACKFLOW PREVENTION GATE

PROJECT COSTS

A project cost estimate was developed as part of this Master Plan development and is included below. Conceptual design of the backflow prevention gate structure was completed to create a conceptual opinion of probable costs. The conceptual opinion of probable cost is summarized below.

MANCHAC GATE COST ESTIMATE					
CONCEPTUAL DESIGN		12/19/2024			
OPINION OF PROBABLE CONSTRUCTION COST					
ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	EXTENSION
1	Mobilization and Demobilization	Lump	1	$4,000,000.00	$4,000,000.00
2	Clearing and Grubbing	Acre	14	$3,500.00	$49,000.00
3	Stone Rip-rap (130 lb.) 3	Ton	7,000	$125.00	$875,000.00
4	Flood Gate (Controls, Sluice Gates) 1,2	Lump	1	$46,000,000.00	$46,000,000.00
5	Land Acquisition	Acre	14	$15,000.00	$210,000.00
6	Channel Excavation 4	C.Y.	27,000	$25.00	$675,000.00
7	Levee	C.Y.	34,000	$50.00	$1,700,000.00
8	Engineering, Planning, and Construction Administration (15% of Total Construction Cost)	Lump	1	$7,500,000.00	$7,500,000.00
				Subtotal:	**$61,009,000.00**
				Contingency (30%)	**$18,302,700.00**
				Total Conceptual Cost	**$79,311,700.00**
				Total Conceptual Cost (Rounded)	**$79,400,000.00**
1. Assumed Sector Gate with Sluice Gates for concept estimating.					
2.Floodgate cost and information based on the USACE Engineering Documentation Report Morganza to the Gulf of Mexico, LA (MTG) Project, December 2021.					
3. Unit cost based on Historic USACE and DOTD Bid Tabs.					
4. Channel excavation to encompass the flood gate and sluice gate structures.					
5. Sector gates used as the basis for cost estimation due to potential reverse head conditions. Alternative gate structures shall be considered during planning and design phase.					
6. Mitigation cost not included in this cost estimate.					

FUNDING CONSIDERATIONS

This project is currently in the conceptual phase, therefore, funding has not yet been explored/addressed. Potential funding sources could include local, state funding and federal funding as discussed in Chapter 2.6 of this Master Plan.

BENEFIT COST ANALYSIS

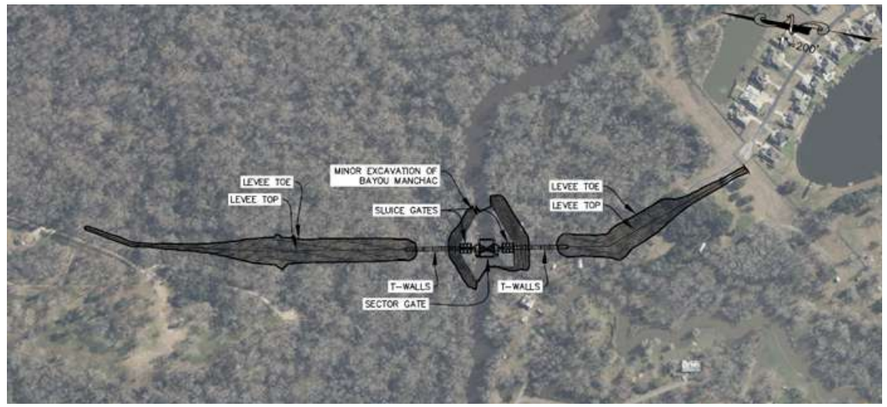
A benefit cost analysis has not been performed at this time.

SEQUENCING AND DEPENDENCIES

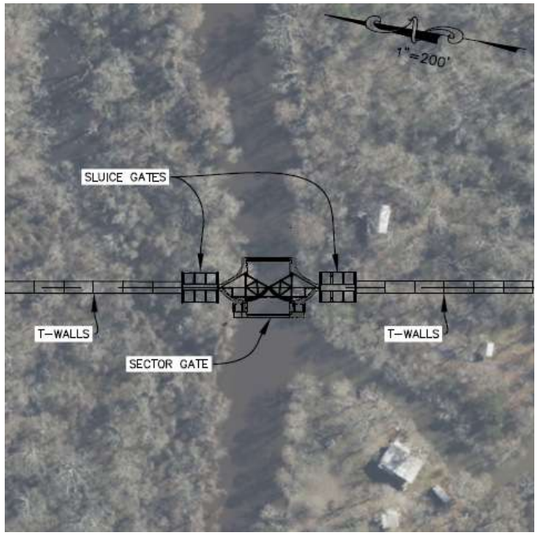
The Bayou Manchac Backflow Prevention Gate, like all projects in this Master Plan, shows opportunities for optimization of flood risk reduction across the entire basin.

There have been project concepts developed for several projects (i.e., New River Pump Station, Willow Glen Pump Station, Upper Amite River Detention/Retention, Lower Amite Sediment Removal, Upper Amite River Flood Risk Reduction and Restoration, etc.) in the Amite River Basin that, if built in conjunction with this project, could potentially have additional positive impacts.

CONCEPT ILLUSTRATIONS



BAYOU MANCHAC BACKFLOW PREVENTION GATES CONCEPT GATES AND EMBANKMENT (PHOTO SOURCE: ARBC)



BAYOU MANCHAC BACKFLOW PREVENTION GATES CONCEPT GATES AND T-WALL SECTIONS (PHOTO SOURCE: ARBC)

BAYOU MANCHAC FLOODPLAIN PRESERVATION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Baton Rouge Parish

PROJECT LEAD AGENCY

East Baton Rouge Parish

PROJECT STATUS

Concept Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of the Bayou Manchac Watershed

ENVIRONMENTAL BENEFITS

Preservation of wetlands and associated habitats. Preservation of floodplain function

PROJECT COSTS

$43M

FUNDING STATUS

Undetermined

MITIGATION NEEDS

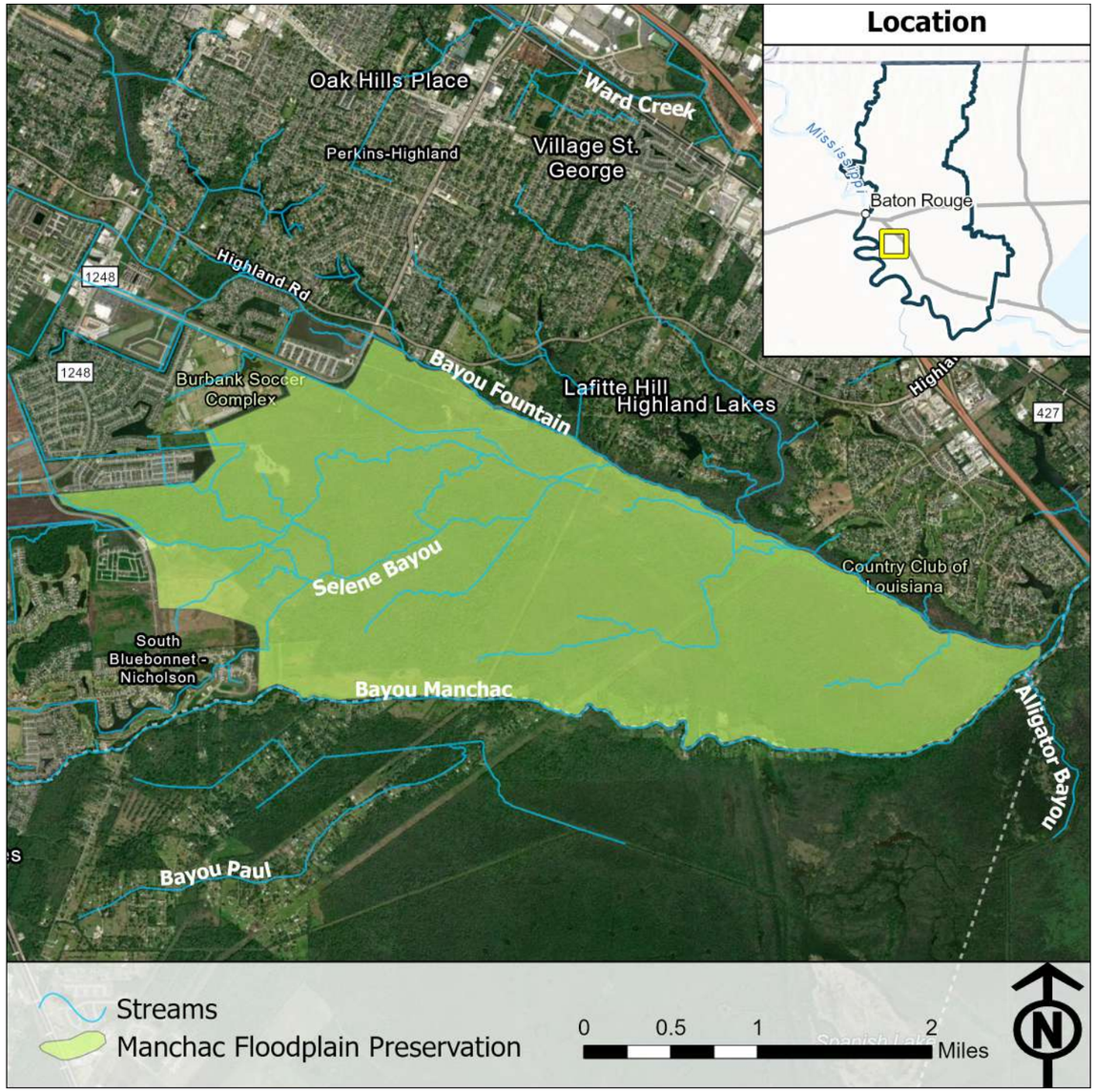
Continued development along the southern portions of East Baton Rouge Parish in the Bayou Fountain/Manchac watershed has removed properties that have provided flood storage and infiltration for stormwater resulting in increased flood risk. A significant portion of land in this area is undeveloped, natural floodplain, that provides storage for a significant amount of water during a flood events.

PROJECT SUMMARY

This project will mitigate future increased flood risk by preserving the existing floodplain storage along Bayou Fountain and Bayou Manchac, preventing development. The project will be located within the Bayou Fountain/Bayou Manchac watershed, in the existing floodplain between Bayou Fountain and Bayou Manchac. Bayou Fountain is approximately 13.1 miles long and flows from north of South Quad Drive to its confluence with Bayou Manchac. Bayou Manchac which forms the border between Iberville and Ascension and East Baton Rouge Parishes, is approximately 18.7 miles long and flows from its upstream start at River Road and the Mississippi River levee to its downstream confluence with the Amite River. Selene Bayou is a tributary to Bayou Fountain that runs through the middle of existing floodplain area. Most of the floodplain area is considered Freshwater Emergent Wetland according to the National Wetland Inventory database.

This project will provide future flood risk mitigation through preservation of existing floodplain and wetlands, by ensuring that no development can occur within the project area, thus maintaining the vital storage for the entire watershed. To ensure preservation of this area, the plan is to acquire land easements for approximately 4,265 acres of land. The proposed preservation area includes property owned by BREC, the Burbank Soccer Complex. Preservation of the area adjacent to the park provides an opportunity to enhance the area further for recreation/education opportunities. The project will provide East Baton Rouge, Ascension, and Iberville Parishes with the security that the existing wetlands and floodplain will remain intact, prevent development, and thereby mitigate future increased risk of flooding throughout.

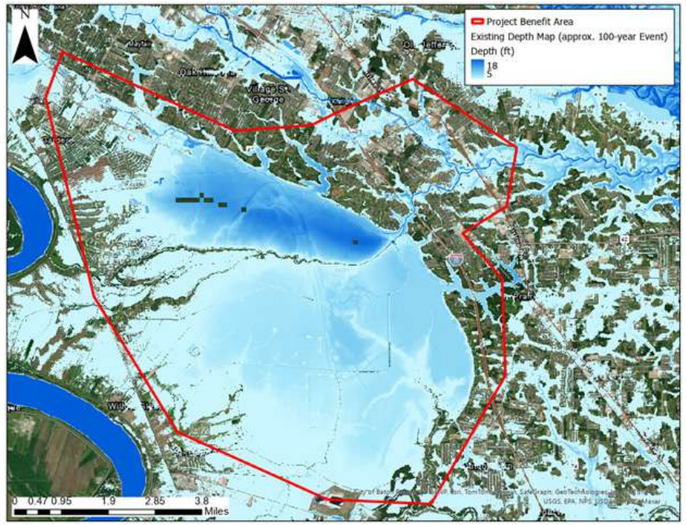
PROJECT LOCATION MAP



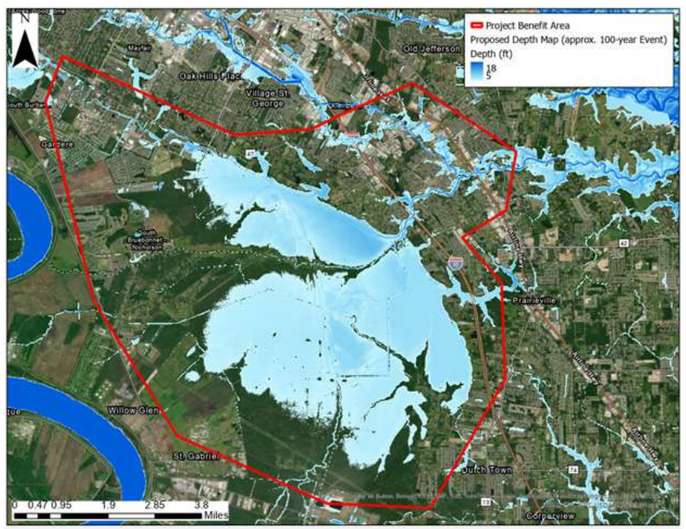
BAYOU MANCHAC FLOODPLAIN PRESERVATION

BAYOU MANCHAC FLOODPLAIN PRESERVATION

PROJECT IMPACTS MAP



FUTURE WITHOUT PROJECT (LAND NOT PRESERVED) FLOOD DEPTH MAP (APPROX. 100-YR EVENT)



FUTURE WITH PROJECT (NO DEVELOPMENT OCCURRED) FLOOD DEPTH MAP (APPROX. 100-YEAR EVENT)

PREDICTIVE MODEL SUMMARY

During the development of the East Baton Rouge Parish Stormwater Master Plan, completed in 2022, a regional model was developed using HEC-RAS 2D modeling to assess storm events and backwater impacts in flood-prone areas of the parish. HEC-FIA was used to assess the damage reductions from the proposed project. The existing conditions model served as a foundation for a future with project (FWP) scenario, which simulated floodplain fill to emulate development. Multiple synthetic events were evaluated based on a series of rainfall depths for a specific duration rather than specific Annual Exceedance Probability (AEP) events. The rainfall depths utilized were NOAA Atlas14 with the 90% confidence interval. HEC-RAS model rainfall depths ranged from 4.5 to 26 inches for the 72-hour duration. For this project analysis, 3-rainfall depths were evaluated. The 7-inch 72-hour duration roughly correlates to the 2-year event, the 10-inch 72-hour duration correlates to the 10-year event, and the 16-inch 72-hour duration correlates to the 100-year event. This analysis identified the potential flood hazards and evaluated the flood risk reduction projects. The modeling was developed utilizing three LiDAR sources from 2017, 2018, and 2019, supplemented by terrain modifications based on recent development plans. Channel surveys were conducted across East Baton Rouge, Iberville, and Ascension Parishes to enhance bathymetric accuracy. Major closure structures, such as the Alligator Bayou closure, were also included in terrain development.

PROJECT IMPACTS

The Bayou Manchac Floodplain Preservation will not result in immediate benefits since it does not result in a structural project. However, preservation of this land will ensure long-term preservation of the vital flood storage and wetland functionality.

ENVIRONMENTAL CONSIDERATIONS

For this project, there are no environmental concerns as the project is passive with no physical impacts. However, if the project is not implemented, future development in the area would reduce the wetlands in the area and the ecological and floodplain benefits they provide.

REAL ESTATE CONSIDERATIONS

There are 4265 acres of proposed easement acquisition at approximately $10,000 per acre, equaling $42,650,000. The intent is that owners will retain ownership but with restrictions on use of the property to preserve the flood storage.

PERMITTING

The site is undeveloped natural wetland and floodplain. Additionally, due to the passive nature of easement acquisition, no permits would be required.

BAYOU MANCHAC FLOODPLAIN PRESERVATION

PROJECT COSTS (FOR PHASE 1)

TOTAL (ESTIMATED): The project cost estimate was developed for East Baton Rouge Parish Stormwater Master Plan.

TITLE	COST
H&H Design Study	$72,000.00
Benefit Cost Analysis	$25,000.00
Survey	$200,000.00
Property Easement Acquisition	$42,650,000.00
Environmental Review	$30,000
Total Cost	**$42,977,000.00**

FUNDING CONSIDERATIONS

The project is in the concept phase and funding has not yet been determined. The project is included in the East Baton Rouge Stormwater Master Plan and Capital Improvement Plan, but the parish has no current or anticipated funding for the project.

BENEFIT COST ANALYSIS

The benefit cost analysis was developed by HNTB on behalf of East Baton Rouge Parish.

Project Benefit: $258,354,852

Project Cost: $42,977,000

Benefit Cost Ratio (BCR): 5.87

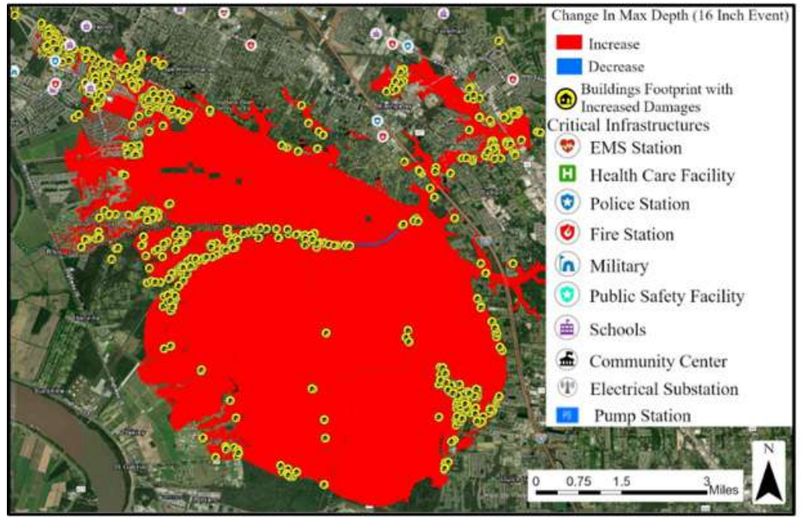
Project Useful Life (years): 100

SEQUENCING AND DEPENDENCIES

This project will not be dependent on any other projects in the area. The intent of the project is to prevent potential future flood risk from development in the area.

PROPOSED PRESERVATION AREA

This map depicts a hypothetical future scenario of the proposed preservation project area if developed through fill to 1 foot above the base flood elevation. This is the elevation required for first floor elevations in residential and commercial structures. The figure depicts the increase in water surface elevations under this developed scenario. The map shows the water surface elevation increases, represented by the red coloring, indicating impact of developing in the project area.



INCREASE IN FLOODING DEPTH UNDER FUTURE DEVELOPMENT IN THE PROPOSED PRESERVATION AREA

LOUISIANA HIGHWAY 22 GAPPING

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

PLD

PROJECT STATUS

Design Phase

PRIMARY AREAS OF PROJECT IMPACT

Eastern Portions of Ascension Parish

ENVIRONMENTAL BENEFITS

Hydrologic restoration of flows through LA Highway 22 into downstream swamps

PROJECT COSTS

$48.8M

FUNDING STATUS

Funded

$42M (LWI),

$6.8M (Capital Outlay)

MITIGATION NEEDS

The Laurel Ridge Levee Extension, is currently under construction. Concerns were raised by Livingston Parish pertaining to potential negative impacts on the river side of the project since flow is being further constricted between the levee system and the elevated banks of the Amite River and Amite River Diversion Canal. Additionally, LA Highway 22 and an area of natural high ground approximately 3,800 feet northwest of LA Highway 22 act as barriers, restricting water from draining south towards the McElroy and Maurepas swamp south of LA Highway 22.

PROJECT SUMMARY

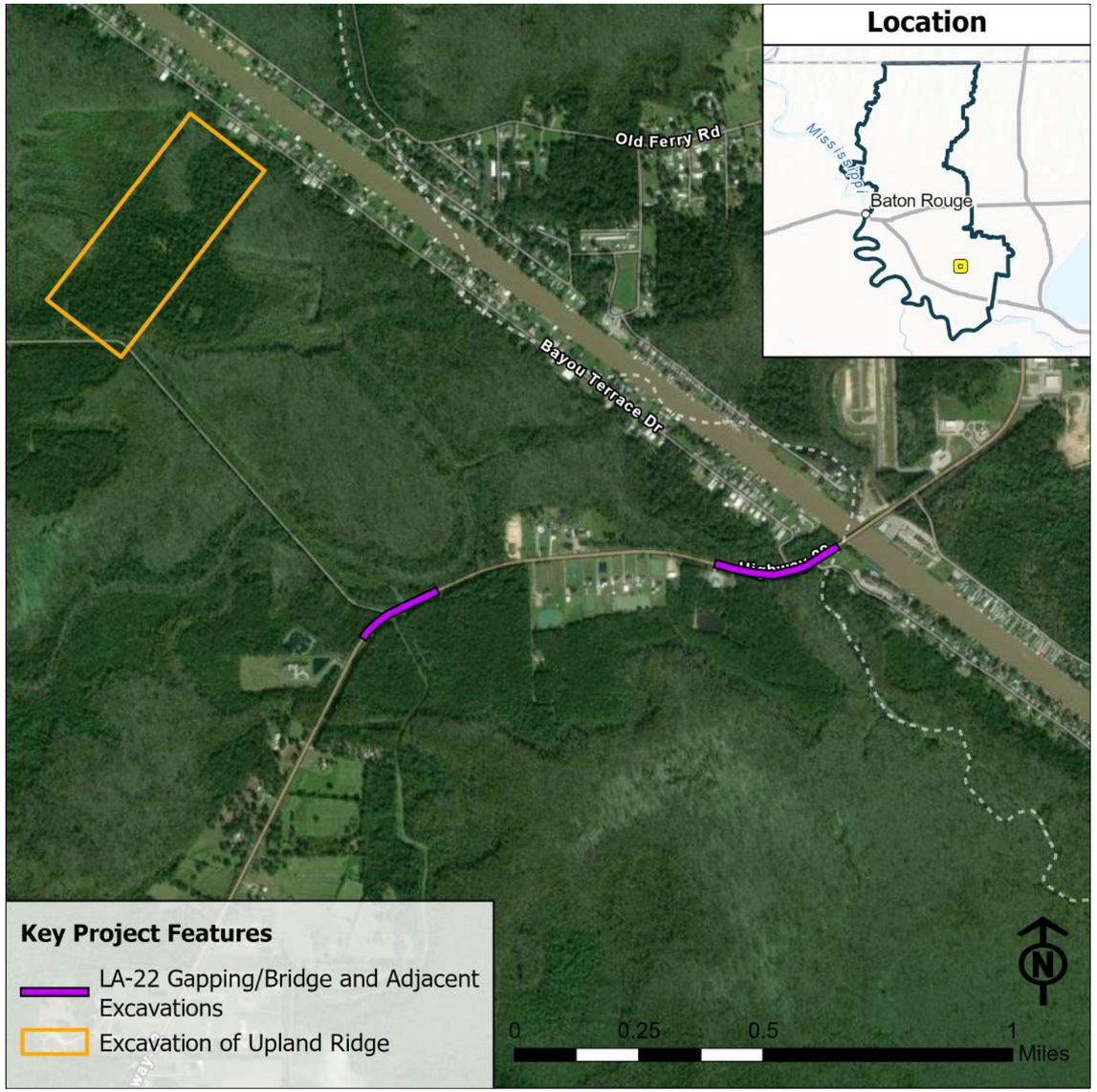
The LA Highway 22 Gapping Project will place two selective trapezoidal excavations through LA Highway 22 with two new bridges to remove the barrier effect and restore hydrologic connectivity to the downstream wetland area. The first bridge location will replace existing culverts near the intersection of LA Highway 22 and the Laurel Ridge Levee. The second bridge location will be a new section near the intersection of LA Highway 22 and the Amite River Diversion Canal. Excavations are proposed around the bridges in addition to the removal of an upland ridge approximately 3,800 feet north of Highway 22.

On request of Ascension Parish, five additional alternatives have been investigated for a second phase of the project which includes a variety of proposed excavations as well as two options for channelization.

The overall goals of the project will be to reduce flood elevations on the Amite River, divert flows away from the inhabited areas, increase the effectiveness of the adjacent levee systems, and restore the flow of freshwater into McElroy and Maurepas Swamps while mitigating the negative impacts of the Laurel Ridge Levee Extension project.

Upon completion, the project will be handed over to Ascension Parish and DOTD for operations and maintenance.

PROJECT LOCATION MAP



LA HWY 22 GAPPING PROJECT LOCATION MAP

LOUISIANA HIGHWAY 22 GAPPING

PREDICTIVE MODEL SUMMARY

A 1D/2D HEC-RAS model was run to compare water surface elevations between existing conditions and proposed project scenarios. Data was provided by the Ascension Parish to develop alternative proposed projects and models.

Duplantis Design Group (DDG) on behalf of PLD utilized the Amite River Basin Numerical Model (ARBNM), which was previously developed by DOTD, and incorporated topographic survey captured from 2017, 2018, and 2024 within the limits of the project. The design event for the model consisted of a 72-hour concentric rain even with a point precipitation of 20 inches of rainfall centered over Darlington to create a 100-year flood discharge in the Lower Amite River.

PROJECT IMPACTS

Preliminary results as indicated by Duplantis Design Group (DDG) for McKim & Creed, on behalf of PLD in their Technical Memorandum No.2, LA 22 Gapping Project -Ascension Parish, dated June 6, 2024, indicated that areas north of LA Highway 22 will experience reduced water surface elevations up to 1.88 feet for the 100-year flood event for the original Alternative A with new survey. Downstream increases for this alternative were not specified. This helps to restore natural freshwater flows into McElroy Swamp which have historically been restricted due to the construction of LA Highway 22 and the Amite River Diversion Canal.

ENVIRONMENTAL CONSIDERATIONS

The evaluation performed for this project illustrates that the proposed bridge gaps and excavation should reintroduce freshwater flows to McElroy swamp by enhancing hydrological exchange, improving water quality, and reducing stagnation. Additionally, channelization will impact the existing wetlands upstream and downstream of the proposed bridges. While an excavation alternative has not been finalized at this time, a maximum of 1,400,000 cubic yards will be excavated.

REAL ESTATE CONSIDERATIONS

Real estate considerations will be dependent on the final alternative selected by PLD and will require easement acquisition.

PERMITTING

This project will require permitting from USACE (Section 10 and 404), the Louisiana Department of Natural Resources (Coastal Use Permit), the Department of Transportation, and Department of Environmental Quality (LPDES - LAR100000).

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

PROJECT COSTS

A construction cost estimate of $48.8M was estimated for purposes of grant application.

FUNDING CONSIDERATIONS

The project is funded through the Louisiana Watershed Initiative.

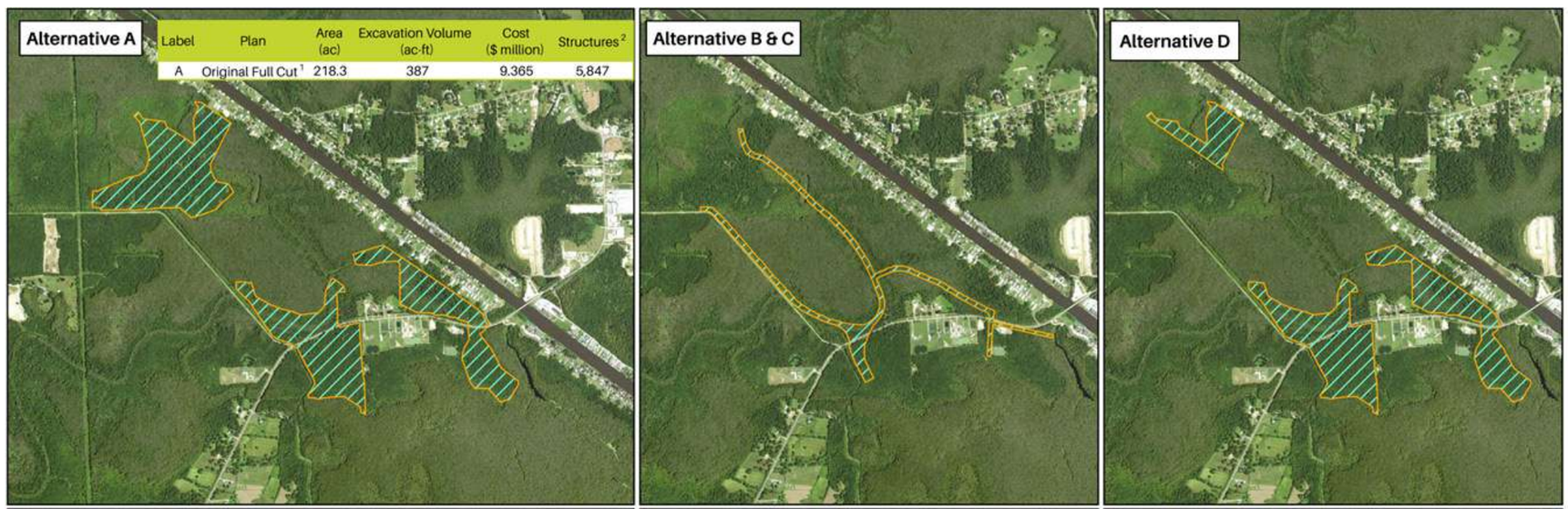
BENEFIT COST ANALYSIS

A BCA was performed by PLD as part of the LWI Round 1 funding requirements. With both bridges in place, a BCA of 1.54 was determined which increased to 5.45 with social benefits included.

SEQUENCING AND DEPENDENCIES

Due to concerns about potential adverse impacts outside of the area protected by the Laurel Ridge Levee Extension by Livingston Parish through a lawsuit seeking to adjoin the project, a settlement agreement was executed on 3/22/2021 between PLD, East Ascension Consolidated Gravity Drainage District and Livingston Parish. Through this settlement agreement, Livingston Parish agreed to stay prosecution of the lawsuit seeking to adjoin the project whereby all parties agreed that in conjunction with the Comite River Diversion Canal and the Louisiana Highway 22 gapping project would provide additional flood risk benefits to the Lower Amite basin. This also included that Ascension Parish shall not increase pumping capacity in the Marvin Braud Pump Station beyond the current pumping capacity until the Louisiana Highway 22 gapping project and CRDC is completed.

ADDITIONAL ALTERNATIVE ILLUSTRATIONS



Label	Alternatives	Area (ac)	Excavation Volume (ac-ft)	Cost ($ million)	Structures Reduction[3]	Max Increase (ft)[4]
B	Channels at -2'	42.1	129	3.121	3,500	0.40
C	Channels at -4'	42.1	211	5.106	3,500	0.40
D	1090-foot Cut	153.6	252	6.098	3,450	0.20
E	1875-foot Cut	187.5	328	7.937	5	0.12
F	1875-foot Cut + Fill	218.3	328	7.937	3,600	0.29

Footnotes:
1. All cuts are excavated to elevation +1-foot unless otherwise stated.
2. Structures include structure locations showing at least a 0.1-foot reduction in peak water surface elevation (WSE) as compared to that of the existing 100-year design storm.
3. Structure reduction is based on the amount of structures showing an increase in WSE greater than 0.05 feet as compared to the Original Full Cut.
4. Max increase is based on the maximum WSE increase identified at a structure as compared to the Original Full Cut.

ADDITIONAL ALTERNATIVES INVESTIGATED FOR A POTENTIAL SECOND PHASE OF THE PROJECT AS REQUESTED BY ASCENSION PARISH (SOURCE: DUPLANTIS DESIGN GROUP FOR MCKIM AND CREED ON BEHALF OF PLD)

MARVIN BRAUD PUMP STATION/LEVEE ELEVATION UPGRADES

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Ascension Parish

PROJECT LEAD AGENCY

Ascension Parish

PROJECT STATUS

Design Phase

PRIMARY AREAS OF PROJECT IMPACT

Eastern portions of Ascension Parish

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

TBD

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

TBD

PROJECT COSTS

$57M

FUNDING STATUS

Funded
(FEMA HNMTAP/Ascension Parish)

MITIGATION NEEDS

The southeastern portion of Ascension Parish (including the town of Sorrento, the City of Gonzales, St. Amant, and unincorporated parts of the parish behind the existing levee system) is subject to flooding from the Amite River Basin and storm surge from tropical cyclone activity. This area has suffered flooding from recent hurricanes including Gustav in 2008, Issac in 2012, Barry in 2019, and Ida in 2021 and from Amite River overflows in 2016.

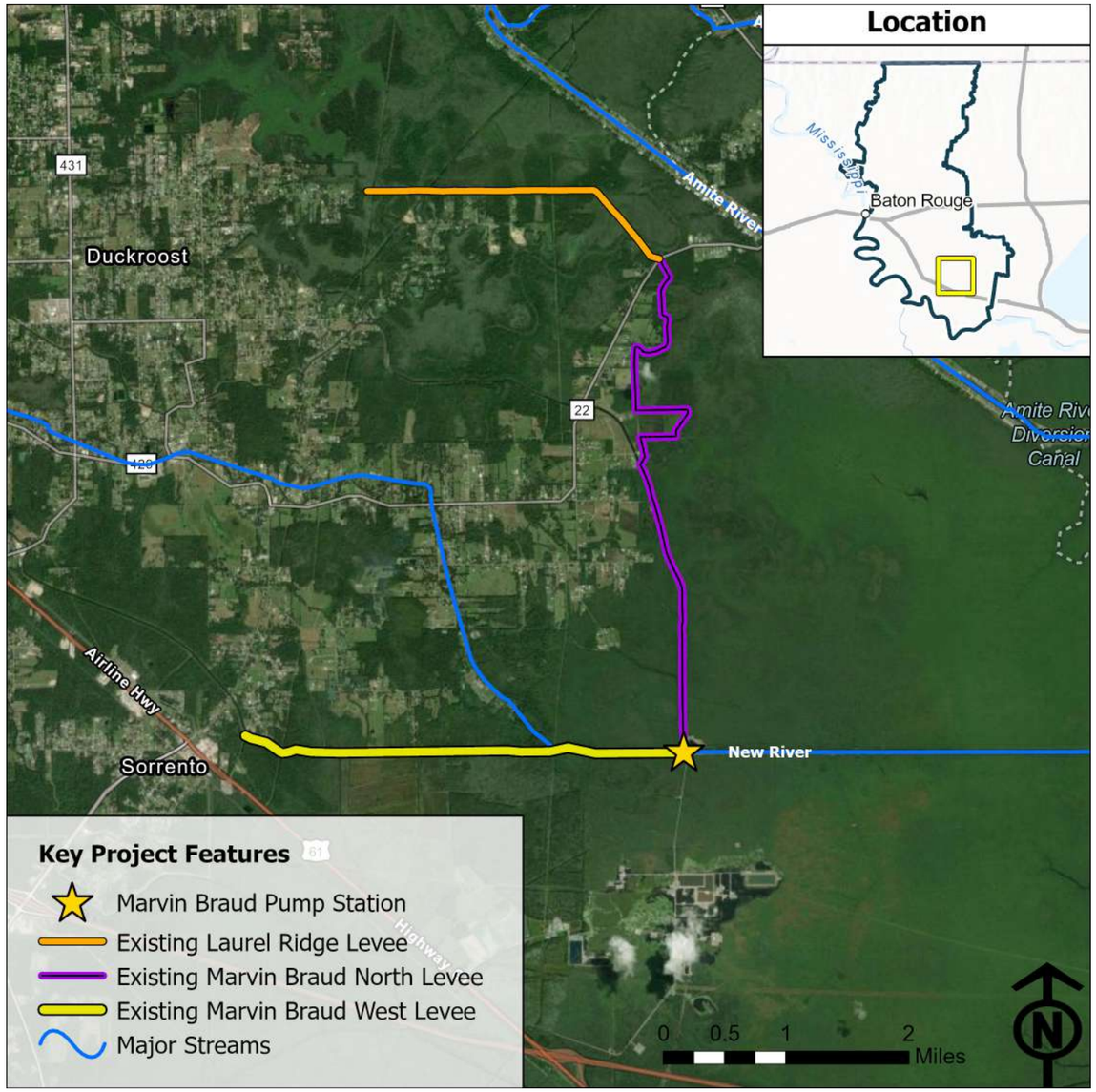
PROJECT SUMMARY

The existing Marvin Braud Pump Station and Levee is located in the eastern portion of Ascension Parish. The project includes raising the existing Laurel Ridge, Marvin Braud North, and Marvin Braud West levees to prevent over-topping from Amite River. Modifications to the pump station will prevent interior flooding from back flow conditions caused by storm surge.

The project is currently in the design phase, and the scope includes backflow protection on the pump station discharge chambers above elevation +5.25 ft. The Marvin Braud Pump Station consists of seven flow pumps in which the discharge chambers will be retrofitted with flap gates on the flood side to prevent backwater flooding in the case of a pump failure during high storm surge events.

The Marvin Braud Levee improvements include: raising the existing Marvin Braud West levee to elevation 12 ft., raising the existing Marvin Braud North levee to elevation 13 ft., and raising the Laurel Ridge levee to an elevation of 14 ft. Tie-ins to the pump station between the Marvin Braud West and North levees will also be included to form a complete line of protection. There are seven existing drainage structures along the Marvin Braud West Levee and six gated structures along the Marvin Braud North Levee that will be replaced and fitted with sluice gates that will maintain flows during normal conditions but can be closed during storm surge and high river conditions.

PROJECT LOCATION MAP



MARVIN BRAUD PUMP STATION AND LEVEE SYSTEM PROJECT LOCATION

MARVIN BRAUD PUMP STATION/LEVEE ELEVATION UPGRADES

PROJECT IMPACTS

The interior area of the Marvin Braud Levee system comprises approximately 86 square miles. Once complete, the pump station modifications and levee elevation upgrades will provide flood protection from high water in the Amite and 100-year storm surge protection from tropical systems.

ENVIRONMENTAL CONSIDERATIONS

The proposed levee improvements will extend into existing wetlands. It is anticipated that wetland mitigation will be required. Increasing the height of the levees will also require increasing the width and will require the purchase of additional right-of-way and wetland mitigation. This project will provide positive benefits to the wetlands inside of the levee system using the upgraded drainage structures.

REAL ESTATE CONSIDERATIONS

Although Ascension Parish owns the existing project property, Increasing the height of the levees will require increasing the width in some locations and this will require the purchase of additional right-of-way. The final determination will be made during detailed design.

UTILITY RELOCATION

There are two pipeline corridors passing through the west levee and an electric utility paralleling the west levee. There will be utility relocations required for some of these. There are two pipeline corridors that also pass through the existing Laurel Ridge levee. Utility relocations are being addressed in the ongoing design.

PERMITTING

This project will require permitting from USACE (Section 10 and 404), Section 401 water quality and the Department of Transportation for potential impacts to Hwy 22, and Stormwater Pollution Prevention Plan per the Department of Environmental Quality (LPDES - LAR100000).

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

PREDICTIVE MODEL SUMMARY

From the 2017 Levee Analysis and Mapping Procedures (LAMP) Study submitted by HNTB on behalf of Ascension Parish, a 2D hydraulic model was developed to accurately represent floodplain flows across the Amite River, New River, and Blind River watersheds, as well as backwater effects at Highway 22 and spoil banks along the Amite River and Amite River Diversion. The model incorporated the most current LIDAR, cross-sectional bathymetry, and topographic survey data.

Calibrated using data from the August 2016 storm event, the model effectively depicted flood dynamics observed during major events. Results indicated that the Marvin Braud West levee protects against a 10-year storm event, the north levee offers 100-year protection with limited free-board, and the Laurel Ridge levee protects against 20–25-year events.

FUNDING CONSIDERATIONS

The project was approved for FEMA HMGP Grant Funding with the federal share of $37,276,000 and local share by Ascension Parish of $19,796,000. Due to rising material and construction cost there is a potential for additional funds of $19,452,000.

MARVIN BRAUD PUMP STATION/LEVEE ELEVATION UPGRADES

PROJECT COSTS

The project cost was developed on behalf of Ascension Parish as submitted for HMGP grant funding.

PHASE 1 COSTS	
SERVICE	**COST**
Topographic Survey	$466,900.00
H&H Study	$252,000.00
Environmental	$465,000.00
Engineering and Design	$1,479,000.00
Permitting	$385,000.00
Geotechnical Investigation	$230,000.00
Wetland Mitigation	$5,532,000.00
Management Cost	$163,445.00
Phase 1 Cost	**$8,964,345.00**

PHASE 2 COSTS	
SERVICE	**COST**
ROW Acquisitions	$260,000.00
Construction	$42,220,885.00
Resident Inspection	$1,536,231.00
Construction Management	$1,536,230.00
Management Cost	$2,554,268.00
Phase 2 Costs	**$48,107,614.00**
Total Project Cost	**$57,071,959.00**

BENEFIT COST ANALYSIS

The BCA below was developed by HNTB on behalf of Ascension Parish:

- Total Project Benefits based on the HMGP Grant Application: $495,041,258
- BCR based on HMGP Cost estimate of $55,138,007: 8.98

SEQUENCING AND DEPENDENCIES

The Marvin Braud Pump Station and Levee system upgrades project and Laurel Ridge Levee Extension project together provide substantial flood risk reduction to East Ascension Parish. However, the combination of the two projects do result in slight increase in flood risk from the Amite River into Livingston Parish. This is intended to be offset by the Highway 22 Gapping project that was approved by LWI for funding.

Due to concerns about potential adverse impacts outside of the area protected by the Laurel Ridge Levee Extension by Livingston Parish through a lawsuit seeking to adjoin the project, a settlement agreement was executed on 3/22/2021 between PLD, East Ascension Consolidated Gravity Drainage District and Livingston Parish. Through this settlement agreement, Livingston Parish agreed to stay prosecution of the lawsuit seeking to adjoin the project whereby all parties agreed that in conjunction with the Comite River Diversion Canal and the Louisiana Highway 22 gapping project would provide additional flood risk benefits to the Lower Amite basin. This also included that Ascension Parish shall not increase pumping capacity in the Marvin Braud Pump Station beyond the current pumping capacity until the Louisiana Highway 22 gapping project and CRDC is completed.

MARVIN BRAUD SITE IMAGES

EXISTING WATER CONTROL SLUICE GATE STRUCTURE (PHOTO SOURCE: HNTB ON BEHALF OF ASCENSION PARISH)

MARVIN BRAUD WEST TYPICAL WIDE LEVEE SECTION (PHOTO SOURCE: HNTB ON BEHALF OF ASCENSION PARISH)

UPPER AMITE RIVER FLOOD RISK REDUCTION AND RESTORATION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

East Baton Rouge, East Feliciana, and St. Helena Parishes

PROJECT LEAD AGENCY

ARBC

PROJECT STATUS

Concept Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, East Feliciana, Livingston, and St. Helena Parishes adjacent to the Amite River

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

1,500

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$33M

ENVIRONMENTAL BENEFITS

Restoration of river sinuosity, reestablishing floodplain connectivity, revegetation, and associated habitat improvements.

PROJECT COSTS

$500M (ROM)

FUNDING STATUS

Phase 1 Partially Funded (Capital Outlay)

MITIGATION NEEDS

The Amite River Basin has a history of both natural and man-made processes that results in portions of the river showing dynamic channel morphology and instabilities. In the Upper River, degradation in the channel and a reduction in sinuosity have resulted in increased slope. On average, the channel width has increased by over 100% percent. The availability of sands in the vicinity of sand and gravel mining operations and higher velocities from increased channel slope have led to further erosion of the channel and downstream transportation of sediment.

Additionally, large storm events during the past 50 years, such as the April 1977, April 1983, January 1990, January 1993, June 2001, March 2016 and August 2016 flood of record have impacted the regrowth of vegetation on the over-banks, leading to further instability of the channel banks.

Eroded materials are transported downstream in the watershed and settle out where velocities are generally slower. For larger particles (particularly sands), notable downstream settlement begins to occur in the vicinity of Greenwell Springs and Watson, and continues intermittently until most of the entrained sand has settled out about 10-20 miles upstream of the Amite River Diversion Canal Weir. For smaller particles, such as silts and clays, major settlement occurs in the vicinity of the Amite River Diversion Canal Weir and continues to deposit towards Lake Maurepas.

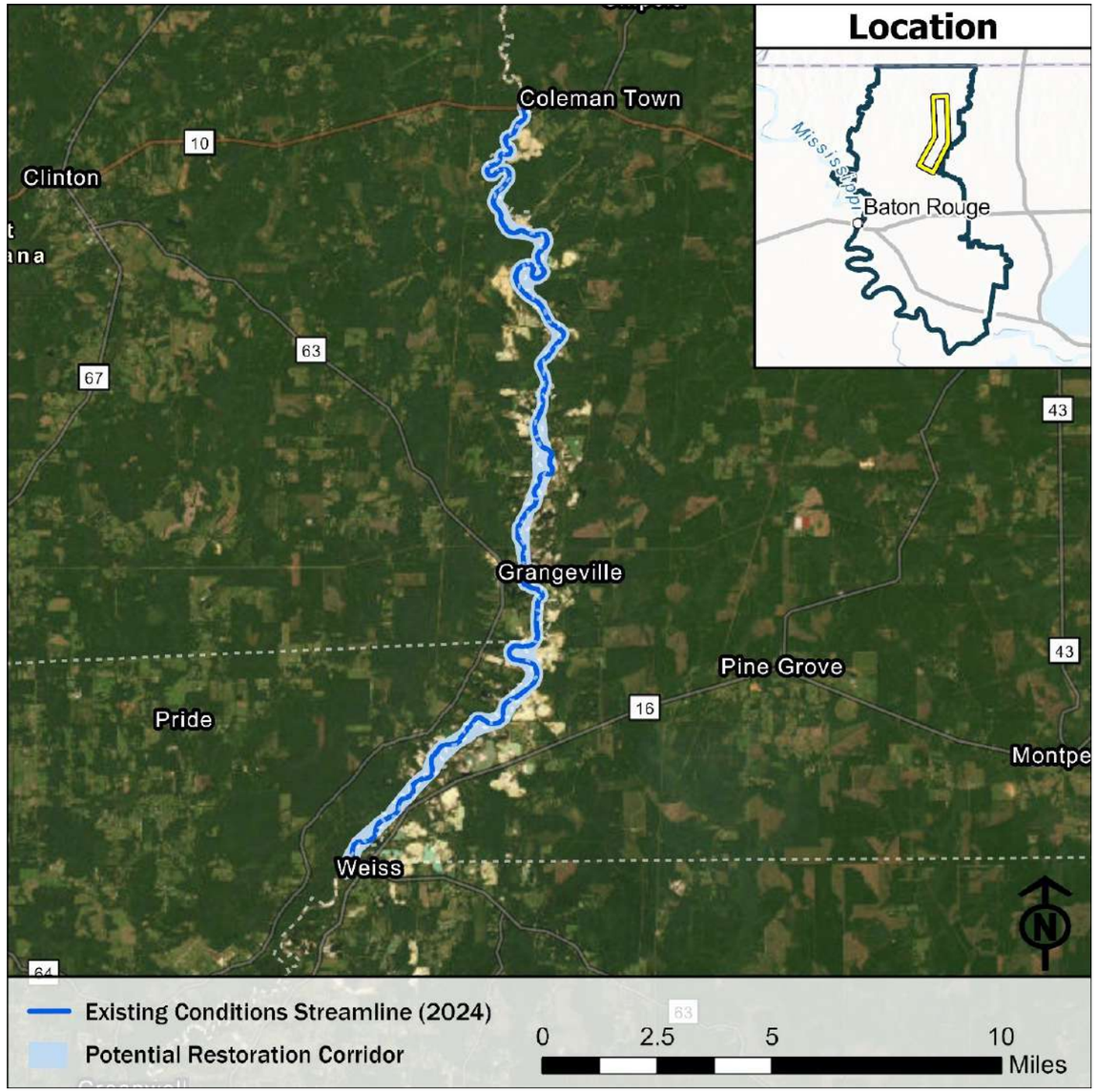
PROJECT SUMMARY

The Upper Amite River Flood Risk Reduction and Restoration concept project would be located on the Amite River starting near Highway 10 and extending downstream to a point near the unincorporated community of Weiss. The concept project would include restoring the Amite River channel width/depth ratio, restoring sinuosity, and revegetation in the general vicinity of mining operations. The channel would be designed to hold the natural bank full discharge, typically a 1.5-year flood, and reconnect flows with the floodplain during larger events. Activities would include stabilization of the system through the restoration of channel slope and channel width which would reduce velocities, in-channel erosion and downstream sediment rates. Additionally revegetation of bare areas would be needed to stabilize and restore natural functions.

The drainage area at the upstream end of the restored reach is approximately 580 square miles. For existing conditions, the average annual sediment load at the upstream end of the project reach is about 220,000 tons/yr, while the average annual sediment load at the downstream of the project reach is 440,000 tons/year (based on 2024 ARBC sediment modeling efforts). There is an increase in entrained sediment throughout the project reach because of increased velocities and an increased channel surface areas cause by channel widening.

Potential restoration efforts include restoration of channel sinuosity, slope, width to depth ratio, and revegetation of the floodplain based on a concept level analysis using Fluvial- Geomorphic/Natural Channel Design (NCD) (Hybrid Rosgen) methodology (Rosgen 1996, Doll et al 2003). The results of the predictive modeling demonstrated a reduction of about 252,000 tons from 2025-2050, or about 10,200 tons/year average annual load at the downstream end of the restored reach (about a 3% reduction).

PROJECT LOCATION MAP



UPPER AMITE RIVER FLOOD RISK REDUCTION AND RESTORATION

PREDICTIVE MODEL SUMMARY

This project was studied as a part of this Master Plan in December 2024. Two models were utilized for this study:
1) Sediment model used to determine sediment load and transport impacts, and 2) LWI Model to determine the floodplain impacts.

A 1D quasi-unsteady HEC-RAS sediment transport model was run to compare average annual sediment loads from 2025-2050 at the downstream end of the project reach for no-action (without project) conditions and restored (with project) conditions. The HEC-RAS model leveraged data from a HEC-6T and HEC-RAS model provided to Dewberry on behalf of PLD (Mobile Boundary Hydraulics, 2010). The leveraged data was used to create a 1D HEC-RAS model, and along with 2024 ARBC collected sediment data, was calibrated from 1985 to 2017 (Revised 1985 Model). The model was updated with 2017 USACE and DOTD channel survey (2017 Existing Conditions) and results were validated using 2024 ARBC channel surveys. The model was run from 2017 to 2025 to create 2025 Existing Conditions geometry. Historical inflow hydro-graphs were scaled using a linearly increasing multiplier in order to simulate increasing future flow conditions as a result of climate change and watershed land use change.

Key geometric information used to model the restoration was determined using Fluvial-Geomorphic/Natural Channel Design (NCD) (Hybrid Rosgen) methodology (Rosgen 1996, Doll et al 2003). The modeled conditions are idealized and determined from a concept level analysis. Additional efforts including field data collection, more detailed analysis of restoration options, and more detailed modeling would be necessary to determine restoration options for a detailed design. Additionally, the project would need to be completed in phases, or strategically chosen reach segments would need to be selected to restore (Doll et al 2003).

To assess hydraulic floodplain impacts, the LWI HEC-RAS model was used to simulate the no-action (without project) and the restored (with project) conditions for the 10-year and 100-year storm events. The LWI Models which are fixed bed provide a higher resolution for the detailed analysis of flood elevations.

PROJECT IMPACTS

Modeling results demonstrated that average annual sediment loads at the downstream end of the project reach could be decreased by approximately 10,200 tons/year over the next 25 years (2025-2050).

Estimated average annual load at key locations throughout the project area for no-action (without project) conditions and restored (with project) conditions.

LOCATION	AVERAGE ANNUAL SEDIMENT LOAD (TONS/YEAR)		CHANGE IN AVERAGE ANNUAL LOAD (TONS/YEAR)	% REDUCTION
	NO-ACTION (WITHOUT PROJECT) CONDITIONS	RESTORED (WITH PROJECT) CONDITIONS		
Highway 10 (at the start of the project reach)	216,663	199,372	-17,291	8.0%
25% of project reach	325,827	297,296	-28,531	8.8%
Middle of Project Reach	402,628	355,797	-46,830	11.6%
75% of project reach	403,520	379,163	-24,357	6.0%
Immediately downstream of project reach	437,658	427,442	-10,216	2.3%
Amite River at Magnolia Bridge Road	532,155	518,031	-14,125	2.7%
Amite River at Florida Avenue, Denham Springs	719,740	703,633	-16,108	2.2%

PROJECT IMPACTS

Project impacts during the 10-year and 100-year floods:

LOCATION	10-YEAR FLOOD ELEVATION IMPACTS (FEET)	100-YEAR FLOOD ELEVATION IMPACTS (FEET)
Amite River at Highway 37 Bridge	+0.34	+0.26
Amite River at Magnolia Bridge Road	-0.12	-0.07
Amite River at Florida Avenue, Denham Springs	-0.28	-0.03
Amite River at Bayou Manchac Confluence	-0.14	-0.03
Amite River at LA Highway 42 in Port Vincent	-0.11	-0.03
Amite River at LA Highway 16 in French Settlement	-0.05	-0.02
Amite River Diversion Canal at LA Highway 22	-0.05	-0.02
Comite River at Central Throughway	-0.49	-0.03

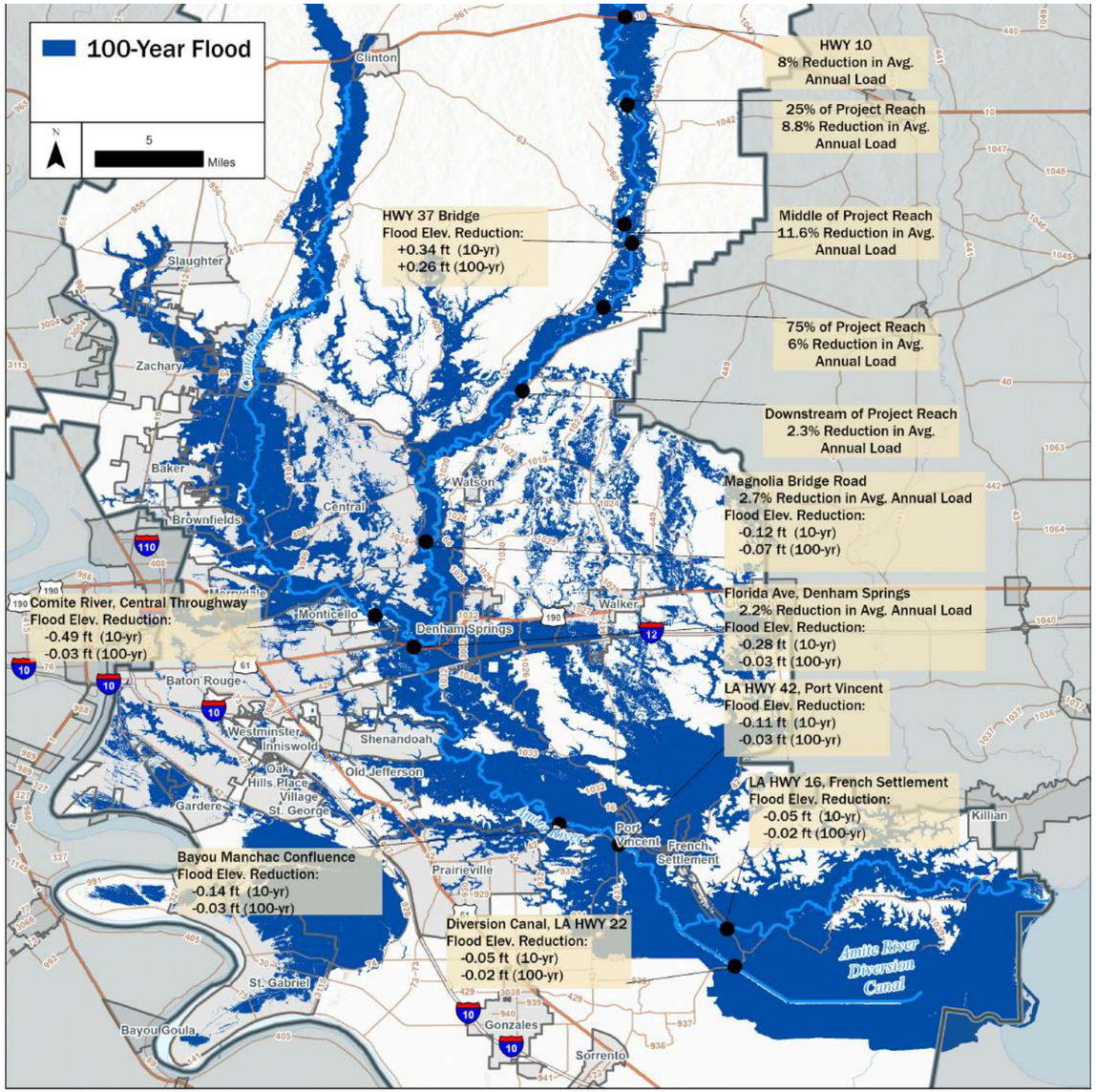
Structure counts and economic impacts downstream of the project area.

FLOOD EVENT	STRUCTURES REMOVED	ADDITIONAL STRUCTURES WITH DECREASED FLOODING	ECONOMIC LOSSES AVOIDED
10-Year Flood	670	3,784	$19,784,181.80
100-Year Flood	1,501	16,474	$33,143,623.60

The river restoration discussed for this project scenario potentially results in the reduction of approximately 1300 acres of channel area, which would be reshaped and vegetatively stabilized based on shear values and soils conditions to develop a stable sediment retaining, floodplain-wetland habitat. Surface water interaction with functional floodplains and wetlands increases the potential for improvements to water quality (e.g., removal of excess nutrients, etc.). Additionally, as discussed in Section 2 and shown in the results in the tables above, restoration has the potential to reduce sediment entering the river and flowing downstream.

UPPER AMITE RIVER FLOOD RISK REDUCTION AND RESTORATION

PROJECT IMPACTS MAP



ENVIRONMENTAL CONSIDERATIONS

Restoring the Upper Amite River has numerous potential environmental benefits. This can include an increase in floodplain habitat and biodiversity via the re-introduction and re-vegetation of native species to the surrounding floodplain and increased surface water-groundwater interaction. This will also stabilize the riverbanks and reduce sediment transport downstream. In addition to re-vegetation, in-stream and bank restoration approaches (rock and log j-hook and cross vanes) can be used where outside meander-bank scour is occurring unnaturally.

Additionally, when restoring the channel sections, taking climate change and increased rainfall amounts into account when designing the bank full discharge can increase resiliency of the channel, surrounding floodplain, and infrastructure.

There would also be a potential need to mitigate the inflated heelsplitter mussel if found within the footprint of the project during field survey.

REAL ESTATE CONSIDERATIONS

Real estate will potentially have to be acquired to complete the restoration project. This may include temporary construction easements or permanent easements. No permanent structures were located within the restored stream corridor through a limited review of aerial imagery.

PERMITTING

Some of the following national permits would likely be necessary for a stream restoration project along the Amite River depending on the planned restoration. Permits may include, but are not limited to:

- Clean Water Act Section 401 Water Quality Certification to Work in Navigable Waters of the U.S.
- Clean Water Act Section 404 Permit for the Discharge of Dredge or Fill Material into Waters of the U.S.
- Endangered Species Act Consultation
- National Environmental Policy Act Consultation
- National Historic Preservation Act Section 106 Consultation
- Rivers and Harbors Act Section 10 Permit for Obstructions to Navigable Waters
- U.S. Army Corps of Engineers Nationwide Permit 27 for Aquatic Habitat Restoration Enhancement and Establishment Activities
- U.S. Army Corps of Engineers Regulatory Guidance Letter: Determination of Compensatory Mitigation Credits for the Removal of Obsolete Dams and Other Structures from Rivers and Streams

The project is located within a FEMA AE flood zone with regulatory flood-way. A FEMA Conditional Letter of Map Revision will

be required in accordance with 44 CFR Part 60.3(d)(4). Following construction of restoration activities, a Letter of Map Revision will be required in accordance with 44 CFR Part 65.3

UPPER AMITE RIVER FLOOD RISK REDUCTION AND RESTORATION

PROJECT COSTS

TOTAL (ESTIMATED): $500M - $1B (ROM)

FUNDING CONSIDERATIONS

Due to the large size of this project, funding will likely require multiple sources and partnerships including ARBC, DOTD, DEQ, and USACE.

The FY24 Capital Outlay budget included $65M in priority 5 appropriation and a further $2M from the state general fund direct (non-recurring)

BENEFIT COST ANALYSIS

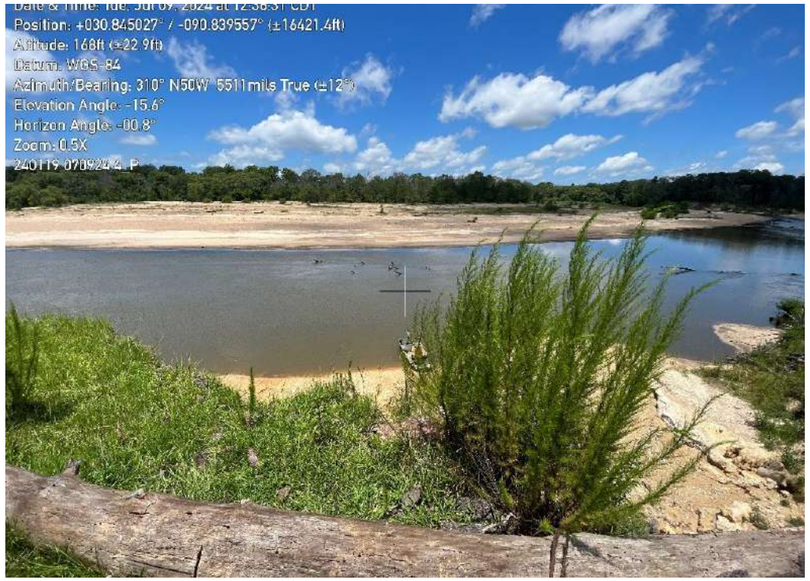
A BCA has not been performed at this time.

SEQUENCING AND DEPENDENCIES

The project can be standalone as it is not dependent on any other projects. However, performance in conjunction with the restoration of abandoned sand and gravel pits and floodplain preservation in the general vicinity of the project could have further benefits.

While downstream impacts are relatively small, these impacts are potentially large enough to mitigate negative impacts of other downstream concept projects, allowing them to be constructed to create a net no negative impact. These projects may potentially include Bayou Manchac Backflow Prevention Gates, clearing and snagging of the Amite River channel, rehabilitation of the Amite River Diversion Canal Weir and sediment removal. Due to real estate and funding constraints, the project may be implemented incrementally.

UPPER AMITE RIVER IMAGES



EXAMPLES OF WIDE, SHALLOW CHANNELS WITH LITTLE TO NO VEGETATION RE-GROWTH (PHOTO SOURCE: ARBC)

WILLOW GLEN PUMP STATION

KEY PROJECT ATTRIBUTES

PROJECT LOCATION

Iberville Parish

PROJECT LEAD AGENCY

Undetermined

PROJECT STATUS

Concept Phase

PRIMARY AREAS OF PROJECT IMPACT

Portions of Ascension, East Baton Rouge, and Iberville Parishes in the Spanish Lake and Bayou Manchac basins.

NET STRUCTURES LOSSES AVOIDED (100-YEAR FLOOD)

201

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

$31,978,000

PROJECT COSTS

$50M (ROM)

FUNDING STATUS

N/A

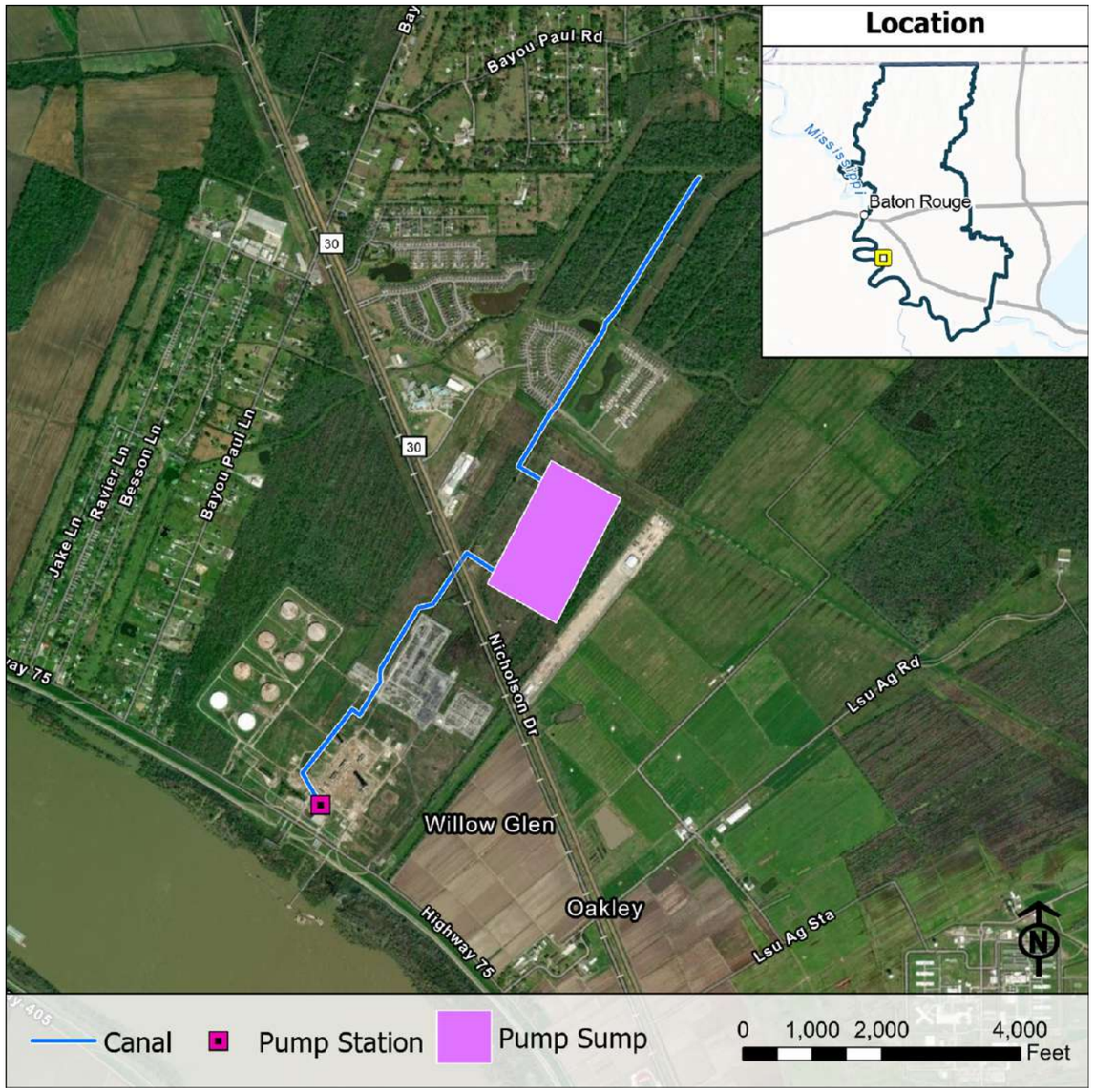
MITIGATION NEEDS

The Spanish Lakes and Bluff Swamp Area (SLBSA) is a 17,000-acre bowl like swamp that can detain large volumes of water during both backwater flooding events driven by the Amite River and intense localized rainfall. However, the area suffers from flat topography and limited outflow through gated structures at Alligator, Frog and Fish Bayous; all which drain into Bayou Manchac and eventually to the Amite River. During backwater events, like the August 2016 flood and heavy localized rainfall events, like in May 2021, water levels in the SLBSA increase until the area fills up with water. As rising water fills the SLBSA, water flows across LA Highway 74 towards New River and overwhelms drainage in New River which creates drainage issues in Geismar, Dutchtown and St. Gabriel. Additionally, this water must travel 17 miles to the Marvin Braud Pump Station to be pumped out.

PROJECT SUMMARY

The Willow Glen Pump Station project would involve the re-purposing of an existing cooling water pump system from the decommissioned Entergy Willow Glen Power Plant to remove stormwater from Spanish Lake directly into the Mississippi River. The project would involve channelization of Bayou Paul and an existing outfall canal to convey flow from the SLBSA to a large sump located on the east side of LA Hwy 30 adjacent to the Willow Glen Pump Station. The proposed plan would convert the existing intakes and outfalls of the closed loop cooling system and re-purpose them as outfalls from the pump station. The estimated cumulative capacity of these existing intakes and outfalls, if all used as outfalls is approximately 4,000 cfs.

PROJECT LOCATION MAP



WILLOW GLEN PUMP STATION

PREDICTIVE MODEL SUMMARY

The LWI HEC-RAS model for the Bayou Manchac Basin was used to evaluate the proposed project as part of the development of this Master Plan. Several events, including the 10- and 100-year flood events were evaluated for both rainfall driven and Amite River backwater flooding conditions. Additionally, LWI HEC-FIA consequence models were used to quantify economics impacts of the project.

During detailed design it is recommended that a sensitivity analysis be performed on the intake structure location to optimize the impacts in both Spanish Lake and Bluff swamp.

PROJECT IMPACTS

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR STORM FLOOD EVENTS FOR STORMS OVER BAYOU MANCHAC BASIN

LOCATION	10-YEAR STORM FLOOD IMPACTS (FEET)	100-YEAR STORM FLOOD IMPACTS (FEET)
Spanish Lake	- 1.7	- 2.2
Bluff Swamp	- 1.2	- 2.0

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS

LOCATION	10-YEAR AMITE RIVER FLOOD IMPACTS (FEET)	100-YEAR AMITE RIVER FLOOD IMPACTS (FEET)
Spanish Lake	- 2.1	- 3.7
Bluff Swamp	- 1.5	- 2.8

FLOOD IMPACTS FOR THE 10-YEAR AND 100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS

LOCATION	NET STRUCTURES IMPACTED	NET ECONOMIC IMPACTS
10-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU BASIN	20	$2,792,000
100-YEAR STORM FLOOD EVENT FOR STORMS OVER BAYOU MANCHAC BASIN	54	$6,694,000
10-YEAR AMITE RIVER BACKWATER FLOODING EVENTS	42	$4,833,000
100-YEAR AMITE RIVER BACKWATER FLOODING EVENTS	201	$31,978,000

ENVIRONMENTAL CONSIDERATIONS

The installation of a pumping station will allow regulation of water in the SLBSA and help to stabilize the ecosystem. This promotes better water quality and provides a more stable environment for wildlife throughout the region. By utilizing the natural infrastructure and integrating it with conventional infrastructure, the project aims to achieve sustainable and resilient flood management while preserving and restoring natural systems. The pump station will regulate water levels and help reduce anoxic conditions in stagnated water.

REAL ESTATE CONSIDERATIONS

Acquisition of land and easements will be required to construct, operate, and maintain the project. Previous discussions with current owner of the Willow Glen site by Iberville Parish indicated that the decommissioned outfalls and intakes and undeveloped land on the east side of La Hwy 30 for the purpose of excavating a large pump sump or detention pond would potentially be donated for the express purpose of flood mitigation.

PERMITTING

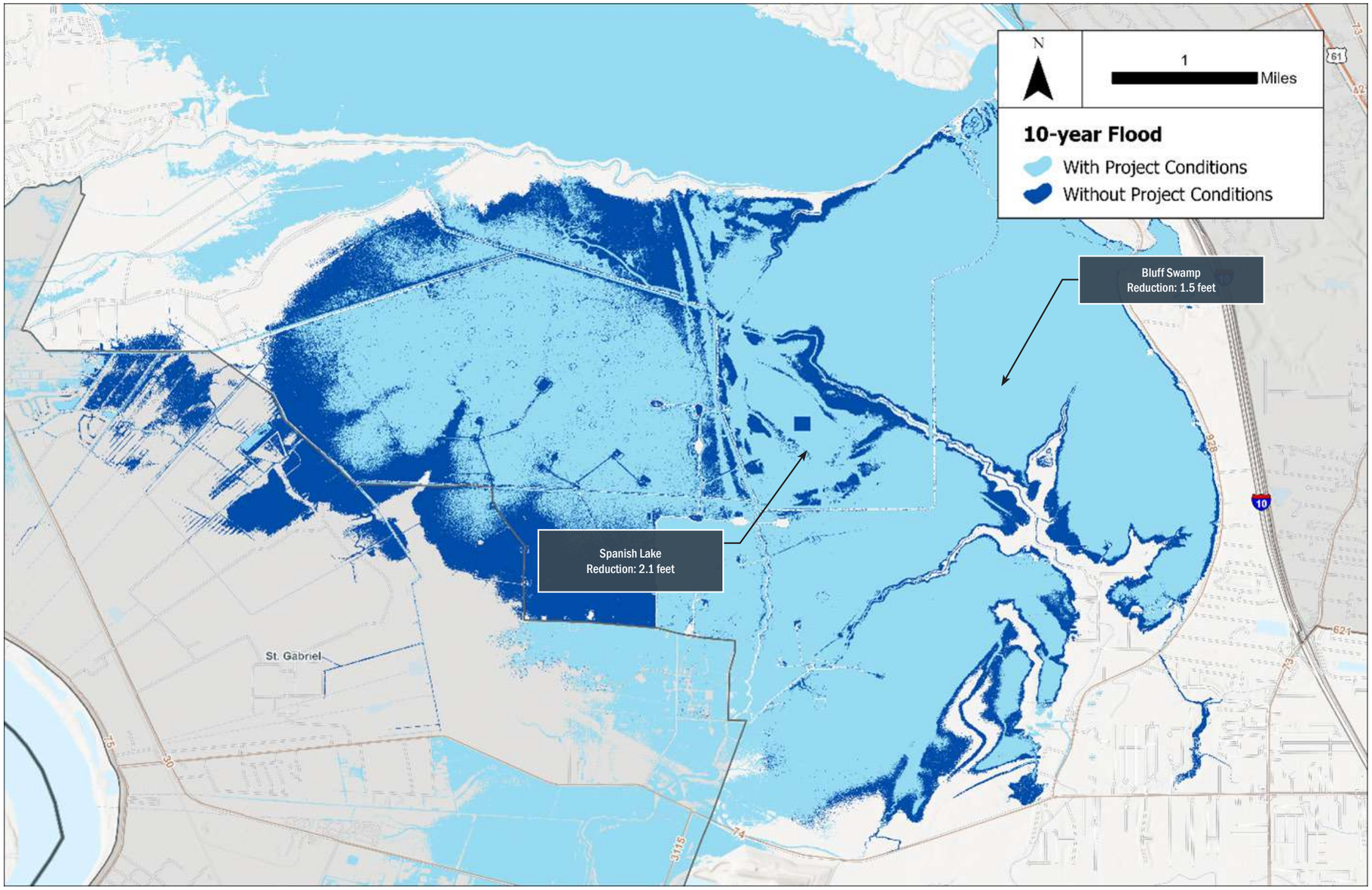
This project will require permitting from USACE (Section 10, 401 and 404), the Louisiana Department of Natural Resources (Coastal Use Permit), the Department of Transportation, and Department of Environmental Quality (LPDES - LAR100000).

By utilizing existing intake and outlet structures already crossing the Mississippi levee, USACE and PLD permitting and coordination is expected to be significantly streamlined.

In accordance with 44CFR §65.3, new technical data must be submitted to FEMA by the community as soon as available, but no later than 6-months after completion for floodplain management requirements.

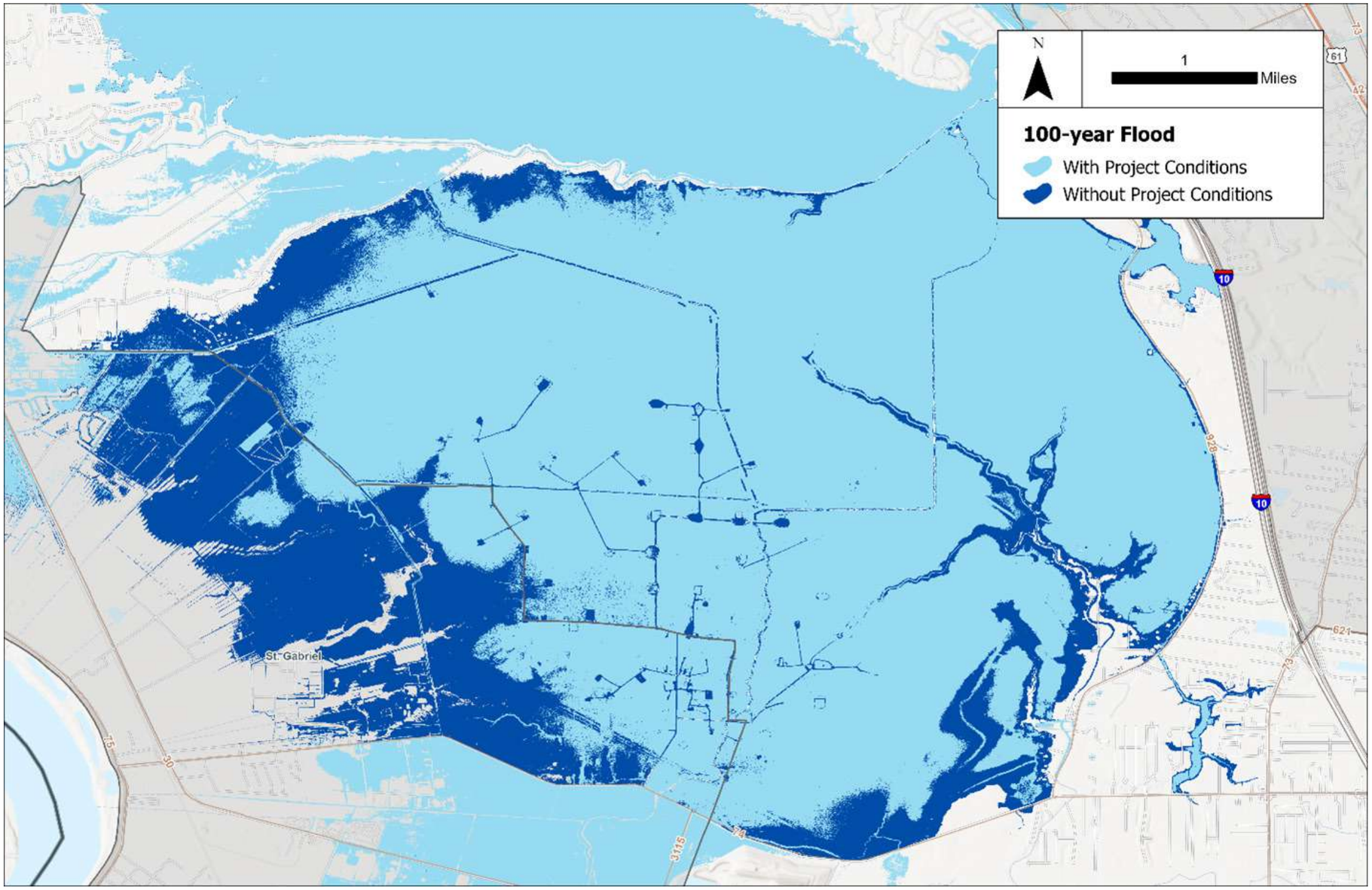
WILLOW GLEN PUMP STATION

PROJECT IMPACTS MAP



WILLOW GLEN PUMP STATION

PROJECT IMPACTS MAP



FLOOD IMPACTS FOR THE 100-YEAR AMITE RIVER BACKWATER FLOODING EVENT

WILLOW GLEN PUMP STATION

PROJECT COSTS

TOTAL (ESTIMATED): $50M (ROM)

FUNDING CONSIDERATIONS

Due to the large size of this project, funding will likely require multiple sources and partnerships including Iberville Parish, ARBC, DOTD, FEMA and PLD

BENEFIT COST ANALYSIS

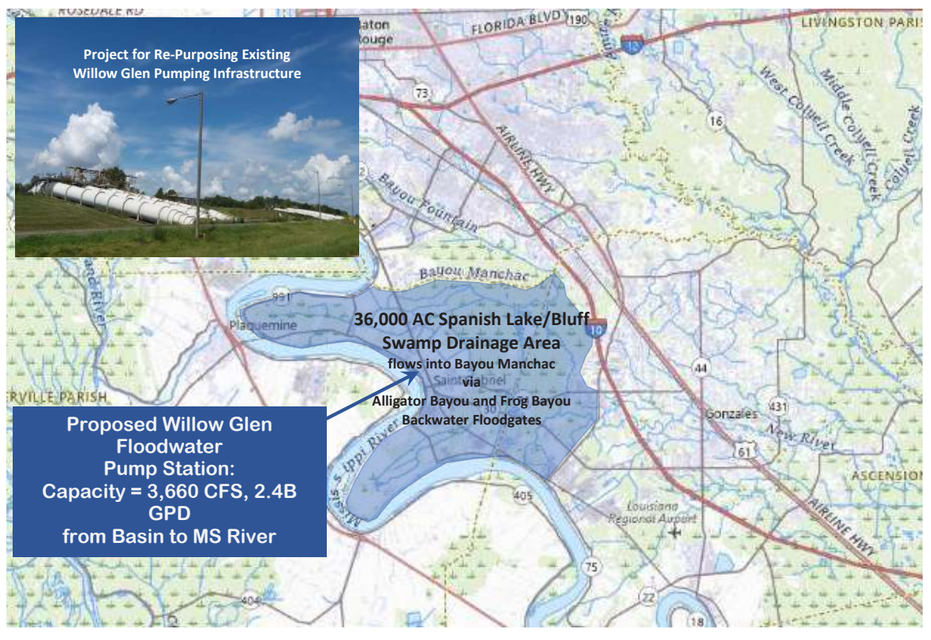
A benefit cost analysis has not been performed for this project.

SEQUENCING AND DEPENDENCIES

This project can be a standalone project and will not depend on any other projects since it takes water out of the Amite River Basin system into the Mississippi River. However, it can potentially mitigate negative impacts of other projects, making them feasible and furthering flood risk reduction benefits in other areas of the Amite River Basin.

EXISTING CONDITIONS

EXISTING INFRASTRUCTURE AT THE DECOMMISSIONED ENTERGY WILLOW GLEN POWER PLANT (PHOTO SOURCE: GOOGLE EARTH)



(SOURCE: IBERVILLE PARISH GOVERNMENT)

CHAPTER 4

TAKE ACTION

This chapter presents the 2025 Master Plan and describes the benefits of the suite of projects and actions with regard to reducing flood risk and protecting and restoring the natural environment.

PHOTO SOURCE: HNTB

4.1 PROJECT IMPLEMENTATION

Projects included within this Master Plan were strategically selected by the ARBC Board of Commissioners and formally approved for inclusion at the March 11, 2025 regular board meeting based on multiple factors, including regional needs and project performance to set out both the near- and long-term road map for regional management of the basin. During this process, it was evident that stormwater runoff cannot be modified easily without negatively impacting other parts of the Amite River Basin, however, with strategic planning and sequencing of projects, it was possible to mitigate negative impacts. This reinforces the need to manage the Amite River Basin on a regional scale and the importance of all ARBC communities working together for a shared common goal. Projects not requiring sequencing to mitigate negative impacts or where real estate mitigation is an integral part of the project such as acquisition or property or easements can be implemented stand alone without any dependencies.

Projects within this Master Plan include pre-construction level designs and concept level designs developed by state, federal, local and regional agencies in addition to new concepts developed through this Master Plan. ARBC is committed to continuing to partner with these agencies to strategically advance project implementation on a regional basis to ensure no-adverse impacts and to optimize project performance.

All predictive modeling of projects included within this Master Plan are concept level and should not be considered detailed design or pre-construction level modeling. Other sources of project performance information include summary data prepared by others, as referenced in this plan. Detailed modeling during the pre-construction phase is critical to ensuring no adverse impacts.

Near-Term Project Implementation

Twelve additional projects were selected for inclusion in the Master Plan that would be more near-term requiring substantially less funding, design and permitting as shown in Table 4-1. These projects include flood risk reduction, environmental restoration, and conservation projects. While individually, these projects may result in mostly positive impacts, negative impacts can present legal liability that must be mitigated.

TABLE 4-1: SUMMARIZES THE 12 ADDITIONAL PROJECTS INCLUDED WITHIN THIS MASTER PLAN AND INCLUDES NOTES PERTAINING TO REQUIRED SEQUENCING OR DEPENDENCIES TO ENSURE NO-ADVERSE IMPACTS.

Priority	Project	Master Plan Project Action	Sequencing or Dependencies	Sequencing or Dependency Considerations
ARBC Board of Commissioners Top Priority Projects (as approved during the July 9, 2024, regular board meeting)	Bayou Manchac Channel Improvements and Ward Creek Realignment	Recognizing the positive benefits of this project during many flood events and the need to restore historic conditions, ARBC is committed to the inclusion of this project in their master plan and to support the tri-parish intergovernmental agreement between Ascension , EBR, and Iberville Parishes, including other project partners to optimize the project design to ensure no-adverse impacts and advance it to construction. By removing the excessive sediment and debris from Bayou Manchac, the project could increase the rate of backwater flooding from the Amite River into the Bayou Manchac Watershed; however, the “no-action alternative” as it stands, will continue to delay the drainage of floodwaters from the Bayou Manchac Watershed to the Amite River.	Yes	If pre-construction design changes are unable to eliminate negative impacts, combining this project with others will potentially result in no-adverse impacts. This would need to be determined through detailed hydraulic modeling. Project combinations may include: • Major Regional Detention and or Retention in the Upper Amite River • Lower Amite River sediment removal • Bayou Manchac Backflow Prevention Gates • New River Stormwater Management Pumping Station • Upper Amite River Flood Risk Reduction and Restoration • Willow Glen Pump Station
	Lower Amite River Sediment Removal	Recognizing the positive benefits of this project, ARBC is committed to the inclusion of this project in the Master Plan to restore the unnatural buildup of sediment in the lower Amite River to more natural pre-diversion canal conditions. ARBC notes that this project is important to offset the potential negative impacts of the restoration of the Amite River Diversion Canal Weir. Livingston Parish has secured $20 million to initiate the first stage of sediment removal from Lake Maurepas to LA 22.	No	
	New River Stormwater Management Pumping Station	Recognizing the positive benefits of this project, ARBC is committed to inclusion of this project in the Master Plan and working with Ascension Parish to advanced it to construction. Since the project removes stormwater from the Amite River Basin, it therefore does not have any adverse impacts, allowing it to occur independently of other projects.	No	
	West Shore Connector Levee	Recognizing the positive benefits of this project, ARBC is committed to inclusion of this project in the Master Plan and working with St. James Parish and other project partners. Pump Stations included in the design ensure that the levee has no adverse impacts on adjacent areas, allowing it to occur independently of other projects while providing major protection against wind driven lake flooding compounded by the future impacts of sea level rise.	No	

Priority	Project	Master Plan Project Action	Sequencing or Dependencies	Sequencing or Dependency Considerations
Additional Projects (as approved during the March 11, 2025, regular board meeting)	Amite River Diversion Canal Weir Rehabilitation	Recognizing the need to restore the heavily deteriorated Amite River Diversion Canal Weir to maintain flow in the Amite River during low flow conditions, ARBC is committed to inclusion of this project in the Master Plan and working with PLD and other project partners to rehabilitate the weir. ARBC notes that the restoration of the Amite River Diversion Canal Weir to design conditions should also include restoration of the Amite River channel to design conditions, and therefore must be performed in conjunction with the Lower Amite River Sediment Removal project. If the Lower Amite River Sediment Removal project cannot be performed concurrently with or prior to the rehabilitation of the Amite River Diversion Canal Weir to design conditions, then the Amite River Diversion Canal Weir should only be shored up to reinforce the remaining structure, preventing further deterioration until sediment removal can be performed.	Yes	This project must be combined with other projects including: • Lower Amite River Sediment Removal
	Ascension (Sorrento) Storm Surge	Recognizing the positive benefits of this project, ARBC is committed to working with Ascension Parish and other project partners to include this project in the Master Plan. Pump stations included in the design ensure that the levee has no adverse impacts on adjacent areas, allowing it to occur independently of other projects.	No	
	Bayou Manchac Backflow Prevention Gates	Recognizing the potential benefits of this project to significantly reduce backwater flooding from the Amite River along Bayou Manchac and its tributaries, ARBC is committed to inclusion of this project in the Master Plan to include further refinement and determination of feasibility. It should be noted that this project would have the potential to eliminate the negative impacts of the Bayou Manchac and Ward Creek Realignment project that were determined by ARBC to occur under certain Amite River backwater flooding situations. Negative impacts on the east side of these gates would require mitigation through combination with other projects to ensure no adverse impacts or potential non-structural mitigation actions.	Yes	Project combinations may include: • Major Regional Detention and or Retention in the Upper Amite River • Lower Amite River Sediment Removal • Upper Amite River Flood Risk Reduction and Restoration • Non-structural elevation/acquisition
	Bayou Manchac Floodplain Preservation	Recognizing the positive benefits of this project, ARBC is committed to working with East Baton Rouge Parish to include this in the Master Plan. This project preserves wetlands, preventing future development, and therefore does not have any adverse impacts, allowing it to occur independently of other projects.	No	
	Highway 22 Gapping	Recognizing the positive benefits of this project that is currently under pre-construction design, ARBC is committed to working with PLD and other agencies to include this project in the Master Plan.	No	It is assumed that the project owner will perform detailed design to ensure no adverse impacts.
	Marvin Braud Pump/Levee Elevation Upgrades	Recognizing the positive benefits of this project, ARBC is committed to working with Ascension Parish and other project partners to include this in the Master Plan to secure funding and advancing this project. Existing and proposed stormwater infrastructure ensures that the project has no adverse impacts on adjacent areas, allowing it to occur independently of other projects.	Yes	Sequencing is required to ensure tie in to other existing or under construction projects. Additionally, a settlement agreement executed on 3/22/2021 between PLD, East Ascension Consolidated Gravity Drainage District and Livingston Parish requires that Ascension Parish shall not increase pumping capacity of the Marvin Braud Pump Station beyond the currently pumping capacity until the Louisiana Highway 22 gapping project and CRDC is completed.
	Upper Amite River Flood Risk Reduction and Restoration	Recognizing the positive environmental and flood risk reduction benefits of this project, ARBC is committed to inclusion of this project in the Master Plan and working with other agencies to secure funding and advancing this project.	No	Conditions would be restored to more natural conditions.
	Willow Glen Pump Station	Recognizing the positive benefits of this project, ARBC is committed to working with Iberville Parish and other project partners to include this in the Master Plan. This project removes stormwater from the Amite River Basin, and therefore does not have any adverse impacts, allowing it to occur independently of other projects.	No	

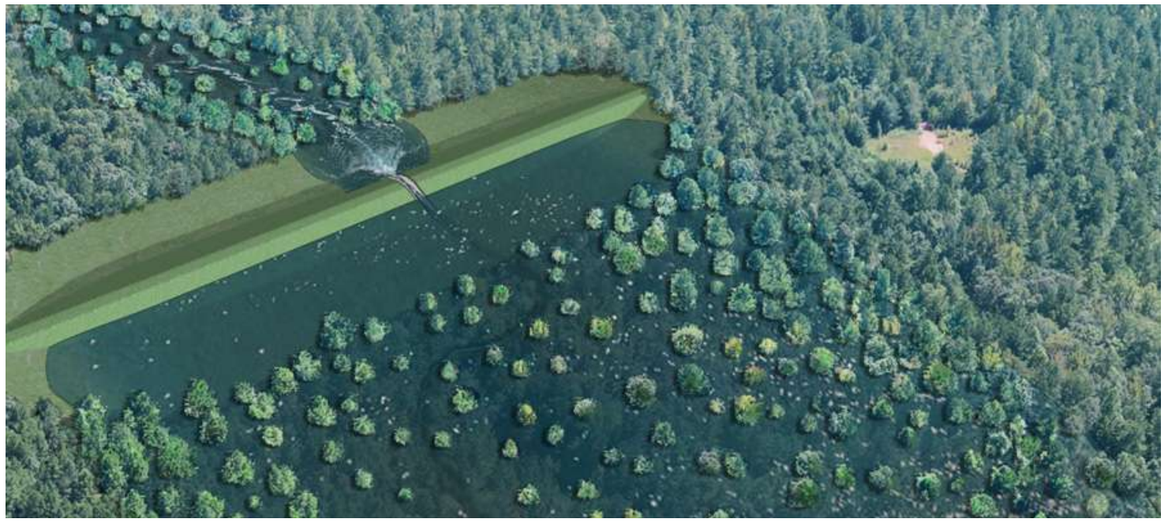


FIGURE 4-1: EXAMPLE DRY DETENTION CONCEPT ILLUSTRATION (PHOTO SOURCE: USACE MOBILE DISTRICT)

Long-Term Major Regional Project Implementation

Through predictive modeling which included the quantification of direct losses avoided, major retention and or detention of stormwater runoff in the Upper Amite River, while a very large and costly undertaking, was determined to have the greatest transformative flood risk reduction benefits over the greatest areas of the Amite River Basin, significantly exceeding the basin wide benefits of other projects. This is summarized in Table 4-2.

TABLE 4-2: PROJECT SUMMARY FOR MAJOR DETENTION AND RETENTION OF STOMWATER RUNOFF IN THE UPPER AMITE RIVER, INCLUDING NOTES PERTAINING TO REQUIRED SEQUENCING OR DEPENDENCIES TO ENSURE NO-ADVERSE IMPACTS

Project	Master Plan Project Action	Sequencing or Dependencies	Sequencing or Dependency Considerations
Upper Amite River Major Detention or Retention (Sites 2 and 3)	SCR 79 of the 2024 regular legislative session by Senator Valerie Hodges, required DOTD to investigate the potential for retention and/or detention of stormwater runoff in the Upper Amite River Basin for multiple potential benefits including flood control, water supply and recreation. This resulted in the December 31, 2024 scoping level response by DOTD that included three sites and included predictive modeling to quantify potential benefits. The predictive modeling quantified flood risk reduction and water supply opportunities, demonstrating the potential for transformative flood risk reduction and water supply opportunities. Additionally, the sites demonstrated options for an array of recreational opportunities. This response was used to inform sections of the Chapter 3 Project Sheets. Upper Amite River detention and/or Retention Sites 2 and 3 provided similar benefits in terms of flood control and water supply potential. Recognizing the transformational benefits of major retention and/or detention in the Upper Amite River Basin, ARBC supports the recommendations of SCR 79 and advancement of one major upstream detention/retention site to the Preliminary Engineering Phase by working with State Legislators and DOTD. Understanding the lengthy design, permitting, real estate, mitigation, financing, and construction implications of such major projects, ARBC makes this a long-term goal to reduce flood risk throughout the basin. It should be noted that only one major site is required and that both sites 2 and 3 would provide similar benefits in terms of flood risk reduction, water supply, and recreational opportunities. With effective real-estate acquisition, this project can be implemented with no adverse impacts.	Yes	The Capital Outlay appropriation for FY25 includes $2,120,000 under Priority 5 to continue the preliminary engineering investigations needed to continue the advancement of this concept project. Recognizing the major cost of implementing this project, ARBC will work with DOTD and state legislators to investigate additional funding which may include requesting federal funds and other revenue generation methods.

Subject to successful mitigation of impacts within the concept reservoir pool, major retention and or detention of stormwater runoff in the Upper Amite River can be performed without any negative downstream impacts, yielding major benefits to all ARBC communities.

Further, as an integrated part of this Master Plan, downstream drainage improvements that would otherwise not be suited as standalone projects due to residual adverse impacts can be implemented in combination, resulting in no adverse impacts.

4.2 PROGRAM RECOMMENDATIONS

National Flood Insurance Program

Section 2.3 summarized the existing status of FEMA FIS, FIRM's and CRS within the Amite River Basin. This section dives deeper into NFIP related actions that can be incorporated by ARBC and its partners including DOTD and local communities to ensure that flood risk is consistently and more accurately represented on FEMA's FIS and FIRM's.

NEED

As demonstrated in Section 2.2, LWI modeling presents an opportunity for communities within the Amite River Basin to significantly improve the accuracy of regulatory flood maps if LWI Models were to be incorporated by FEMA and the resultant FIS's and FIRM's adopted by the local communities as regulatory products. This will also ensure that flood risk matches across political boundaries, ensuring a consistent level of accuracy.

It is recommended that ARBC coordinates with local communities and other agencies to ensure the LWI Model which provides greater accuracy are incorporated into the FEMA Flood Insurance Studies and Flood Insurance Rate Maps replacing outdated and inaccurate studies.

This presents an opportunity for a net removal of over 20,000 insurable structures from the FEMA Special Flood Hazard Area, removing mandatory flood insurance purchase requirements.

Utilizing the findings of this Master Plan, ARBC will communicate the potential benefits of updated flood maps to ARBC communities and collaborate with agencies including the DOTD NFIP Coordinators office and FEMA to help expedite the updating of FIS's and FIRM's and explore funding opportunities if necessary.

By incorporating the LWI Model results which provide greater accuracy compared to the outdated FEMA FIS's and FIRM's, there is opportunity for ARBC communities to achieve a net removal of over 20,000 insurable structures from the FEMA SFHA, removing the mandatory flood insurance purchase requirements for those structures.

Table 4-3 provides a summary of the potential implications for insurable structures within the Amite River Basin of replacing the effective FEMA SFHA's with LWI modeling results. While adoption of these maps will result in over 9,000 insurable structures being added to the SFHA and consequentially triggering mandatory flood insurance requirements, a significantly larger number of over 30,000 insurable structures are expected to be removed from the SFHA and will no longer fall under the mandatory purchase requirements following updates of the FIRM's. Additionally, those in and those to be added to the SFHA will be based on more accurate flood risk information.

Adoption of these models by FEMA can be performed through various established processes to result in updated FIS and FIRMs for ARBC communities, ensuring consistent, state of the art flood risk information throughout the ARBC boundary. It should be noted that the most common process for communities to update FEMA flood maps with improved data is through the FEMA Letter of Map Revision (LOMR) process. However, the LOMR process would not be appropriate for this situation since FEMA will typically limit this process to the equivalent of one map panel area. Revisions exceeding this are converted to the Physical Map Revision (PMR) process and are either put in an indefinite hold until funding becomes available to process the case, or requesters may pay additional fees based on the number of panels to be revised. Three avenues for ARBC and its partners to pursue updates to the FEMA FIS's and FIRM's are described to the right.

Processes for Updating FEMA FIS and FIRMs

OPTION 1

Coordination with DOTD NFIP Coordinator's Office

The NFIP Coordinator's office at DOTD is also a Cooperating Technical Partner (CTP) to FEMA Region VI and implements the Risk MAP program for flood risk identification and mitigation to all communities in Louisiana with funding from FEMA. The LWI models can be used as "leverage", provided to FEMA to supplement the funding needed by the program to update the FIS with FEMA approval.

- Step 1: LA DOTD CTP (or others) prepare flood-way modeling and flood zone mapping for LWI models
- Step 2: LA DOTD CTP prepares draft FIRM databases and FIS's for each ARBC Parish
- Key benefit: Locally led approach, provides ARBC communities greater control and input into the FIRM and FIS through close coordination with DOTD
- Key Benefit: Full or partial funding to potentially be provided by FEMA (if funds are available and allocated)
- Key Drawback: Schedule will be dictated by funding and could take several years

OPTION 2

Coordination with FEMA Region VI Risk MAP Program for Physical Map Revisions

The FEMA Region VI Production and Technical Services contractor will oversee the issuance of the Physical Map Revision (PMR), updating the modeling and mapping to align with FEMA requirements including flood-ways. If this option is chosen, it is possible that FEMA would want to utilize the lower detail BLE data to update the FIS and not the LWI data as recommended.

- Step 1: FEMA Region VI prepares LWI or BLE flood-way modeling and flood zone mapping
- Step 2: FEMA Region VI prepares draft FIRM databases and FIS's for each ARBC Parish
- Key Benefit: Funded by FEMA (if funds available and allocated)
- Key Drawback: Nationally led - Will likely provide ARBC communities less control and input into the FIRM and FIS production and will require close coordination with DOTD
- Schedule will be dictated by funding and could take several years

OPTION 3

Self Funded Physical Map Revision Through the MT-2 Process

Each parish could independently or collaboratively fund the Physical Map Revision (PMR) to Parish FIRM's and FIS's using LWI data, ensuring that the modeling is refined to meet FEMA standards for the entire area, allowing for floodplain mapping and product submission specific to each parish's flooding sources.

- Step 1: Local parishes in coordination with ARBC are responsible for preparing LWI flood-way modeling and flood zone mapping
- Step 2: Local parishes, in coordination with ARBC, are responsible for preparing draft mapping data and documentation for submittal through the FEMA PMR process
- Key Benefit: Potentially the fastest pathway to updating FIS and FIRMs
- Key Drawback: Funded directly by ARBC and/or each community within the ARBC including FEMA processing fees (Estimated to be $972,750 for all the communities within the ARBC)

TABLE 4-3: COMPARISON BETWEEN EFFECTIVE FEMA SFHA AND LWI MODELS

Parish (within ARBC Geographic Boundary)	Total Insurable Structures in Effective FEMA SFHA	Total Insurable Structures in LWI Modeling 100-year Floodplain	Insurable Structures to be added to SFHA by LWI Modeling	Structures to be removed from SFHA by LWI Modeling	Net Insurable Structures Impacted by LWI Modeling
Ascension	17,111	11,967	2,276	7,420	5,144 (removed)
East Baton Rouge	28,010	20,335	5,918	13,593	7,675 (removed)
East Feliciana	245	321	93	17	76 (added)
Iberville	282	325	148	105	43 (added)
Livingston	25,148	13,682	903	12,369	11,466 (removed)
St. Helena	94	79	8	23	15 (removed)
St. James	76	402	344	18	326 (added)
Overall	**70,966**	**47,111**	**9,690**	**33,545**	**23,855 (removed)**

Mitigating the Number of Structures to be Added to the SFHA

While LWI Models present a way to potentially remove over 30,000 structures from the FEMA SFHA throughout the ARBC geographic boundary, nearly 10,000 new structures would be added.

Through close collaboration with FEMA and their partners including the DOTD NFIP Coordinator's Office, it may be possible to reduce the number of structures added to the SFHA, while still accurately communicating flood risk to residents of the Amite River Basin and encouraging them to purchase flood insurance rather than mandating it.

FEMA flood zones shown designated as a shaded Zone X are considered "Moderate" flood risk and are sometimes, at the discretion of the FEMA Project Officer overseeing the FIS and FIRM updates, used to describe areas of flood hazard that include:

- Areas of 0.2% annual chance (500-year) flood
- Areas of 1% annual chance (100-year) flood with average depths of less than 1 foot
- Areas of 1% annual chance flood with drainage areas less than 1 square mile
- Areas protected by levees from the 1% annual chance flood.

Through careful review of LWI Modeling outputs including drainage area and flood depth, it is possible to identify potential candidate areas meeting FEMA's definition of Moderate Flood Risk that can be shown as a Shaded Zone X rather than a SFHA Zone A or AE which would trigger flood insurance requirements as illustrated in Figure 4-2.

This will put the decision to purchase flood insurance directly into the hands of residents of moderate-risk areas giving them more control over their properties. This should be accompanied with a strategic campaign to communicate the benefits of flood insurance to impacted structure owners to allow them to make an informed decision pertaining to flood insurance purchase.

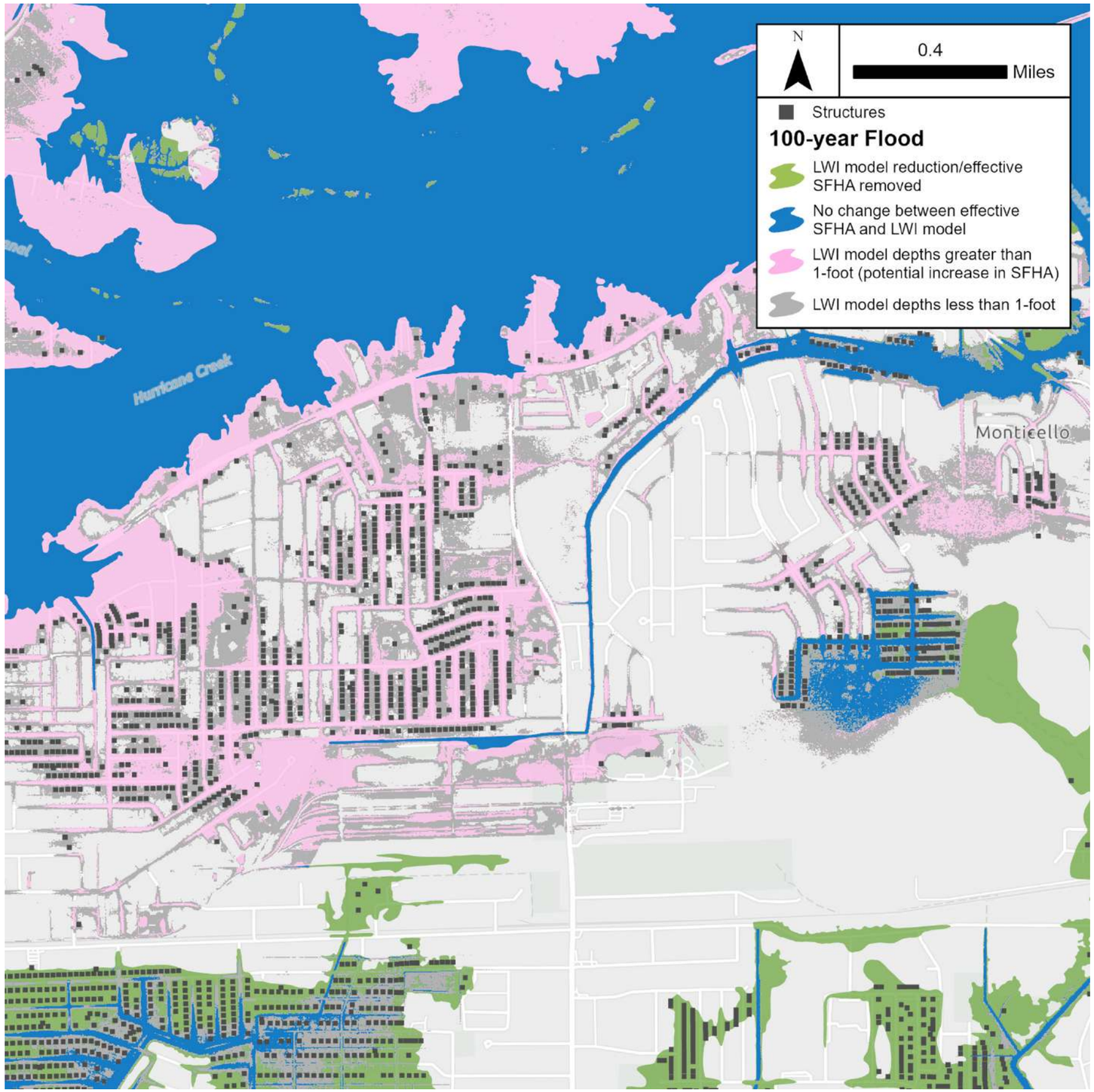


FIGURE 4-2: EXAMPLE OF BOTH INCREASED AND DECREASED 100-YEAR FLOODPLAINS WHEN COMPARING EFFECTIVE FIRM TO LWI MODELING RESULTS INCLUDING AREAS WITH LESS THAN 1-FOOT DEPTH THAT MAY POTENTIALLY BE SHOWN AS A SHADED ZONE X FLOODPLAIN IF LWI MODELS ARE INCORPORATED INTO FEMA FIS AND FIRMS. (SOURCE: ARBC)

CRS Recommendations

NEED

CRS participation data summarized in Section 2.3 highlighted the flood risk mitigation successes and challenges in ARBC communities. While eleven communities participate in CRS, ranked in classes ranging from 6 to 9, 12 communities have yet to enroll or earn NFIP policy premium discounts. One community is currently suspended from NFIP and is therefore ineligible for CRS. Of the class-ranked communities, all have opportunities to earn more points to reduce premiums for policyholders – efforts ARBC and Master Plan Initiatives can directly support.

Table 4-4 summarizes the number of NFIP policies in force, current CRS discounts and estimated total annual policy costs for ARBC communities participating in CRS. Based on these discounts and policy payments, it is estimated that ARBC communities realize nearly $11 million in reduced flood insurance premiums because of CRS. Those communities with a greater number of policies in force and a lower CRS class, indicating greater premium discounts, receive significantly greater savings.

COMMUNICATING THE BENEFITS AND SUPPORTING ARBC COMMUNITIES PARTICIPATING IN CRS

Through this Master Plan, ARBC will communicate the potential benefits of CRS and encourage participation through alignment of the Master Plan with CRS to ensure communities do not need to duplicate efforts and are able to reduce the effort to both maintain status and potentially improve class rating.

It is estimated that ARBC communities currently realize nearly $11 million of benefits annually through CRS, and implementation of items in this section by ARBC communities can further increase those realized CRS benefits.

Table 4-5 highlights NFIP Policies in Force for ARBC communities currently not participating in CRS or not receiving discounts. It also estimates the potential savings for policy holders if these communities were to achieve a Class 7 rating (15% discount on flood insurance premiums). With nearly 13,000 policies in force and currently no CRS discounts, Livingston Parish stands to benefit the greatest from CRS participation. Livingston Parish is currently working towards improving their CRS status and is targeting a Class 7 rating which would yield an estimated annual benefit of over $2.4 million to policy holders. Iberville Parish would also stand to benefit significantly with nearly $122,000 of annual benefits estimated.

While the benefits to residents through CRS participation can be significant, the cost of entering and complying with CRS requirements can often be cost prohibitive for smaller communities with fewer policies in force. However, communities currently not enrolled in CRS but who have a Memorandum of Agreement (MOA) with their parish for floodplain management could benefit from the parish's CRS rating by joining the program, thereby maximizing the efforts of the parish to directly benefit their own residents.

For example, when Livingston Parish implements measures to begin receiving a discount based on their CRS class, the Town of Livingston could also receive a discount if they enroll in CRS themselves, establish an MOA with the parish, and take advantage of Livingston Parish's rating. Similarly, the Villages of French Settlement and Port Vincent who already participate in CRS could also achieve a discount by establishing an MOA with the parish. The MOA for floodplain management with the parish applies to those compliance and floodplain management measures.

TABLE 4-4: NFIP POLICIES IN FORCE FOR ARBC COMMUNITIES PARTICIPATING IN CRS (SOURCE:HTTPS://NFIPSERVICES.FLOODSMART.GOV/REPORTS-FLOOD-INSURANCE-DATA AS OF JANUARY 31, 2025)

Communities receiving NFIP discounts through CRS	Class	NFIP Policies in Force	Current Discount	Total Annual Policy Payment	Estimated Total Annual Savings to Policy Holders
E. Baton Rouge Parish	6	36,296	20%	$25,522,183	$5,104,437
Ascension Parish	7	13,290	15%	$11,996,124	$1,799,419
City of Central	7	4,606	15%	$5,532,376	$829,856
City of Denham Springs	7	1,986	15%	$2,784,447	$417,667
City of Gonzales	8	1,204	10%	$1,766,486	$176,649
City of Walker	7	1,023	15%	$1,588,302	$238,245
St. James Parish	8	946	10%	$990,909	$99,091
City of Zachary	8	940	10%	$1,069,501	$106,950
City of Baker	9	694	5%	$939,485	$46,974
Town of Sorrento	9	289	5%	$446,516	$22,326
Town of Lutcher	8	203	10%	$204,426	$20,443

TABLE 4-5 NFIP POLICIES IN FORCE FOR ARBC COMMUNITIES NOT PARTICIPATING IN CRS (SOURCE:HTTPS://NFIPSERVICES.FLOODSMART.GOV/REPORTS-FLOOD-INSURANCE-DATA AS OF JANUARY 31, 2025)

Community Not Receiving NFIP Discounts through CRS	NFIP Policies in Force	CRS/NFIP Status	Estimated Total Annual Potential Savings to Policy Holders (assuming Class 7)
Livingston Parish	12,662	CRS Class 10, no discount	$2,422,511
Iberville Parish	857	Not enrolled in CRS	$121,669
City of St. Gabriel	293	Not enrolled in CRS	$40,154
Town of Livingston	135	Not enrolled in CRS	$35,220
Village of French Settlement	152	CRS Class 10, no discount	$30,984
Town of Gramercy	185	Not enrolled in CRS	$26,976
Village of Port Vincent	117	CRS Class 10, no discount	$20,661
St. Helena Parish	95	Not enrolled in CRS	$20,712
E. Feliciana Parish	100	Not enrolled in CRS	$16,727
Town of Clinton	40	Not enrolled in CRS	$10,510
Town of Slaughter	14	Not enrolled in CRS	$3,265
Village of Wilson	N/A	Not enrolled in CRS	$0
Town of Jackson	2	Not enrolled in CRS	$251

While facilitating local floodplain management practices and resilience efforts, NFIP communities often engage in CRS-credited activities before even enrolling in CRS. For example, Louisiana Administrative Code Title 17 was updated to require free-board (design height above the BFE) statewide for new or substantially improved buildings per ASCE-24, while the minimum elevation required by FEMA is elevating "to or above" the BFE. By simply adhering to statewide standards, communities can receive credits towards CRS.

Regional planning efforts like ARBC's Master Plan can support communities' floodplain management practices by providing data, tools, communication products, and policy guidelines – all of which help communities earn additional credits in CRS. ARBC currently facilitates a community of practice for parishes, cities, and towns to share lessons learned. This planning process has further highlighted community successes that ARBC can promote to others, including useful resources like software, emergency planning tools, and other statewide standards and guidance. For example, some parishes are working towards leveraging record-keeping software for building permit specifications such as Elevation Certificates, Flood-proofing Certificates and more.

The ARBC Master Plan itself contains several initiatives that provide these crucial resources for participation or increased efforts towards credited activities. Table 4-6 aligns CRS credit opportunities with Master Plan activities by section.

Louisiana Administrative Code Title 17 was updated in 2023 (effective August 1, 2023) to require free-board statewide for new or substantially improved buildings per ASCE-24. Residential and most other buildings require one foot of free-board; certain critical facilities require 2-3 feet; and only agricultural facilities, temporary facilities and minor storage facilities are permitted to have lowest floors at the BFE. Communities in ARBC can receive credit for this statewide law under Activity 430 Higher Regulatory Standards. It is a prerequisite for Class 8 or higher.

It is estimated that if adopted by communities earlier, the state minimum free-board requirement would have resulted in approximately $11 million of average annual losses avoided based on development from 2000 to 2025 within the Amite River Basin.

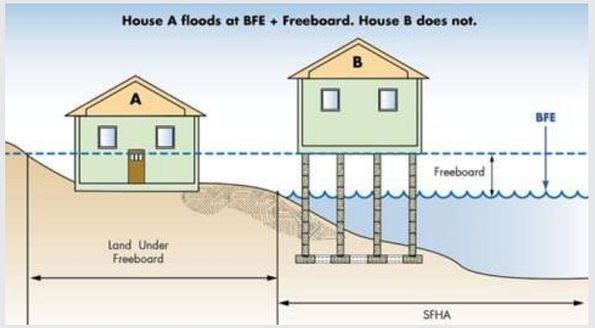


FIGURE 4-3: FREE-BOARD ILLUSTRATION (SOURCE: HTTPS://FLOODSCIENCECENTER.ORG/)

TABLE 4-6: CRS CREDIT OPPORTUNITY ALIGNMENT WITH THE MASTER PLAN

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	ARBC MASTER PLAN ALIGNMENT	ARBC MASTER PLAN ALIGNMENT NOTES
Series 300 – Public Information: This series credits programs that advise people about the flood hazard, flood insurance, and ways to reduce flood damage. The activities also provide data insurance agents need for accurate flood insurance rating.			
310	**Elevation Certificates** Maintain FEMA elevation certificates for new construction in the floodplain. At a minimum, a community must maintain certificates for buildings built after the date of its CRS application.	4.6 Communication	ARBC outreach and education actions provide opportunities for communities to learn about items such as development guides and technology for floodplain management record keeping to meet the goals on Activity 310.
320	**Map Information Service** Provide Flood Insurance Rate Map information to those who inquire and publicize this service. • Basic FIRM information • Additional FIRM information • Problems not shown on the FIRM • Flood depth data • Special flood-related hazards • Historical flood information • Natural floodplain functions	2.3 Current Conditions including Flood Risk Profile 3.1 Flood Risk Assessment 4.6 Communication	Models and maps used to inform this Master Plan, including various AEP modeling results from LWI and original datasets developed for this Master Plan, such as AEP modeling results for future 2050 “no-action” conditions as discussed in Section 2.3, provide more comprehensive and up to date insights into flood risk than the effective FEMA FIS and FIRM. Additionally, the High-Definition Flood Inundation Map for the August 2016 Flood developed on behalf of ARBC provides a historical context into the flood of record for a large portion of the Amite River Basin. Additionally, Section 3.1 provides information pertaining to proposed projects and Section 4.6 provides a plan for communicating actions of the Master Plan. These datasets and technical information can be made accessible to communities to host on their own website or within a ARBC website to help meet the goals of Activity 320. Additionally, these mapping information services can further help distribute these datasets to support other activities including 410 as further documented below.
330	**Outreach Projects** Distribute outreach projects with messages about flood hazards and preparedness, flood insurance, flood protection measures, and/or the natural and beneficial functions of floodplains. • Outreach Initiatives • Flood response preparations • Program for Public Information • Stakeholder delivery	4.6 Communication	Public Engagement efforts for this Master Plan can support communities in hosting or participating in meetings related to flood preparedness, risk mitigation, and recovery. Engagement material templates can be used by communities for re/use and deploy joint communication campaigns leveraging materials and data developed for the Master Plan to help communities meet the goals of Activity 330.
340	**Hazard Disclosure** • Real estate agents advise potential purchasers of flood-prone property about the flood hazard • Regulations require notice of the hazard • Disclosure of the flood hazard • Other disclosure requirements • Real estate agents’ brochure • Disclosure of other hazards	2.3 Current Conditions including Flood Risk Profile 3.1 Flood Risk Assessment 4.6 Communication	The datasets and technical information produced through Master Plan Sections 2.3 and 4.6, leveraged by communities through Map Information Services (Activity 320), can support real estate agents’ efforts to disclose flood risk, thus meeting the goals of Activity 340.
350	**Flood Protection Information** The public library and/or community’s website maintains references on flood insurance and flood protection. • Flood protection library • Locally pertinent documents • Flood protection website	4.6 Communication	Public Engagement efforts can be used to encourage communities to supply locally pertinent documents such as the ARBC Master Plan and their Hazard Mitigation Plan at local libraries to help communities meet the goals of Activity 350.
360	**Flood Protection Assistance** Give inquiring property owners technical advice on how to protect their buildings from flooding and publicize this service. • Property protection advice • Protection advice provided after a site visit • Financial assistance advice • Advisor training		

TABLE 4-6: CRS CREDIT OPPORTUNITY ALIGNMENT WITH THE MASTER PLAN (CONT.)

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	ARBC MASTER PLAN ALIGNMENT	ARBC MASTER PLAN ALIGNMENT NOTES
370	**Flood Insurance Promotion** Assess flood insurance coverage within the community and implement a plan to promote flood insurance. • Flood insurance coverage assessment • Coverage improvement plan • Coverage improvement plan implementation	2.3 Current Conditions	Section 2.3 of the Master Plan details flood risk information that ARBC can provide to communities to help identify structures at risk of flooding. Communities can leverage this more detailed information to improve NFIP participation of properties within and beyond the SFHA with flood risk.
Series 400 – Mapping & Regulations: This series credits programs that limit floodplain development or provide increased protection to new and existing development.			
410	**Flood Hazard Mapping** • Develop new flood elevations, flood-way delineations, wave heights, or other regulatory flood hazard data for an area not mapped in detail by the flood insurance study • Higher study standards • More restrictive standards • Mapping of special coastal flood-related hazards	2.3 Current Conditions including No-Action Alternatives	Models and maps used to inform this Master Plan, including various AEP modeling results from LWI and original datasets developed for this Master Plan including future 2050 “no-action” conditions AEP modeling results as discussed in section 2.3 provide a more comprehensive and up to date insight into flood risk than the effective FEMA FIS and FIRM. These datasets provide flood risk information for many areas not mapped by FEMA in addition to communicating future conditions flood risk and potentially higher flood risk for mapped areas.
420	**Open Space Preservation** Guarantee that currently open public or private floodplain parcels will be kept free from development. • Zone the floodplain for minimum lot sizes of 5 acres or larger • Open space preservation • Deed restrictions • Natural functions open space • Special flood-related hazards open space • Coastal erosion open space • Open space incentives • Low-density zoning • Natural shoreline protection	2.6 Mitigation Banking 3.6 Restoration Project Evaluation 4.7 Gravel Pit Restoration High Potential Sites	Sections 2.6 and 3.6 of the Master Plan discuss the benefits and presents potential areas for conservation including floodplain preservation and mitigation banking. If implemented, ARBC can support conservation project development and implementation within enacting communities to help meet the goals of Activity 420. Section 4.7 provides recommendations on potential sites for conservation.
430	**Higher Regulatory Standards** • Regulations Administration • Limit new buildings and/ or fill in the floodplain • Require free-board • Require soil tests or engineered foundations • Require compensatory storage • Require coastal construction standards in AE Zones • Have regulations tailored to protect critical facilities or areas subject to special flood hazards (for example, alluvial fans, ice jams, subsidence, or coastal erosion.)	2.3 Current Conditions including No-Action Alternatives 4.3 Policies/Regulations 4.5 Capacity Building	As previously noted for Activities 320 and 410, models and maps used to inform this Master Plan, including various AEP modeling results from LWI and original datasets developed for this Master Plan including future 2050 “no-action” conditions AEP modeling results as discussed in Section 2.3 provide a more comprehensive and up to date insight into flood risk than the effective FEMA FIS and FIRM which communities can adopt as a higher standard. Section 4.3 of the Master Plan provides recommendations on changes to Regulations and Polices that can be used to support the requirements of RS 38:3306(A)(2). This is an opportunity for the ARBC to provide template Floodplain Ordinances/regulations for watershed management on the ARBC website and publicize recommendations for updated regulatory requirements, guidance changes, and technical evaluation methodologies as previously noted for Activities 320 and 330. Adoption of these higher standards will not only increase resiliency but will help communities meet the goals of Activity 430. Section 4.5 provides recommendations on capacity building for both local governments within the ARBC and the local community of practice. Through this Master Plan, ARBC will support and partner with other agencies to provide capacity building opportunities. This may include Certified Floodplain Manager (CFM) trainings, technical training in partnership with LWI and resources and advertise ASFPM/FEMA conferences, webinars, and workshops. Therefore, these actions could help meet the goals of Activity 430.

TABLE 4-6: CRS CREDIT OPPORTUNITY ALIGNMENT WITH THE MASTER PLAN (CONT.)

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	ARBC MASTER PLAN ALIGNMENT	ARBC MASTER PLAN ALIGNMENT NOTES
440	**Flood Data Maintenance** • Flood insurance coverage assessment • Coverage improvement plan • Coverage improvement plan implementation	5.1 Implementing the Plan	The ARBC Master Plan has created a significant amount of new state of the art technical data. As discussed in Section 5.2, there is a need to preserve and make this technical data readily available for local communities to leverage and support floodplain planning. As part of this Master Plan, ARBC will seek funding to establish a data management system for cataloging and storing relevant flood modeling data. By preserving and making these datasets available to the local community of practice will help communities meet the goals of Activity 440.
450	**Stormwater Management** • Regulate new development throughout the watershed to ensure that post-development runoff is no greater than pre-development runoff • Regulate new construction to minimize soil erosion and protect or improve water quality • Watershed Master Plan	All sections	The ARBC Master Plan is a regional plan. Adoption of portions of this plan at a local community level will greatly reduce the level of effort required for local plans and will help communities meet the goals of Activity 450.
Series 500 – Flood Damage Reduction: This series credits programs that reduce the flood risk to existing development.			
510	**Floodplain Management Planning** • Prepare, adopt, implement, and update a comprehensive flood hazard mitigation plan using a standard planning process • Prepare an analysis of the repetitive flood loss areas within the community • Prepare, adopt, implement, and update a plan to protect natural functions within the community's floodplain	2.2 LWI Overview 3.1 Flood Risk Assessment 3.3 Project Evaluations and Project Prioritization Framework 5.2 Implementation Plan, Future Planning	The ARBC Master Plan incorporates community-specific vulnerabilities and needs into regional flooding problems and risk reduction goals, including Repetitive Loss. The ARBC Master Plan also include projects to address these vulnerabilities and identifies potential funding opportunities and strategies to ensure both the long and short term implementation. ARBC can further support communities in designing and implementing identified flood mitigation projects, and make emergency planning tools available to communities, such as the at-risk evacuation route map viewer.
520	**Acquisition and Relocation** Acquire and/or relocate flood-prone buildings so that they are out of the floodplain.	4.2 Program Recommendations	Section 4.2 of the Master Plan provides recommendations for the implementation of acquisition and relocations programs to reduce flood risk.
530	**Flood Protection** Protect existing floodplain development by flood-proofing, elevation, or minor flood control projects.	4.3 Policies/Regulations	Section 4.3 of this Master Plan provides recommendations pertaining to the implementation of codes for both wet and dry flood proofing.
540	**Drainage System Maintenance** Have a program for and conduct annual inspections of all channels and detention basins; remove debris as needed • Channel debris removal • Problem site maintenance • Capital improvement program • Stream dumping regulations • Storage basin maintenance	4 Take Action	Chapter 4 of the Master Plan presents a plan for implementing projects (capital improvements) aimed to reduce flood risk and protect and restore natural resources. This includes recommendations on maintenance of waterways. Communities can adopt or mirror ARBC Management Plans and help meet the goals of Activity 540.

TABLE 4-6: CRS CREDIT OPPORTUNITY ALIGNMENT WITH THE MASTER PLAN (CONT.)

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	ARBC MASTER PLAN ALIGNMENT	ARBC MASTER PLAN ALIGNMENT NOTES
Series 600 - Warning and Response: This series credits community-based programs for flood detection and warning systems.			
610	**Flood Warning and Response** Provide early flood warnings to the public and have a detailed flood response plan keyed to flood crest predictions. • Flood threat recognition system • Emergency warning dissemination • Flood response operations • Critical facilities planning • StormReady community • TsunamiReady community	4.2 Program Recommendations 4.6 Communication	Chapter 4 of this Master Plan made recommendations for the implementation of GIS datasets derived from 2.2 models to support both emergency planning and flood forecasting. Further, Section 4.6 made recommendations on communication of these datasets. Supplemental to this plan, these datasets along with guidance for implementation was provided to support ARBC and local communities both plan for and respond to floods through simplified inundation mapping and can be provided online and in further support of Activities 320, 330 and 510. These datasets will help communities meet the goals of Activity 610.
620	**Levees** • Annually inspect and maintain existing levees • Have a system for recognizing the threat of levee failure and/or over-topping, disseminating warnings, and providing emergency response • Coordination with operators of critical facilities	4.4 Maintenance	ARBC and other agencies including PLD can share levee maintenance SOPs between communities with levees currently and communities considering levees to help meet the goals of Activity 620.
630	**Dams** • Have a high-hazard-potential dam that could affect the community • Have a system for recognizing the threat of dam failure, disseminating warnings, planning, and practicing emergency responses • Coordinate with operators of critical facilities	N/A	There is only one dam within the Amite River Basin. This dam is located within East Baton Rouge Parish and has an Emergency Action Plan (EAP) that was developed in 2010. ARBC can encourage East Baton Rouge to coordinate with the dam operator and incorporate the EAP into the Emergency Operations Plans (EOPs), which may present an opportunity to receive points under Activity 630.

Voluntary Elevation and Acquisition/Relocation Programs

Non-structural mitigation measures such as voluntary structure elevation and acquisition/ relocation projects can be cost effective approaches to mitigate flood risk for ARBC communities. The results of this Master Plan can help to identify structures that would achieve the greatest flood risk reduction benefits through implementation of these voluntary programs.

NEED

Structure elevation projects typically involve lifting a structure and placing it on a new, higher foundation, which may consist of columns, piers, posts, or raised foundation walls to elevate a structure above an expected water surface elevation. While structure elevation can reduce the flood risk, it does not eliminate the risk entirely. Voluntary acquisitions (sometimes called "buyouts") refer to the owner-elected sale of a private property and purchase by another entity with the goal to proactively move people, buildings, and assets away from areas at risk, allowing developed floodplains to return to their natural function while maintaining the fabric of the community. It is the only mitigation strategy that eliminates 100% of the risk of flooding. ARBC communities can acquire private residential property from willing owners who choose to accept a buyout offer, often using pre-storm fair market value. Communities can then convert bought-out land to natural floodplains and open space uses, per funding source requirement. Both voluntary elevation and acquisition projects are driven by community interest, voice, and vision to guide programmatic decision- making and realized outcomes.

Communities should note that "acquisition" and "buyout" can have different meanings depending on funding source. Projects funded by HUD use acquisition when more flexible reuses are permitted (e.g., convert to commercial) and buyout when the land is to be preserved as open space. Projects funded by FEMA use the terms interchangeably and typically a deed restriction is required to ensure the conversion to open space exclusively and in perpetuity.

Within the ARBC geographic boundary, the 7 parishes collectively are estimated to have approximately 14,500 structures with FFEs below the 10-year flood elevation as summarized in Table 4-7 below and can be used as a screening level analysis for potential structure elevations, acquisitions, and relocations. These numbers are derived by the LWI enhanced structure dataset that contains AI-derived FFE estimates and may contain accessory structures including camps, barns, and boat docks. Ascension, East Barton Rouge, and Livingston parishes would benefit most from a proactive elevation and acquisition programs to reduce flood damages and recovery expenditures ahead of the next flood event.

TABLE 4-7: ELEVATION/ACQUISITION

Parish	Structures with Finished Floor Elevation below the 10-year flood
Ascension	5600
East Baton Rouge	4800
East Feliciana	140
Iberville	50
Livingston	3800
St. Helena	30
St. James	230

ACTION

Individual communities may seek to review existing voluntary elevation or acquisition and relocation programs or establish new programs to reduce flood risk and increase resiliency based on the best available modeling data. Through this Master Plan, ARBC can be an advocate for supporting and advising communities on how to best prioritize project selection and optimize funding. ARBC communities can benefit greatly from these voluntary programs by way of costs avoided during events, in response operations, and throughout recovery. This strategy gives communities the opportunity to end the damage-recovery cycle of repetitive loss properties and keep families and first responders safe. Moreover, flood-prone land acquired through this process can be restored to its natural state – the flood storage potential of healthy wetlands can protect adjacent and downstream properties.

Implemented through LWI, **the State of Louisiana is funding buyout programs in seven locations**—within Amite River Basin, Denham Springs is one of the seven prioritized locations. The program "is designed to primarily benefit low- to moderate-income residents" and offers payment above fair market value to incentive eligible participants to relocate out of harm's way. Applications are still being accepted.

Though effective in reducing risk, voluntary acquisition implementation can pose complex challenges. If not carefully planned, it can disrupt local communities and ways of life tied to those areas. Most voluntary acquisition programs today include relocation considerations in their mission and services. Relocation refers to the subsequent process of assisting at-risk property owners to move to a lower-risk location after an offer has been accepted. Acquisition programs should engage communities throughout the entire process and include strategic relocation of participating property owners to the same or adjacent community to help maintain cohesion.

Another consideration for communities to consider related to voluntary acquisition projects is potential revenue loss to communities where property owners relocate outside of jurisdictional boundaries. Reductions in tax base may lead to or exacerbate land management challenges. Large volumes of land rights transfers from property owners to a managing agency may overwhelm public space maintenance programs, especially when newly vacant land is not contiguous. And relatedly, legal challenges at the municipal level may arise – from liability to enforcement related to relocation success, deed restrictions, and land ownership.

Incorporating Equity: "Sending" communities, whose residents are leaving an area due to increased flood risk, and "receiving" communities, whose housing supply must meet increased demand, must be analyzed for socially vulnerable populations. Once identified, programs should be tailored to promote equitable relocation strategies.

BENEFIT-COST ANALYSIS

The significant cost of elevating structures or purchasing properties, particularly groups of properties, can be a prohibitive factor in developing a non-structural mitigation strategy. There are several federal funding programs available, which require a demonstration of cost effectiveness in order to be eligible. To help determine if the benefits of a non-structural mitigation project outweigh the costs, ARBC communities can conduct a Benefit- Cost Analysis (BCA). BCAs consider inputs such as project cost, project useful life, past or estimated damages based on recurrence intervals, ecosystem services valuations, and more. BCAs return a Benefit-Cost Ratio (BCR); BCRs greater than 1.0 are considered cost-effectiveness.

The flood BCA module requires a full set of quantitative flood hazard data, including first floor elevations of buildings, stream discharge and flood elevation data, preferably for four flood return periods (typically, the 10-, 50-, 100- and 500-year events) and stream bottom elevations. To understand the most at-risk structures, ARBC communities can utilize a 10-year recurrence interval as a screening level tool to identify high-potential candidate structures. Structures with First Floor Elevations below the 10-year flood may also be repetitive loss structures and likely yield a BCR of 1.0 or more.

Alternatively, the FEMA BCA can be by-passed for non-structural mitigation projects by using pre-calculated benefits. FEMA's current pre-calculated benefit value for a single family residential structure acquisition in the SFHA is $775,411 per structure, meaning if the project cost is less than that amount, no BCA is required. For elevation projects, if the project cost is less than $355,522, the project is considered to meet the cost effectiveness requirements, and no BCA is required.

Reviewing structures with First Floor Elevations below the 10-year flood elevation is an effective method of screening risk. This focused approach can streamline the identification of potential candidate properties and structures for voluntary acquisition and relocation.

TO LEARN MORE ABOUT...

the FEMA's BCA process , please visit:
https://www.fema.gov/grants/tools/benefit-cost-analysis

OR SCAN THE QR CODE BELOW

WHERE TO START

ARBC Communities interested in exploring the feasibility of a voluntary elevation or acquisition programs should leverage lessons learned from local, regional, and national programs to pursue three critical milestones:

Program Framework Design	Funding Road-map	Communications Strategy

BUILDING A FRAMEWORK: COMPONENTS OF A SUCCESSFUL PROGRAM

The decision to plan for and implement a non-structural mitigation program including elevation or acquisition/relocation projects, depends heavily on each community's ability to balance the above benefits and limitations. However, several communities across the country have implemented widely successful programs which incorporate many—if not all—of the following process components, which should be considered by ARBC communities as summarized in Table 4-8.

TABLE 4-8: PROCESS COMPONENTS

Center around communities the program is meant to serve.	Involve and educate elected officials, lawmakers, regulators, and departments responsible for delivery.
Property elevations and acquisitions – even when voluntary – can be emotionally and psychologically weighted experiences for individuals, families, and communities. Therefore, conversations should always be community-driven, Community Based Organization (CBO)-supported, customer-centric, and widely accessible. It is important for programs to be designed in parallel with community goals and values, and to support community cohesion where possible.	Voluntary elevation and acquisition programs require significant political buy-in and must align with local initiatives such as community development and land use plans. Following an acquisition project, the reuse of space must satisfy these local initiatives to the greatest extent possible – communicating the value of risk reduction (and the opportunities that stem from it) early is crucial.
Identify appropriate staffing and expertise as the foundation of successful service delivery.	**Consider the current and future funding landscape.**
To successfully deliver a non-structural mitigation program, the correct staff capacity (e.g., program managers, case managers, contract coordinators) and expertise (e.g., outreach and engagement, fiscal and financial strategy, housing market trends, climate resilience, legal and regulatory considerations) is essential. Programs across the United States have utilized professional services contracts to augment staff and fill critical knowledge gaps. Programs are best supported when pathways to and from other relevant programs that operate at state, county, and local levels are incorporated.	Though several federal, state, and local funding streams are codified, funding opportunities, grant allocations, and spending delegations can change year over year. Recently, communities across the United States benefited from unprecedented amounts of federal funding meant to build resilience to natural hazards. The ability to generate, combine, and plan for various funds allows programs to utilize a reliable stream of funding for voluntary elevation and acquisition projects.
Clearly and consistently communicate goals, abilities, and limitations of non-structural mitigation projects.	**Choose a delivery model that considers risk tolerance and leverages community relationships.**
The process of completing a non-structural mitigation project is complex and messaging should be transparent about that complexity. Communications can help manage public expectations by clearly and consistently explaining the program's purpose, timeline, and services. Program goals should reflect realistic abilities and scope: program criteria should be focused on the properties that will provide the most impactful results. This may mean prioritizing more socioeconomically vulnerable communities with repetitive and severe repetitive loss properties first.	Elevation or acquisition program delivery models can take many forms – from public private partnerships to third-party management to community aggregators. Each community's perceived risk tolerance will inform appropriate ownership of tasks such as applicant intake and coordination, financial and land rights transfers, vetting and selecting contractors, and ensuring program conformance. Efforts to understand and leverage community capacity to manage aspects of program delivery builds trust and transparency.

DEVELOPING A FUNDING ROAD-MAP

As mentioned in key components above, the funding landscape is a critical consideration in pursuing voluntary elevation or acquisition projects. ARBC can be a resource for communities to help identify relevant funding sources and schedules, grant writers, and the entity (or entities) that will administer program funds.

There are a variety of federal, state, and local funding sources available for voluntary elevation and acquisition programs. Importantly, these sources are often combined to meet local match to federal grants, adhere to grant source requirements, and achieve community goals. The following list of grant programs, insurance coverage, and match sources are relevant to program planning in Amite River Basin:

Grant Programs

- FEMA Flood Mitigation Assistance (FMA)
- FEMA Building Resilient Infrastructure and Communities (BRIC)
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Flood Mitigation Assistance Swift Current (Swift Current)
- Department of Agriculture Emergency Watershed Protection Program
- National Oceanic and Atmospheric Administration Land Acquisition Projects
- United States Army Corps of Engineers Flood Risk Reduction Project

Local Match Sources

- HUD CDBG-DR
- State Mitigation Budgets
- Stormwater management fees
- Sales, Corporate, or Development Tax
- Bonds

Insurance Coverage

- FEMA NFIP Increased Cost of Compliance Coverage

COMMUNICATIONS STRATEGY

Building a program framework includes activities like public education and engagement, internal planning, and policy-making that lead to piloting and implementing voluntary acquisition programs. These programs can vary, combining different approaches to best meet community needs. To understand stakeholder priorities, ARBC can assist communities in conducting ongoing outreach to understand the diverse needs of residents, partner agencies, and local leadership. Many programs also involve community participation in designing new open spaces re-purposed as parks or recreational areas, highlighted in Section 4.7. The following communications strategies can be used to gain critical feedback and perspective to incorporate in program design:

1. Social media posts, website pages, and other online resources
2. In-person and virtual town halls, open houses, workshops, and presentations
3. Briefs, memorandums, and press releases
4. Dedicated platforms and staff to receive questions, comments, and concerns

FIGURE 4-4 - ISLE DE JEAN CHARLES SOURCE: KERRY MALONEY IN FRONTIERS IN ENVIRONMENTAL SCIENCE. (PHOTO SOURCE: FRONTIERS)

EXAMPLES FOR CONTINUED LEARNING

Isle de Jean Charles, Louisiana, is an island community where indigenous people of Louisiana have resided for generations. The island, which was once more than 22,000 acres, now has just 320 acres remaining. In 2016, the community was awarded a Community Development Block Grant which has enabled them to plan a voluntary retreat, including the development of their new community. The New Isle (Figure 4-4) is located 40 miles north of Isle de Jean Charles, where over 500 new homes have been built to withstand natural hazards, like high winds, flooding, hail, hurricanes, and tornadoes. It also includes community resources that were planned and designed by residents including a community center, walking trails, and commercial and retail space. In 2022, residents began relocating to the New Isle. Learn more about the resettlement process here.

ADDITIONAL RESOURCES

The following resources were used to inform overview and we encourage you to take a look for continued learning:

- **Georgetown Climate Center's Managed Retreat Toolkit – bit.ly/GCC-Toolkit**

or

- Georgetown Climate Center's Managing the Retreat from Rising Seas Lessons and Tools from 17 Case Studies -- bit.ly/GCC-Case-Studies

OR SCAN THE QR CODE BELOW

4.3 POLICIES/REGULATIONS

NEED

ARBC is committed to fulfilling its mandate under Louisiana Revised Statute 38:3306(A)(2) to recommend and promote regional standards that reduce flood risks and enhance resiliency within the Amite River Basin. Recognizing the increasing frequency and severity of flood events, ARBC has developed the following potential standards to address these challenges while protecting lives, infrastructure, and natural resources.

Reduce Flood Risks

Protect Public Health and Safety

Ensure the Long-Term Viability of the Region's natural and Built Environments

RECOMMENDATION

By advancing these standards through the voluntary adoption by individual communities, ARBC plans to meet its statutory obligation to support coordinated floodplain management practices. These efforts align with the goals of ensuring a unified approach to mitigating flood risks while balancing growth and preservation. ARBC strongly encourages all communities within the Amite River Basin to adopt these standards to protect their residents and resources for the future and will provide best management practices and guidelines to support communities with these efforts.

Floodplain Preservation Standard

Floodplains serve as natural buffers against flooding, absorbing, and storing excess water during flood events. Preserving these areas is crucial for minimizing flood risk and protecting water quality. By implementing regulations that prioritize the conservation of floodplains, communities can protect themselves from the escalating costs associated with flood damage, while also preserving the ecological value of these critical areas.

STANDARD

- At least 50% of the total floodplain area within any new large residential development must be preserved as open space. This ensures the retention of natural floodwater storage, groundwater recharge, and the maintenance of wildlife habitats, while also mitigating the impacts of flooding. (up to 725 points in CRS Activity 420)
- **Flood Risk Management Standards Best Practices:** For any new construction, alternative floodplain preservation actions that use natural features or nature-based solutions must be considered and used if practicable. If natural solutions are not feasible as standalone alternative actions, they must be implemented as a minimization measure.

Preserving floodplain areas not only reduces flood risks but also maintains vital ecosystems.

Floodplain Development Regulation Standard

In cases where development within the floodplain cannot be avoided, strict regulatory controls are critical to manage the impact on flood risk and the environment. These regulations should ensure that any alterations to the landscape do not exacerbate flooding or degrade the natural functionality of the floodplain. By adopting these measures, communities can balance development needs with the imperative to reduce flood hazards.

STANDARD

- **Floodplain Impact Study:** When a development includes placement of fill in the regulatory FEMA or floodplain established using best available flood risk information (typically LWI Modeling), these models should be used to simulate the hydraulic impacts of the fill placement for the 100-year flood by comparing existing conditions flood elevations to proposed conditions, whereby proposed grading is either incorporated into the 2D hydraulic model mesh or 1D cross sections.

Recognizing the sensitivity of floodplain modeling using modern unsteady state models including 2D models, it is recommended that communities adopt a policy whereby a rise should be considered as anything greater than 0.03 feet.

It should be noted that this does not supersede FEMA policy in areas where BFEs are established.

- **Fill Mitigation:** When development requires the use of fill material in the floodplain, compensatory storage must be provided at a ratio of 1.5:1. This requirement ensures that for every cubic yard of fill placed within the floodplain, 1.5 cubic yards of additional floodwater storage capacity is created, maintaining, or improving the area's ability to manage floodwaters. (up to 195 points in CRS Activity 430)
- **Flood Risk Management Standards Best Practices:** FEMA, HUD, and USACE all prioritize the minimization of fill use in the floodplain, and 44 CFR 60.3 prohibits fill use in regulatory flood-ways unless hydrologic and hydraulic analyses performed in accordance with standard engineering practices demonstrate that the fill use will not increase flood elevation during a 1%-annual-chance flood event. Therefore it is considered best practices that new structures be elevated above the flood risk level rather than fill in land to achieve flood protection, wherever practicable.

Did you know? Compensatory storage requirements help maintain floodplain storage capacity, minimizing flood risk.

- *Example Ordinance: "All fill placed within the floodplain must be offset by compensatory storage at a ratio of 1.5:1 to preserve or enhance the floodplain's water retention capacity. Compensatory storage for fill can not be counted towards storm detention storage and can not be lower than the natural stream top bank."*

- **Hazardous Material Storage:** The storage of hazardous materials in flood-prone areas poses significant risks to public health and the environment, particularly during flood events. To protect water quality and reduce contamination risks, the storage of hazardous materials within floodplains should be strictly prohibited. However, if storage is necessary, materials must be elevated above the BFE to ensure they are protected from floodwaters. (up to 20 points in CRS Activity 430)
    - *Example Ordinance: "Hazardous materials shall not be stored within the floodplain unless absolutely necessary. In such cases, they must be stored at least two feet above the BFE to prevent contamination during flood events."*
- **Flood-way Restrictions:**
    - HUD Implications: actions located in flood-ways are not eligible for HUD financial assistance unless they serve a functionally dependent use, they qualify for one of the exceptions in 24 CFR § 55.12, or a permanent covenant or restriction will preserve all on-site FFRMS floodplain and/or wetland areas.
    - FEMA Implications: fill, new construction, and substantial improvement are prohibited in flood-ways unless hydrologic and hydraulic analyses performed in accordance with standard engineering practices demonstrate that the fill use will not increase flood elevation during a 1%-annual-chance flood event.

Building and Infrastructure Standards

Building and infrastructure in flood-prone areas must meet higher standards to withstand flood risks. Ensuring that new constructions and essential services are designed to reduce vulnerability to flooding will significantly decrease the potential for costly damage, protect residents, and maintain vital access routes during flood events.

STANDARDS

- **Elevation of Structures in Flood-Prone Areas:** All new buildings, including key utilities such as electrical, heating, and plumbing systems, should be constructed at least two feet above the BFE, or best available flood risk information, typically the LWI studies. This requirement ensures that essential infrastructure is protected from flood damage, contributing to the long-term safety and resilience of the community. Looking ahead as an optional higher level of resilience, the ARBC Master Plan's 2050 flood model presents an opportunity for communities to adopt even higher elevation standards, ensuring long-term protection against evolving flood risks and promoting sustainable development across the region (up to 250 points in CRS Activity 430; in accordance with HUD FFRMS). For communities that want to be more proactive, future 2050 no-action flood elevations can also be utilized for establishing free-board requirements for residential structures for new or substantially improved or damaged structures, therefore communities would require the greater of:
    - Existing FEMA BFE + 1 foot (state requirement)
    - New LWI 100-year flood elevations plus 2 feet; or
    - Future 2050 No-Action conditions 100-year flood elevation plus 1 foot
    - *Example Ordinance: "All structures, including electrical, heating, ventilation, plumbing, and air conditioning systems, must be constructed or installed at least two feet above the BFE as determined by FEMA, LWI or 1 foot above BFE as determined by ARBC 2050 future conditions model, whichever is higher to minimize flood risks."*
    - **At a minimum all entities should require FFE be at least one foot above BFE as determined by FEMA per state law. (Louisiana Administrative Code Title 17)
- **Flood Risk Management Standards Best Practices:** While not required, communities may also elect to use the Climate-Informed Science Approach (CISA) to determine floodplain elevation when data is available.
    - The CISA dictates that the floodplain should be at least as restrictive as the 500-year flood area elevation for critical actions and the 100-year flood area elevation for non-critical actions. When CISA data is not available, compare the 0.2-percent-annual-chance flood approach (0.2PFA) and the Free-board Value Approach (FVA) to select the appropriate method for determining floodplain elevation; the FVA determines elevation and flood hazard area by adding two feet to the BFE for non-critical construction and three feet for critical construction. For non-critical actions, use whichever approach produces a lower flood elevation. For critical actions, use whichever approach produces a higher flood elevation; if there is no information regarding the 0.2PFA, use the three-foot FVA.
    - If local, state, or tribal flood elevation standards exist, use the higher standard.
- **Elevation of Structures adjacent to Flood Prone Areas:** All new buildings, including critical utilities such as electrical, heating, and plumbing systems, must be constructed at least two feet above the nearest adjacent BFE, as established by FEMA or LWI studies. This standard ensures that structures and essential infrastructure are protected to a level consistent with the adjacent flood-prone areas, minimizing the risk of flood damage and enhancing community resilience. To future-proof against evolving flood risks, the ARBC Master Plan's 2050 flood model provides an opportunity for communities to adopt even higher elevation standards, fostering long-term safety and sustainable development across the region.
    - *Example Ordinance: "All structures, including electrical, heating, ventilation, plumbing, and air conditioning systems, must be constructed or installed at least two feet above the nearest adjacent BFE as determined by FEMA, LWI or 1 foot above BFE as determined by ARBC 2050 future model, whichever is higher to minimize flood risks."*

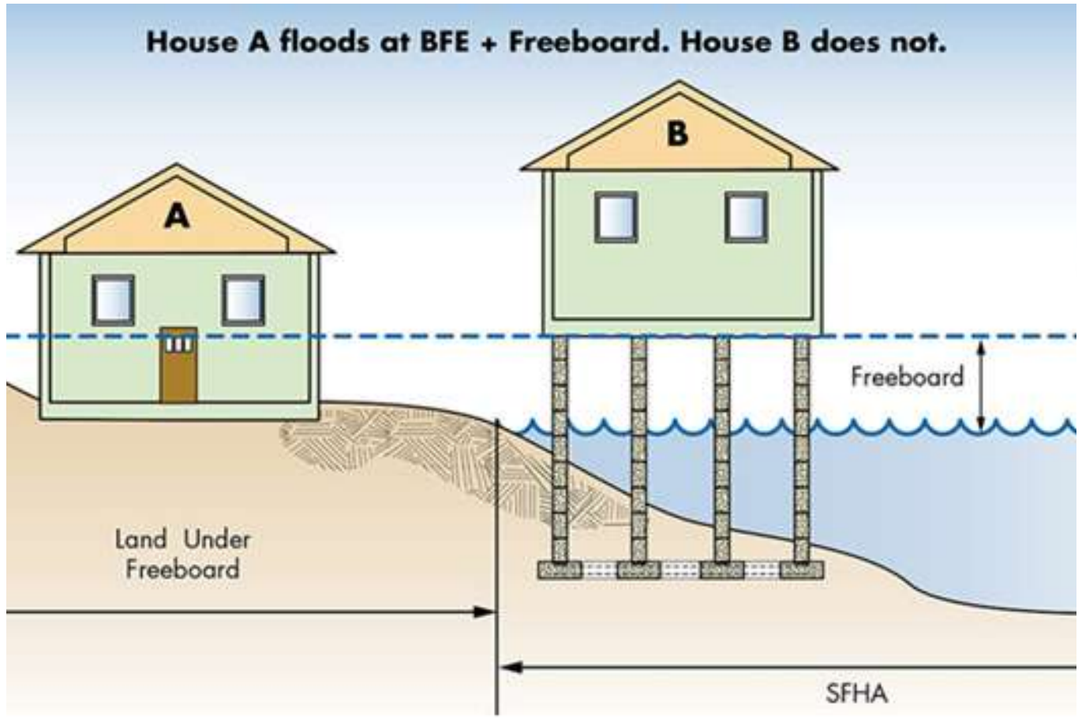


FIGURE 4-5: HOME ELEVATION (SOURCE: ASFPM ELECTED OFFICIALS FLOOD GUIDE VOLUME II: MOVING BEYOND THE ESSENTIALS)

- **Wet Flood-proofing (Non-Habitable Structures Only):** Non-habitable structures, such as garages, storage sheds, or agricultural buildings located in flood-prone areas, may utilize wet flood-proofing methods. Structures must be designed to allow water to enter and exit, minimizing hydrostatic pressure on walls and reducing structural damage. Use flood openings (e.g., vents) that comply with FEMA Technical Bulletin 1, which requires one square inch of venting per square foot of enclosed area. Materials below the BFE must be flood-resistant per FEMA and ASCE-24 standards. This option is prohibited for habitable buildings.
    - *Example Ordinance: "All non-habitable accessory structures in flood-prone areas may use wet flood-proofing methods, provided they are designed to allow automatic entry and exit of floodwaters using FEMA-compliant flood openings and constructed with flood-resistant materials 2 ft above the BFE as determined by FEMA, LWI or 1 foot above BFE as determined by ARBC 2050 future model, whichever is higher."*

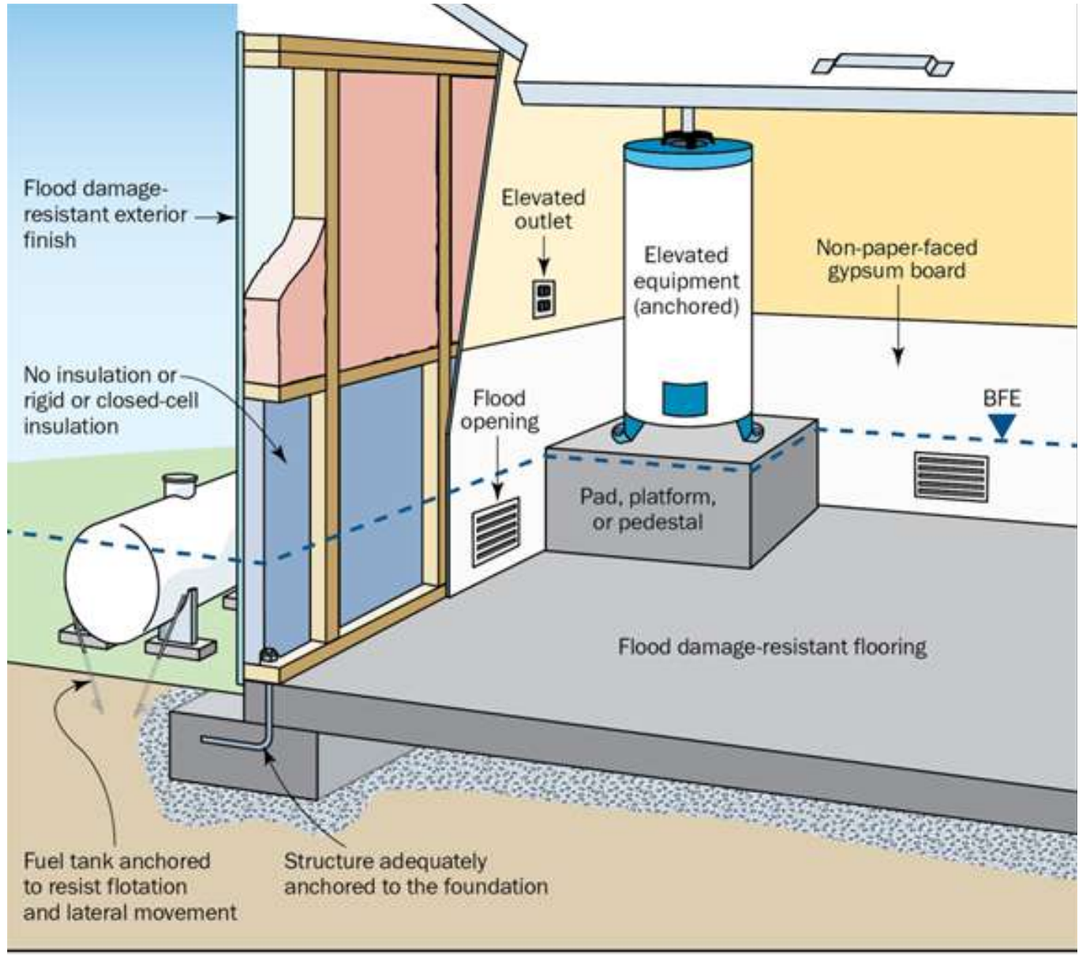


FIGURE 4-6: TYPICAL WET FLOOD-PROOFING MEASURES (SOURCE: NFIP TECHNICAL BULLETIN 7/ MAY 2022: WET FLOOD-PROOFING REQUIREMENTS AND LIMITATIONS)

- **Dry Flood-proofing (Non-Residential Structures Only):** Non-residential structures in flood-prone areas may implement dry flood-proofing as a practical alternative to elevation. These buildings must be designed and certified by a licensed professional engineer or architect to ensure they comply with FEMA and ASCE-24 standards. Dry flood-proofing requires the structure to be made watertight and capable of withstanding hydrostatic and hydrodynamic forces, as well as buoyancy, up to the required elevation. This option is available only for non-residential buildings and is not permitted for habitable spaces.
    - *Example Ordinance: "All non-residential buildings in flood-prone areas may be dry flood-proofed instead of elevated, provided they are designed and certified by a licensed professional to withstand flood-related forces and are watertight up to the BFE plus 2 ft above the BFE as determined by FEMA, LWI or 1 foot above BFE as determined by ARBC 2050 future model, whichever is higher."*

Drainage and Erosion Control Standards

Managing drainage and controlling erosion are key components of a robust floodplain management strategy. Proper drainage systems help prevent localized flooding, while erosion control measures preserve the integrity of the landscape, ensuring that stormwater runoff does not contribute to increased flood risks or degrade natural watercourses. These standards are essential for maintaining the overall functionality of the floodplain and mitigating flood impacts.

STANDARDS

- **Finish Floor Elevation:** To ensure effective drainage and prevent flooding of interior spaces, the finish floor elevation of any new structure must be at least one foot higher than the crown of the nearest roadway. This standard promotes positive drainage and minimizes the risk of floodwater entering buildings. (up to 40 points in CRS Activity 430)
    - *Example Ordinance: "The finish floor elevation of all new structures must be at least one foot above the crown of the nearest roadway to ensure proper drainage and reduce flood risk. If more than 5' of fill is required, a drainage plan can be provided to show positive drainage with only 5' of fill."*
- **Size Requirement for Drainage Regulations:** All developments that involve parcels larger than 0.5 acres or increase impervious surfaces by 5,000 square feet or more must comply with drainage regulations. These size-based requirements are designed to capture developments that have the potential to significantly impact stormwater runoff and drainage systems, ensuring that proper controls are in place to mitigate flood risks and maintain drainage capacity. (up to 90 points in CRS Activity 450)
    - *Example Ordinance: "Drainage regulations and requirements shall apply to all developments except single-family residences, parcels of 0.5 acres or less, or developments increasing impervious surfaces by less than 5,000 square feet."*
- **Drainage Impact Studies:** Before new development can proceed, a thorough drainage impact study should be conducted. The study should analyze multiple storm scenarios, from frequent storms to extreme events, ensuring that the development does not increase post-construction runoff and exacerbate flood risks for surrounding areas. (up to 100 points in CRS Activity 450)
    - *Example Ordinance: "Developers must submit a drainage impact study that analyzes the 2-year, 10-year, 25-year, 50-year, and 100-year storm events, with post-development runoff not exceeding pre-development levels for each event."*
- **Erosion Control:** Erosion not only degrades landscapes but also increases sedimentation in watercourses, reducing their capacity to manage floodwaters. Any land disturbance greater than 1,000 square feet must include erosion control measures to maintain proper drainage and prevent downstream impacts (up to 40 points in CRS Activity 450).
    - *Example Ordinance: "Erosion control measures must be implemented for any land disturbance exceeding 1,000 square feet. Measures may include silt fencing, sediment traps, or other approved methods to prevent soil erosion and maintain drainage."*

4.4 MAINTENANCE

Effective maintenance is vital for the longevity, functionality, and resilience of watershed management projects in the ARBC. Clear maintenance responsibilities, supported by flexible funding mechanisms, ensure that essential flood protection systems continue to operate effectively. Maintenance responsibilities are project specific and include activities necessary to maintain the project's effectiveness and maintain the project's lifespan and are subject to available funding.

Sediment Maintenance on the Amite River

Section 3 summarized the sediment modeling completed for the ARBC Master Plan. Specific projects pertaining to sediment and erosion management are documented in Section 3, which included the Upper Amite River Restoration and the Lower Amite River Sediment Removal project.

Periodic maintenance sediment removal in the vicinity of and downstream of the Amite River Diversion Canal Weir

NEED

Local officials, engineers and the public have highlighted their concerns with sedimentation in the lower Amite River and the need to remove sediment. Sediment transport modeling demonstrated that the Amite River Diversion Canal and Weir have accelerated the deposition of sediment on the main Amite River adjacent to and downstream of the weir. This is primarily because most flow spills into the Amite River Diversion Canal, reducing the potential energy to transport sediment downstream in the main channel, however, since the weir generally skims water off the top of the water column, sediment remains within the main channel and consequently settles out, resulting in over 20 feet of sediment accumulation since it was constructed adjacent to the boat way and downstream of the weir.

ACTION

ARBC will explore funding opportunities and potential partnerships to support the implementation of periodic sediment maintenance in the vicinity of the Amite River Diversion Canal Weir. By initially removing approximately 1.4 million cubic yards of sediment, and then conducting periodic maintenance sediment removal, channel conveyance can be maintained and remain more consistent with original USACE Amite River and Tributaries Project design conditions and the Lower Amite River Sediment Removal project conditions. If funded, key steps would include:

> It is estimated that following an initial sediment removal, **160,000-200,000 cubic yards of sediment** would need to be removed every 10-15 years to maintain the Amite River adjacent to and downstream of the Amite River Diversion Canal Weir

- Performing detailed analysis, developing plans and specifications, and performing permitting for removal of sediment consistent with the Lower Amite River Sediment Removal project recommendations.
- Perform sediment removal and disposal
- Perform monitoring of the Amite River at least every 5 years and after major flooding events adjacent to and up to 5 miles downstream of the Amite River Diversion Canal Weir using bathymetric survey and comparing to post sediment removal conditions.
- Review monitoring data and as needed to strategically initiate Step 1 as needed to perform maintenance sediment removal. It is estimated that 160,000-200,000 cubic yards of sediment would need to be removed every 10-15 years.

Additionally, as further discussed below, maintenance responsibilities should be clearly defined and formalized in an updated Operations and Maintenance Manual for the USACE Amite River and Tributaries project.

KEY BENEFITS

- Maintains navigation in the vicinity of the Amite River Diversion Canal Weir
- Helps to restore and maintain original Amite River and Tributaries project design conditions
- Maintains flow capacity in the Amite River, reducing the increases in flood elevations resulting from sediment build up and partial blockage of the main channel
- Helps to offset negative impacts of restoring the Amite River Diversion Canal Weir

KEY DRAWBACK

- Periodic maintenance costs
- Disposal of removed sediment
- Temporary environmental disturbance to the riverbed.

Restoration of the Upper Amite River

NEED

As presented in Section 2, in the vicinity of sand and gravel operations, the Upper Amite River has seen significant reductions in the channel sinuosity and subsequent increases in both the channel width and slope resulting in channel instabilities, major degradation and eroding of vegetation and destruction of habitats.

ACTION

ARBC will explore funding opportunities and potential partnerships to incrementally restore sections of the Amite River. Restoring the upper river closer to 1950's conditions by restoring historic slope, sinuosity, channel width and depth while accounting for increased flows due to climate change and land use changes can help stabilize and reduce unnatural in-channel erosion and transport of sediment downstream. If funded, key steps would include:

- Performing detailed reconnaissance, data collection, analysis, and modeling along the Upper Amite River to determine what portions of the river will achieve the greatest impact to channel stabilization, sediment transport reduction, and ecosystem benefits.
- Development of plans and specifications, permitting and acquisition of required property and easements
- Construction of sills/plugs, excavation, fill, revegetation etc. needed to restore conditions
- Perform annual and post flood monitoring including aerial imagery and survey to monitor the performance of the restoration project and take corrective action as needed.

KEY BENEFITS

Restoration can achieve benefits on multiple fronts including:

- Reduced downstream sediment loads more consistent with pre-1950's conditions.
- Small reductions in downstream flows and flood elevations
- Improved water quality and ecosystem through revegetation and habitat creation
- Improved recreational condition on the Amite River including improved navigation for personal watercraft.

KEY DRAWBACKS

- Potential impacts and conflicts with sand and gravel operations

Maintenance of the Amite River and Tributaries Project Including the Amite River Diversion Canal Weir

Amite River and Tributaries Project Operations and Maintenance

NEED

The 1963 Operations and Maintenance Manual for the Amite River and Tributaries project outlined agreements between USACE and local police juries. As previously discussed in Section 2.4, this document indicated that the Ascension Parish Police Jury assumed responsibility for maintaining all works in its jurisdiction, including the Amite River Diversion Canal Weir. The manual stipulated that the parish "will not permit the boat way to further erode or enlarge," emphasizing its obligation to maintain the weir and boat way. Livingston Parish Police Jury also agreed to maintain parts of the Amite River in their jurisdiction. The 1963 manual required inspections every 90 days and after high-water events, along with semiannual reporting, but these protocols have not been consistently tracked.

ACTION

ARBC will collaborate with relevant agencies and jurisdictions to conduct a comprehensive review and update to the 1963 Operations and Maintenance Manual for the Amite Rivers and Tributaries Project. This should include all agencies with jurisdiction and impacted by the Amite River and Tributaries project including:

- ARBC
- USACE
- PLD
- Ascension Parish
- East Baton Rouge Parish
- Livingston Parish

The updated Operations and Maintenance Manual should clearly define and formalize:

- Maintenance responsibilities and frequencies for various aspects of the project including:
    - Channel maintenance (Amite River and other modified project components) including:
        - Clearing, snagging
        - Waterway debris removal
        - Sediment removal
    - Amite River Diversion Canal
    - Amite River Diversion Canal Weir
- Inspection and reporting responsibilities including location, frequency, and nature of both routine and post flood monitoring activities.
- Cost sharing responsibilities and funding mechanisms for monitoring and both routine and major maintenance projects.

Restoration and Maintenance of the Amite River Diversion Canal Weir

NEED

As presented in Section 2, the Amite River Diversion Canal Weir has not been regularly maintained and is in a state of deterioration. Active head cutting downstream of the weir is observed and is likely to cut through the weir and right embankment of the Amite River in the future, further reducing flow in the Amite River and lowering water quality of both the main river and swamps that receive overflows from the Amite River.

ACTION

ARBC will endorse the restoration of the Amite River Diversion Canal Weir by PLD and seek additional funding and partnerships to restore original design conditions. This restoration should be performed in conjunction with the Lower Amite River Sediment Removal project to mitigate flood elevation impacts associated with restoring the weir and channel to original design conditions. If funded, key activities would include:

- Repair of the existing weir structure to elevation 0 MSL
- Restoration of the boat way to original design dimensions
- Stabilization of downstream scour holes
- Restoration and erosion protection of the Amite right over-bank where the rock weir structure is located
- Strategic sediment removal on the Amite River adjacent to the Amite River Diversion Canal Weir

These restoration and maintenance efforts may be completed in parts, first focusing on stabilizing the existing structure, with later efforts focused on improvements to restore the design to be fully functional. Regular monitoring of the weir should be performed at least annually and following major flooding events to identify any developing deterioration and identify maintenance needs early to preserve the structure.

It is also recommended that cardinal markers consistent with marine navigation standards be used to clearly mark the presence of the Amite River Diversion Canal Weir to improve safety for navigation. Similarly, standard marine channel markers should be used to clearly define the boat way and approach to ensure vessels can safely pass. This should include the installation of a staff gage to indicate the real-time depth of the water within the boat way and posted limitations on vessel size.

KEY BENEFITS

- Helps to restore and maintain original Amite River and Tributaries project design conditions
- Helps to preserve flows on the Amite River improving water quality and flows into the swamps adjacent to the Amite River

KEY DRAWBACKS

- Periodic maintenance costs
- Reduced boat way dimensions when compared to existing conditions, potentially limiting navigation to smaller vessels

Recommendations for Sediment Maintenance on the Comite River Diversion Canal

Effective maintenance of the Amite River and its tributaries is crucial for preserving the ecological health and functionality of the watershed while ensuring reliable flood protection for surrounding communities. The proposed recommendations, including sediment removal, restoration efforts, and a comprehensive update to the Operations and Maintenance Manual, provide a structured approach to address current challenges and enhance the resilience of these vital waterway systems. Local project owners play a key role in maintaining projects within the watershed, with the ARBC available to assist as needed. By developing partnerships, defining responsibilities, establishing robust monitoring practices, and securing sustainable funding mechanisms, the ARBC can foster long-term improvements that benefit flood protection, water quality, and ecosystem integrity, ultimately safeguarding the region against future impacts.

Maintenance of the Comite River Diversion Canal

NEED

The Comite River Diversion Canal is a man-made channel that will over time attempt to reach its own natural equilibrium and channel form if erosion protection measures are damaged or not maintained. To address these challenges, ongoing monitoring and adaptive maintenance will be critical. The need for effective and proactive maintenance of the Comite River Diversion Canal is essential to ensure its long-term functionality and reliability as a flood mitigation measure.

FIGURE 4-7: COMITE DIVERSION CANAL CHANNEL SEGMENT 4 (PHOTO SOURCE: USACE)

ACTION

Effective maintenance requires the continuous monitoring of the canal's performance during both normal conditions and flood events to ensure it meets its design capacity and operates as intended. This would involve:

- Partnering with the USGS to gauge flows during high-water events and analyzing data to validate the canal's design performance and identify potential design deficiencies. Such partnerships would allow for timely detection of performance issues and inform necessary adjustments to the system.
- Regular inspections should be performed to identify potential degradation of the canal. Initially, inspections should be conducted more frequently to identify issues such as erosion, scour, sedimentation, and vegetation buildup. Depending on observations, the frequency of inspections should be either increased or decreased accordingly.
- Post-high-flow inspections are also recommended to assess storm-induced damage, including debris accumulation and structural damage. These inspections should trigger immediate remedial actions to maintain the canal's functionality. To enhance post-storm inspections, aerial photography could be employed during and after flood events. Partnerships with organizations like the Civil Air Patrol or local law enforcement departments equipped with aircraft or drones that could provide cost-effective aerial surveys. High-resolution imagery would help efficiently identify damage and debris, supporting targeted maintenance efforts and minimizing the risk of further issues.

East Baton Rouge Parish will be ultimately responsible for maintaining the canal once construction is completed, although ARBC's partnership is recommended. It is imperative to work with East Baton Rouge Parish and establish a clear and sustainable funding framework to maintain the canal's long-term operation.

4.5 CAPACITY BUILDING

Capacity building is the process of developing and strengthening the skills, abilities, and resources that local communities, agencies, and all stakeholders within the ARBC need to implement this Master Plan and achieve the common goal of mitigating flood risk, increasing resilience and preserving the natural resources of the Amite River Basin. ARBC will support the efforts below to enhance the technical capacity and stakeholder engagement within the ARBC geographic boundary.

Public and Community of Practice Capacity Building and Education

Promotion of Flood Preparedness and Flood Insurance Through Risk Communication

NEED

Promote the need for the public to protect their home, family, and financial security throughout the year, and take extra precautions when flooding is predicted within the ARBC Geographic Boundary.

ACTION

ARBC will promote increased flood preparedness by providing enhanced flood risk information to help the public understand their risk and make informed decisions and by providing guidance on how to be prepared for a flood and why residents should consider purchasing flood insurance. This may include:

- Promoting flood risk communication to residents of the ARBC geographic boundary by providing enhanced flood risk information including flood depths, flood frequency and consequences information to help the public understand their risk and make informed decisions
- Provide guidance on how to be prepared for a flood
- Provide guidance on and why they should consider purchasing flood insurance

TO LEARN MORE ABOUT...

the Flood Smart, please visit:
https://www.floodsmart.gov/

OR SCAN THE QR CODE BELOW

Flood Safety Awareness

NEED

Communicating flood risk and flood safety awareness to the public is essential to reducing potential risk community-wide.

ACTION

ARBC will promote flood safety awareness to reduce the potential risks by educating the public around available flood programs such as the National Weather Service's "Turn Around, Don't Drown" and GOHSEP's "Flood Safety Awareness Campaign" programs. This will be shared through the ARBC website, social media and outreach to ARBC communities.

Flood preparedness is critical for the public to protect their home, family, and financial security throughout the year, and includes the need to take extra precautions when flooding is predicted within the ARBC Geographic Boundary.

The "Turn Around, Don't Drown" program is a public safety initiative aimed at raising awareness about the dangers of driving through flooded areas. The core message of the program is simple: if you encounter a flooded road, turn around and seek an alternative route instead of attempting to drive through the water. The program educates the public about the risks associated with floodwaters, which can be deceptive and dangerous. Even shallow water can sweep a vehicle away, and the depth of water may be difficult to gauge. The initiative often uses signage, social media campaigns, and public service announcements to spread its message. These tools are designed to be easily recognizable and memorable. The program encourages people to stay informed about weather conditions and flood alerts, helping them make safer choices during heavy rain or flooding events.

TO LEARN MORE ABOUT...

the NWS'sTurn Around Don't Drown®, please visit:
https://www.weather.gov/safety/flood-turn-around-dont-drown

OR SCAN THE QR CODE BELOW

The GOHSEP Flood Safety Awareness Campaign is designed to educate the public about the dangers of flooding and to promote safety measures during flood events. The campaign intends to inform the community about the risks associated with flooding, including flash floods and riverine flooding and encourage residents to prepare in advance by creating emergency plans and kits. The campaign provides brochures, fliers, and online resources that outline safety tips, flood risks, and preparedness steps. GOHSEP uses social media platforms to share information, infographics, and videos related to flood safety, helping to reach a wider audience. The campaign often includes workshops, seminars, and community events where residents can learn about flood safety and preparedness directly from experts. The campaign encourages the use of emergency alerts and weather notifications to keep the public informed about impending flood risks.

TO LEARN MORE ABOUT...

the GOHSEP's Flood Safety Awareness Campaign, please visit:
https://gohsep.la.gov/about/louisiana-hazards-plus-threats/flooding/flood-safety/

OR SCAN THE QR CODE BELOW

Building the Technical Capabilities of the Local Engineering Community of Practice

NEED

Through LWI, ARBC now has state of the art, high detailed hydrologic, hydraulic and consequences computer models that can be used to assess current, future and project conditions, providing critical tools for higher levels of floodplain management. While these models use highly advanced 1D and 2D modeling techniques that provide greater accuracy and utility, their complexity can be extremely challenging for both new and experienced users, creating a significant learning curve to understand not only the advanced functions of the HEC modeling software but also the specifics of individual models. This challenge is incurred at both the local community officials' level and within the local engineering community of practice.

ACTION

ARBC will partner with DOTD, LFMA, and other organizations to promote hands-on technical training on the implementation of LWI and ARBC derived models for both local community officials and the engineering community of practice. ARBC can promote and highlight the availability of technical training opportunities including:

- General hydrologic, hydraulic and consequences modeling training: There are numerous opportunities for engineers that are new to modeling or who are new to the advanced 2D modeling approaches used by LWI and ARBC. By highlighting these opportunities within the ARBC geographic boundary, ARBC can support the enhancement of technical capabilities of the local engineering community.
- ARBC Specific Model Training: LWI is scheduled to provide basin specific training for all models within Region 9 in 2025. These trainings opportunities are well suited for engineers that are already experienced with advanced 2D modeling approaches used by LWI and ARBC but require specific training on applying these models developed for the Amite River Basin.

Government Capacity Building and Education

Tools for Financial Support

NEED

Communities need tools and financial support to build capacity and tackle water management issues proactively.

ACTION

ARBC will promote the resources provided by LWI and other agencies for funding, technical assistance, and collaborative watershed planning. LWI offers communities a wide range of tools, resources, and technical assistance aimed at improving flood risk preparedness and fostering sustainable water management practices. Through LWI, communities can access funding opportunities, engage in collaborative watershed planning, and take part in programs that promote floodplain restoration, stormwater management, and resilience-building efforts. LWI also supports the development of local stormwater master plans, helping communities identify key vulnerabilities and create long-term solutions to mitigate flood risks. By leveraging the resources and guidance available through LWI, ARBC can assist communities to strengthen their capacity to manage stormwater more efficiently, reduce future flood risks, and protect public safety and the environment in the long term.

Floodplain Manager Training

NEED

A very competitive hiring environment has been experienced during the past 5 years making it challenging for many ARBC communities to hire and retain experienced floodplain management staff. Further, staff attrition due to promotions and retirement of experienced floodplain managers can frequently create a greater need for experienced floodplain managers.

ACTION

ARBC will partner with FEMA, DOTD and/or LFMA to coordinate floodplain management training opportunities. These training may be offered as standalone training events promoted by ARBC, DOTD, LWI or potentially offered in conjunction with conferences including the annual LFMA floodplain management conference or one-off workshops.

Courses relevant to this effort may include FEMA's Emergency Management Institute's EL0273: Managing Floodplain Development through the NFIP and EL0278: National Flood Insurance Program/Community Rating System.

TO LEARN MORE ABOUT...

the FEMA Floodplain Management Courses, please visit:
https://www.fema.gov/floodplain-management/training/courses

OR SCAN THE QR CODE BELOW

These opportunities can be combined with a proctored exam for the ASFPM CFM certification at the end of the course to promote community officials and other local floodplain managers obtaining this certification. The CFM certification program lays the foundation for ensuring that highly qualified individuals are available to meet the floodplain management needs of the ARBC and its communities.

TO LEARN MORE ABOUT...

the CFM certification, please visit:
https://www.floods.org/certification-program-cfm/what-is-the-cfm-certification-program/

OR SCAN THE QR CODE BELOW

Emergency Planning and Response

NEED

LWI Modeling and other efforts including this Master Plan have created a wealth of technical data that can support emergency planning and response. However, much of the data is contained within highly complex software that requires extensive experience to efficiently use and interpret with a very limited cadre of users.

ACTION

ARBC will make available to ARBC communities tools and technical data to support emergency planning and response to create safer, more resilient communities in formats that can be easily used and interpreted within software including GIS that has a wider cadre of users.

Prior modeling efforts within the ARBC geographic boundary including the ARBNM and LWI Models, provide ready to use detailed flood results including depth, velocity, and flooding extents for various precipitation amounts within the watershed, ranging from 8 to 26 inches. While these models provide seemingly endless details including high resolution depth and velocity, this can often be overwhelming to many users and does not easily translate to real world risk associated with emergency planning and response. These results can be simplified into more meaningful, readily understood information by applying the ACER11 danger levels to modeling results which boils this data down to simplified, meaningful zones.

ACER11 is a technical guidance developed by the U.S Department of Interior Bureau of Reclamation specific to downstream hazard classification which provides depth-velocity flood danger levels for occupants of vehicles, adult pedestrians, and children as illustrated in Figure 4-8 for adult pedestrians. These flood danger levels range from Low Danger (minimal risk to humans and vehicles), Judgment Zone (increasing risk to humans and vehicles) and High Danger Zone (catastrophic risk to humans and vehicles) and can be mapped geospatially utilizing the velocity and depth outputs of HEC-RAS and other hydraulic models as illustrated in Figure 4-9.

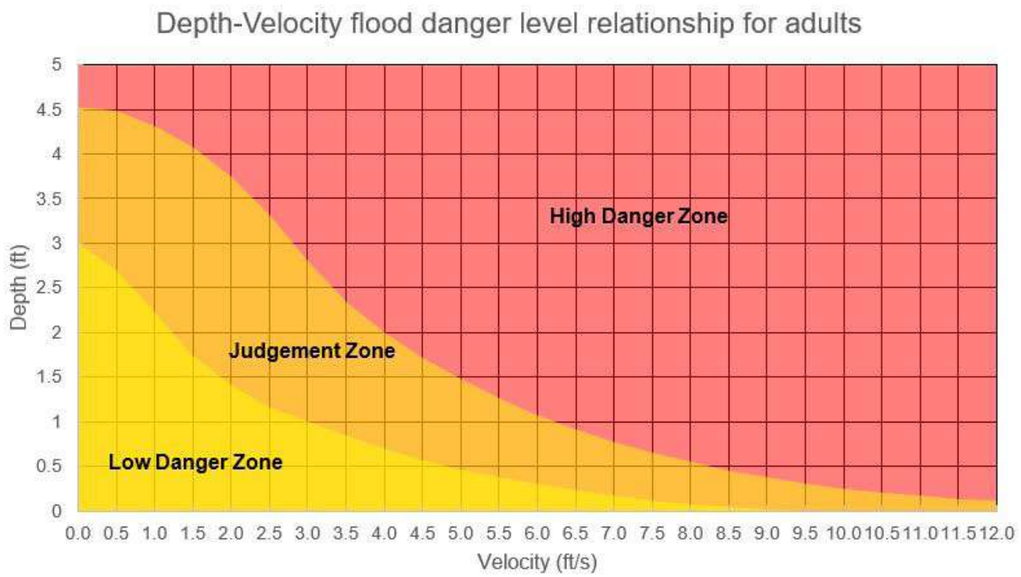


FIGURE 4-8: ACER 11 DEPTH-VELOCITY FLOOD DANGER LEVEL RELATIONSHIP FOR ADULT PEDESTRIANS (SOURCE: ARBC RECREATED FROM ACER11)

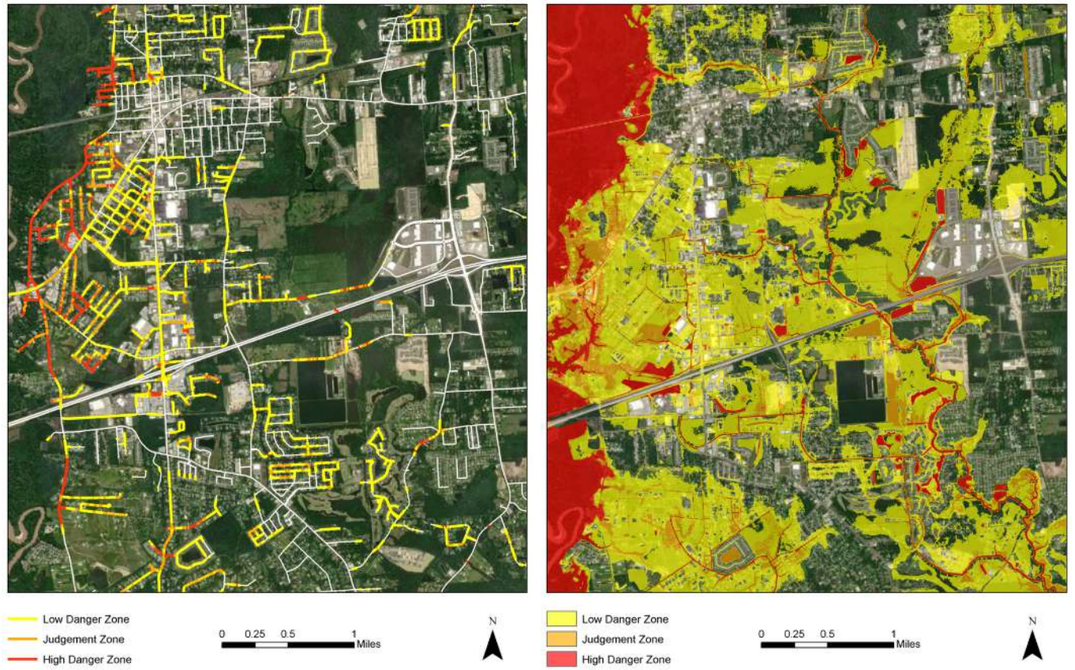


FIGURE 4-9: DEMONSTRATION OF ROAD LINES CLASSIFIED FOR OCCUPANTS OF VEHICLES AND FLOODPLAINS CLASSIFIED BY ADULT PEDESTRIAN USING ACER 11 DANGER ZONES (SOURCE: ARBC)

The goal is to provide the ARBC communities with tools and data to rapidly perform informed emergency planning and response to improve public safety and resilience.

Critical facilities are structures that are critical to the operations of the community, and include hospitals, medical facilities, police and fire stations, shelters, and emergency operation centers (EOC) needed for emergency operations during and after an emergency. Other examples of critical facilities may include nursing homes, hazmat locations, water/sewer treatment plants, and cell phone towers. Identification of these facilities within the various flooding scenarios can identify those that need to have mitigation actions taken to prevent catastrophic damage during these events as well as identifying ingress and egress vulnerabilities.

Simplified Flood Forecasting

The models developed as part of this Master Plan for the Amite River Basin and other studies include a range of events with various combinations of design storms of specific depth, duration and location, probabilistic simulations and coastal boundaries. This catalog of flood inundations is included as a digital appendix to this Master Plan and can be used for a wide range of applications. One such application includes simplified flood forecasting, whereby the catalog of modeling results can be used to support simplified yet effective real time inundation mapping.

NEED

In an emergency response scenario, advanced warning of impending floods is a critical factor to reducing the risk to human life and to implement emergency actions to protect critical assets and mitigate flood losses. Floodplain managers and emergency managers need information such as identification of high danger areas to pedestrians and vehicles, but often do not have the technical expertise or time to rerun complex predictive models based on highly unpredictable and variable precipitation events.

ACTION

Through this Master Plan, ARBC will provide communities and other agencies with the tools to rapidly understand the potential impact of impending floods and respond to protect the population at risk using existing resources. This will ensure critical facilities can continue to serve and protect assets from flood losses. Additionally, ARBC will seek funding to implement a more robust decision support tool.

ARBC is proposing three potential methods for stakeholders to understand the potential flood impacts associated with impending storms and improve situational awareness for informed decision making. These methods utilize the existing catalog of flood inundations developed as part of this Master Plan, which include data such as detailed flood results, such as depth, velocity, flood extents, and depth-velocity danger zones. Since these datasets are in industry standard GIS formats, they can be used by anyone with a basic working knowledge of GIS, making them accessible to a large community of practice without the need for specialized expertise in hydrologic and hydraulic modeling software.

Proposed Methods 1 and 2 for simplified flood forecasting can be implemented immediately utilizing existing resources including local expertise and NWS river forecast sites, while Method 3 is provided as a more robust and automated method for potential implementation by ARBC or stakeholders. These methods and processes are illustrated in Figure 4-10.

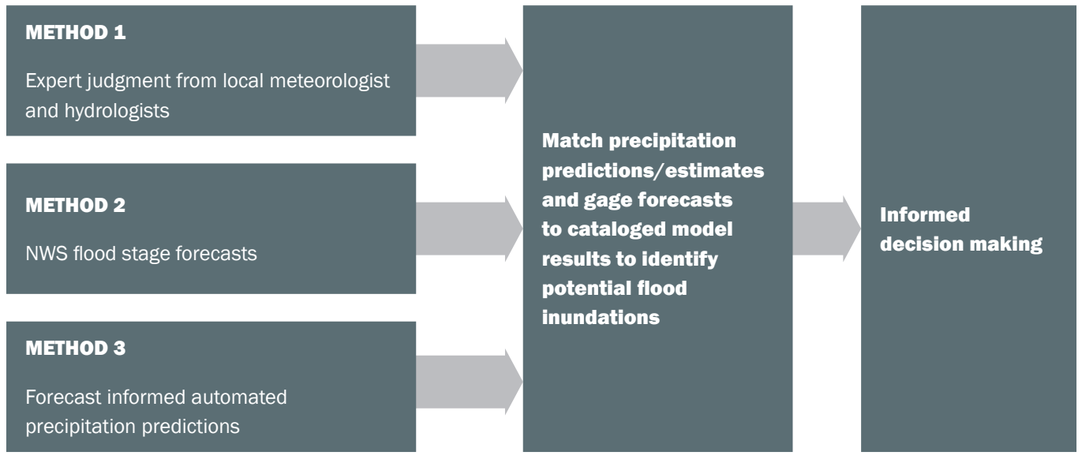


FIGURE 4-10 – POTENTIAL METHODS TO CORRELATE EXPECTED CONDITIONS TO EXISTING FLOOD INUNDATIONS TO SUPPORT FLOOD FORECASTING AND INFORMED DECISION MAKING.

METHOD 1: EXPERT JUDGMENT FROM LOCAL METEOROLOGIST AND HYDROLOGISTS (AVAILABLE FOR IMMEDIATE IMPLEMENTATION)

Method 1 involves matching the precipitation predictions from local meteorologists and hydrologists by matching these predictions to specific events within catalog of flood inundations. These local experts often have intimate knowledge of weather patterns and a comprehensive understanding of the inherent biases associated with precipitation forecasting within the ARBC geographic boundary. By using their local knowledge and expertise, these experts can provide recommendations to communities and emergency managers on which scenario from prior modeling efforts within the ARBC geographic boundary is most likely to represent impending weather conditions and subsequent flood inundations. From there, communities and emergency managers can make appropriate and more informed decisions to protect residents and infrastructure during a flood event. Through this Master Plan, this method is available for immediate implementation by communities within the ARBC geographic boundary.

The value of these local partnerships was evident when Hurricane Barry was forecasted to make landfall in western Louisiana in 2019, with rainfall totals initially forecasted to exceed those observed in August 2016 within the Amite River watershed. Local meteorologist Jay Grymes worked with DOTD staff and consultants to better quantify the probable precipitation amounts, which were several inches lower than initially forecasted by NWS. Using the catalog of inundations from the previous modeling efforts, Governor Edwards and senior DOTD staff were able to make informed decisions on interstate closures and allocation of emergency resources.

METHOD 2: APPLICATION OF NWS FLOOD STAGE FORECASTS (AVAILABLE FOR IMMEDIATE IMPLEMENTATION)

Method 2 involves utilizing the existing catalog of flood inundations and model results in combination with the NWS's Flood Stage Forecasts. NOAA's National Water Prediction Service (https://water.noaa.gov) provides real-time forecasted stage information for multiple gages along the Amite and Comite Rivers and summarizes river stage and the categorical flood threat as Action, Minor Flooding, Moderate Flooding, and Major Flooding. This allows for easy dissemination of the flooding impacts to residents within the ARBC geographic boundary; however it typically does not include spatial information pertaining to inundation extents associated with the forecast stages.

Therefore, ARBC has developed a look-up table in the Supplements, which correlates the results of the previous modeling efforts with the NWS forecast sites stage levels. This allows the user to immediately determine, based on forecasted stage heights, which of the cataloged ARBNM inundations most closely match these forecasted stages, providing more detailed information to emergency planners and responders. The Amite River Basin, as of April 2025, has 6 NWS real-time forecast sites that provide forecasted stages during floods as illustrated in Figure 4-11 and Figure 4-12. By correlating the forecasted stages at these gages with the model results in the Supplements, communities and emergency managers can reference the most likely inundation results such as depth, velocity, danger zones, and other flood information for any impending storm event at each forecast location. Through this Master Plan, this method is available for immediate implementation by communities within the ARBC geographic boundary.

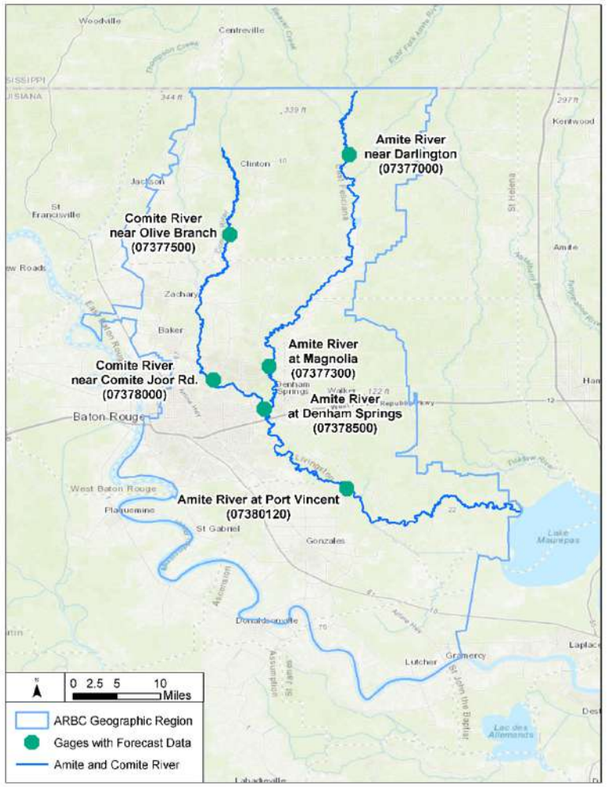


FIGURE 4-11: NATIONAL WATER PREDICTION SERVICE GAGE LOCATIONS WHERE FORECAST DATA IS AVAILABLE (PHOTO SOURCE: ARBC)

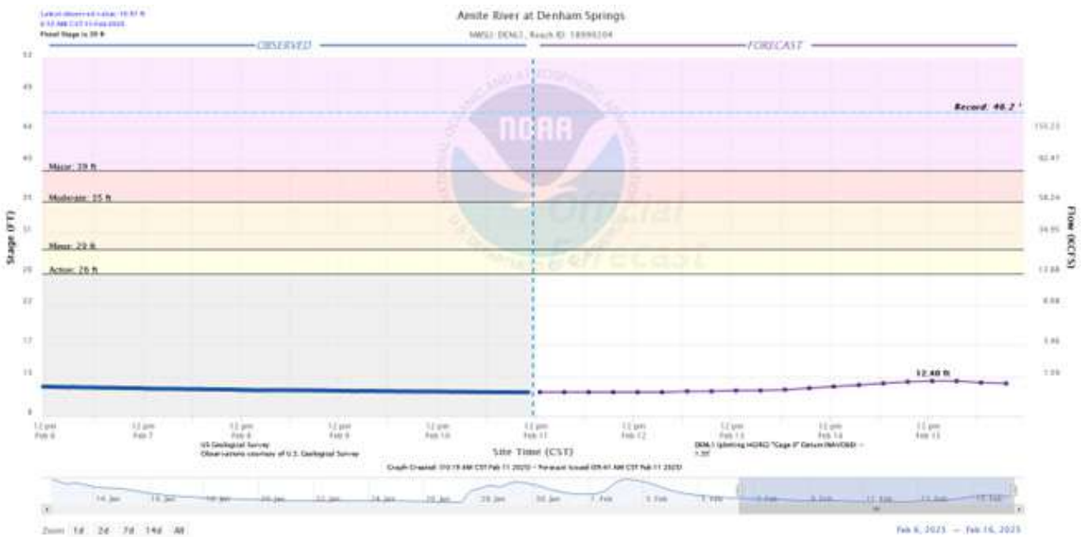


FIGURE 4-12: EXAMPLE FORECAST GRAPH FOR AMITE RIVER AT DENHAM SPRINGS GAUGE DEMONSTRATING CATEGORICAL FLOOD THREAT (SOURCE: NWS)

METHOD 3: AUTOMATED INFORMED FORECASTS (FUTURE IMPLEMENTATION)

Method 3 involves developing tools for automated and continuous review of multiple sources of forecasted precipitation estimates for the Amite River Basin and correlation to the catalog of flood inundations developed as part of this Master Plan and other projects. Rather than relying solely on expert local knowledge or NWS gages to estimate precipitation forecasts on an as-needed basis as proposed in Method 1 and Method 2, this method utilizes multiple sources across various datasets on a continuous basis to provide ARBC communities with a more automated and continuous approach to flood forecasting. This method is not currently available to ARBC communities; however this Master Plan summarizes potential paths for future implementation of this tool, which can be developed by ARBC stakeholders if desired.

Tools for automated and continuous review of NWS precipitation forcasts for Amite River Basin → **Automated matching of forecast to existing catalog of inundations** → **Automated display of inundations and impacts on infrastructure for informed decision making**

Suggested data sources that can be used for future implementation of an automated flood forecast system include:

- NOAA's Weather Prediction Center (WPC) Quantitative Precipitation Forecasts (QPF)
  - This data spatially depicts the amount of liquid precipitation estimated to fall in a defined period. To align with previous modeling efforts within the ARBC geographic boundary, the 3-day QPF can be used to quantify the location of maximum precipitation and total amount forecasted.
- NOAA's WPC Probabilistic Precipitation Portal
  - While the QPF provides deterministic forecasted precipitation amounts, there are inherent errors associated with the atmospheric models used to calculate the QPF. In order to get a better understanding of the possible ranges of precipitation that can possibly occur with a given weather event, a probabilistic forecast such as the WPC can provide ranges of possible precipitation amounts based on exceedance probabilities. While the QPF provides a single reference point (expected precipitation), the WPC Probabilistic Precipitation Portal can be used to determine lower and higher precipitation amounts to get a better understanding of possible flooding scenarios.
  - The WPC Probabilistic Precipitation Portal (Figure 4-11) provides Probabilistic Quantitative Precipitation Forecast (PQPF), out to 72 hours for rainfall totals from 0.01 inches to at least 12 inches. The PQPF dataset is derived from 60 ensemble and deterministic forecast models, as well as the WPC's QPF.
  - NOAA's WPC Probabilistic Precipitation Portal can be found here (https://www.wpc.ncep.noaa.gov/Prob_Precip/?zoom=LIX).
- NOAA's Storm Prediction Center (SPC)
  - For storm events where the possibility that precipitation may exceed 12 inches, the SPC's Plume Viewer (Figure 4-12) allows the user to view these higher amounts of precipitation. The Plume Viewer is a graphical representation of the National Center for Environmental Prediction (NCEP) Short Range Ensemble System (SREF). The SREF ensemble consists of 26 forecast models (Weather Research and Forecasting Model [WRF] and the North American Model [NAM]). Each of the WRF and NAM consists of the control member and 12 perturbations of the model. In a similar fashion to the PQPF, the SREF models can assist the user in determining the lower and upper bounds of possible precipitation amounts during an event.

As of April 2025, the underlying datasets for the WPC Probabilistic Precipitation Portal are not currently available for download, as the data is currently experimental. This dataset does provide valuable information that can be used manually to determine the appropriate ARBNM inundation scenario to use. In the event that this data is available, automated routines can be developed to analyze the exceedance probabilities and spatial patterns of the precipitation to select the appropriate ARBNM inundation scenario.

Data from the NCEP SREF Plume Viewer are publicly available and readily accessible for download. Automated routines can be developed to retrieve the necessary data layers (mean precipitation and standard deviation) to develop a 72-hour rainfall accumulation forecast product. The cumulated 72-hour standard deviation can then be used to set the upper- and lower-bounds of possible precipitation, and return the most appropriate scenarios from the ARBNM inundation dataset.

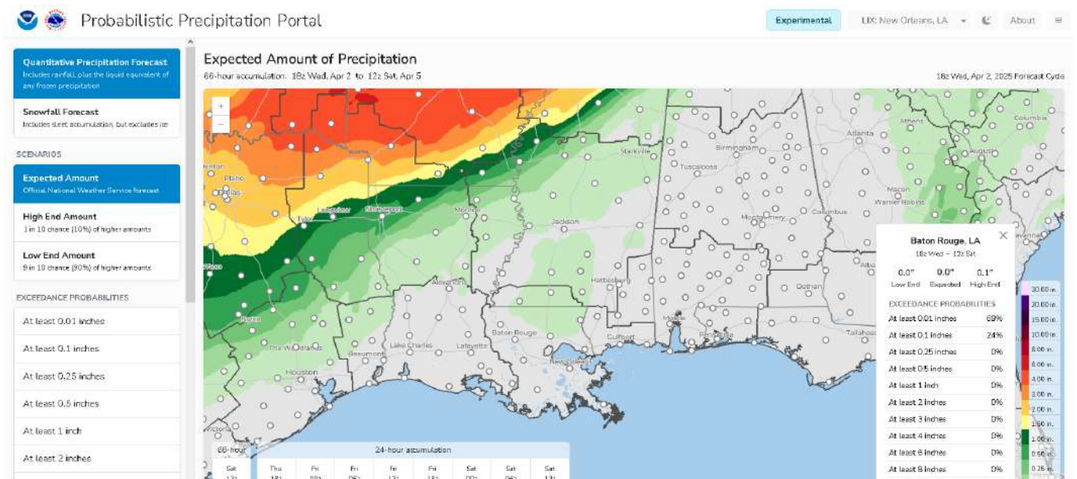


FIGURE 4-13: EXAMPLE OF THE PROBABILISTIC PRECIPITATION PORTAL FOR THE NEW ORLEANS NWS AREA OF RESPONSIBILITY. EXCEEDANCE PROBABILITIES ARE VIEWED BY SELECTING THE CIRCLES ON THE MAP (SOURCE: NWS)

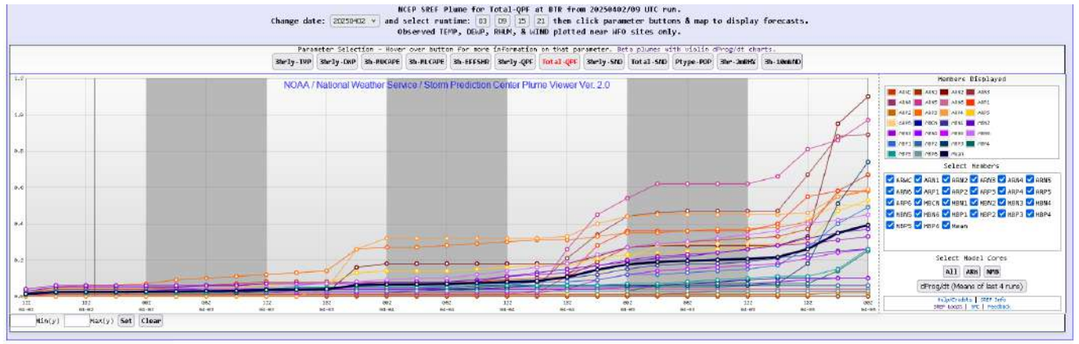
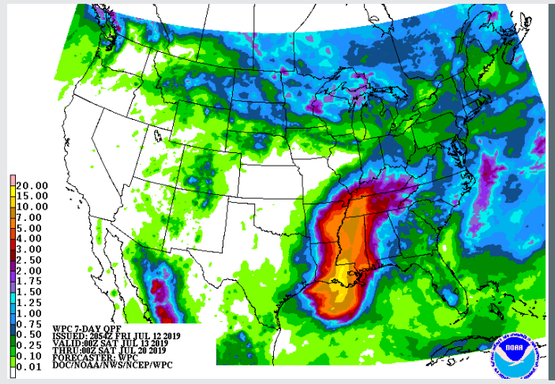


FIGURE 4-14: EXAMPLE OF NCEP SREF PLUME VIEWER FOR BATON ROUGE (SOURCE: NWS)

Through this Master Plan, ARBC will provide ARBC communities and other agencies with the data and guidance to rapidly understand the potential impact of impending floods and respond to protect the population at risk using existing resources using Methods 1 and 2 previously presented. This will ensure critical facilities can continue to serve and protect assets from flood losses. Additionally, ARBC will seek funding to implement a more robust decision support tool using Methodology 3 above, potentially integrating this within an online GIS platform such as a Digital Twin.

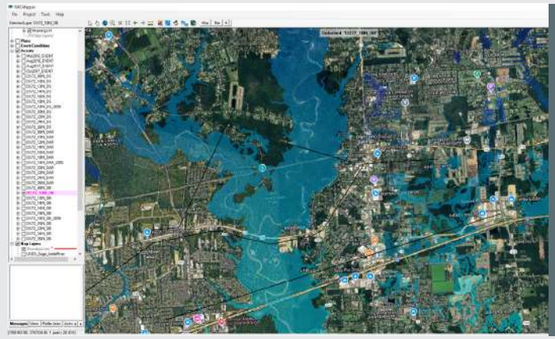
SIMPLIFIED FLOOD FORECASTING OF THE AMITE RIVER

In July 2019, Hurricane Barry was forecast to make landfall in southern Louisiana with devastating rainfall. Working with local meteorologist Jay Grymes, DOTD staff and consultants, the anticipated flood inundation extents corresponding to meteorologic estimates were rapidly determined and used by Governor Edwards and senior DOTD staff to successfully make informed decisions on interstate closures and allocation of emergency response resources.



1

Quantitative Precipitation Forecasts to identify expected range of rainfall depths, duration, and locations.



2

Matching of expected precipitation range to existing catalog of model results to determine expected flood inundation extent, depth and velocities.

3

Review and interpretation of model results to make informed decisions pertaining to emergency response including Road closures, evacuations, allocation of resources, and impacted critical utilities and services.

Advanced Real-Time Flood Forecasting

NEED

Several methods for simplified flood forecasting have been presented in this section, however with the availability of data and modeling, opportunities exist for the potential development of advanced real-time flood forecasting in the future.

ACTION

Through this Master Plan, ARBC will share resources with communities and potentially seek funding to implement an advanced real-time flood forecasting system, which could provide improved situational awareness before and during a flood event to support emergency response and decision making as illustrated in Figure 4-15. This more robust system could leverage:

- LWI Models and technology including HEC-RTS for real time simulation
- Local and NWS precipitation records, precipitation forecasts and river stages
- Artificial Intelligence including machine learning to predict and refine model simulations to produce periodic reports and prediction of roads and critical infrastructure to be inundated

A long-term framework for implementation of real-time flood forecasting is presented in the Supplements.

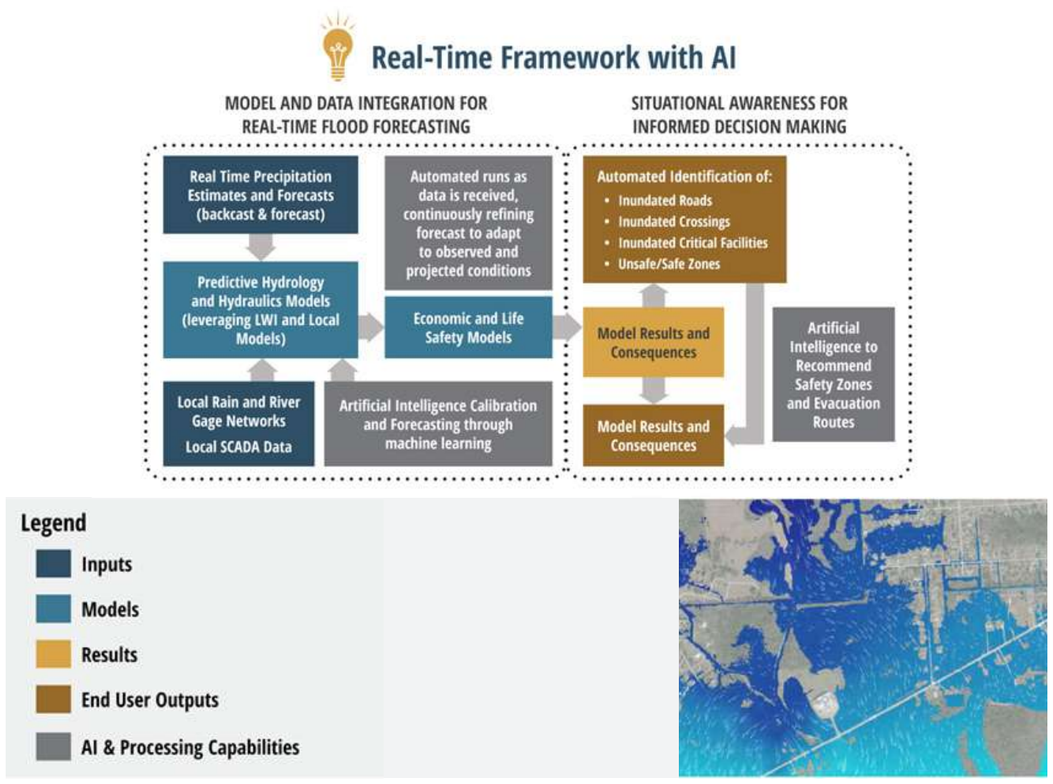


FIGURE 4-15: FRAMEWORK FOR REAL-TIME FLOOD FORECASTING (SOURCE: DEWBERRY)

4.6 COMMUNICATION

Outreach and Education

Public education and outreach is an essential component to the successful implementation of the actions described in this Master Plan. ARBC will play a critical role in helping communities understand the plan's recommendations as well as navigate the challenges of flooding and storm risks. Through continued engagement and strategic action, ARBC will ensure that the goals of the Master Plan are realized on the local level through various efforts. These efforts will ensure that the community remains informed, engaged, and supportive of any recommendations put forth by this Master Plan. A summary of public education and outreach opportunities that may be utilized by ABRC include:

REGULAR COMMUNITY MEETINGS AND PUBLIC FORUMS

- Community Workshops: Participate in targeted workshops that address specific issues such as flood mitigation, storm surge reduction, and Nature-Based Solutions (NBS). These workshops can include interactive activities where residents learn how they can reduce their personal flood risk or engage in local environmental efforts. ARBC can support local education efforts by assisting with training and resources on how communities can incorporate NBS into their flood management strategies. This may be done not only through workshops but also through community seminars and online resources. Educating the public on these approaches and providing transparency will foster local buy-in and promote public support and positive feedback in restoration projects.
- Project Presentations: Participate in meetings that present specific projects to the potential benefiting area to further educate the public and encourage feedback to ensure public satisfaction with the proposed flood mitigation improvements.

FIGURE 4-16: CENTRAL WEST REGION OPEN HOUSE (PHOTO SOURCE: ARBC)

PARTNERSHIPS WITH LOCAL ORGANIZATIONS AND STAKEHOLDERS

- Engage with NGOs and Advocacy Groups: Partner with local environmental organizations (Department of Environmental Quality, Department of Natural Resources, etc.), neighborhood groups, and advocacy organizations to host joint events. These collaborations could amplify ARBC's message and connect with a broader network of residents to further encourage project support.

COMMUNITY-DRIVEN FLOOD RISK MAPPING AND PLANNING

- Master Plan Data Viewer Access: ARBC can promote a Master Plan Data Viewer and support community-led training on how to use this tool. By facilitating sessions on how to access and interpret flood risk data, ARBC can empower individuals to better understand how they may be affected by future floods and what actions they can take to protect themselves.
- Flood Risk Reduction and Preparedness: Promote floodplain management policies and providing resources on how residents can protect their properties, such as through elevation, flood-proofing, or relocating from high-risk areas. These efforts will increase community awareness of risks and help individuals take proactive steps in floodplain management.

ANNUAL CONFERENCES AND PUBLIC EVENTS

- Annual Community Conferences: ARBC already holds monthly public meetings where residents can learn about ongoing projects and provide feedback. ARBC intends to organize/host an annual conference with each parish within its jurisdiction to discuss needs, issues, and goals regarding floodplain management. This event would feature experts, community leaders, and residents discussing progress, challenges, and opportunities in implementing the Master Plan. This event can help parish leaders relay the message to the communities and can help encourage residents support for implementation.
- Public Exhibits and Fairs: Participate in or sponsor local environmental fairs, community expos, or town hall-style events during Flood Awareness Month/Week to engage with the public. These events can feature interactive exhibits, information about flood risk, and resources for improving flood resilience.

FIGURE 4-17: CENTRAL WEST REGION OPEN HOUSE (PHOTO SOURCE: ARBC)

COLLABORATION WITH LOCAL BUSINESSES

- Business Engagement: Engage local businesses in discussions about flood risk reduction and how they can play a role in implementing the Master Plan's strategies. This can include providing businesses with resources on how to protect their properties and become more resilient to floods, as well as encouraging them to participate in local conservation efforts.

COLLABORATION WITH LOCAL GOVERNMENTS

- Codes and Ordinances: ARBC can continue to communicate with local governments about codes and ordinances and collaborate with authorities to integrate the plan's recommendations into existing regulatory frameworks. This can involve updating zoning laws, building codes, and environmental regulations to align with the Master Plan's goals, ensuring sustainable development and effective resource management. ARBC can also provide ongoing guidance, technical support, and monitoring to help local governments enforce these updated codes and ordinances, maintaining consistency with the vision set forth in the Master Plan.

PROPOSED PROJECT TRANSPARENCY

- Project Updates: To ensure transparency and keep the public informed about the progress and schedule of proposed projects, ARBC can implement regular communication strategies such as public meetings, online updates, and project dashboards. By providing detailed information on project timelines, milestones, and potential impacts, ARBC can foster public trust and encourage community involvement. Creating accessible channels for public feedback and questions will help ensure that stakeholders remain engaged throughout the project life-cycle.

The Master Plan provides a road-map for a more resilient future, and ARBC's efforts will ensure that these solutions are realized at the community level. ARBC is well-positioned to guide local communities in its implementation. By continuing to use these various methods, ARBC can ensure that the community remains informed, engaged, and empowered to take action. This ongoing communication between ARBC and the community will be crucial in successfully implementing the plan's recommendations and building a more resilient Amite River Basin.

4.7 GRAVEL PIT RESTORATION HIGH POTENTIAL SITES

Restoration of the disused gravel pits has the potential to restore and enhance many of the Amite River's natural floodplain and ecological functions. Section 3.6 summarized the gravel pit restoration project evaluation process for abandoned pits. This section identifies the top ranked sites in response to Section 3.6 findings.

Gravel Pit Restoration Prioritization

Based on four potential factors identified as benefits/potential for restoration, the gravel pits have been ranked to determine several priority locations. Restoration, flood control, and sediment sink potential were the main factors that contributed to the ranking, as almost all the gravel pits have the potential to be used for recreation purposes. Gravel pits number 17, 18, and 20 are top candidates to pursue with regards to restoration, flood control, and sediment sink potential, with one of those sites (20) also meeting the criteria for recreation. Table 4-9 highlights how each of the recommended sites falls under each identified benefit/potential used for the rankings. ARBC will further investigate potential partnerships or champions to further the implementation of restoration activities for these sites. This could include partnering with agencies including DEQ.

Sites 17, 18, and 20 represent the highest potential sites for ARBC to further pursue with regards to restoration, flood control, and sediment sink potential, with one of those sites (20) also demonstrating strong potential for recreational opportunities. ARBC will continue to look for partnerships to advise and potentiality implement restoration activities on these sites.

TABLE 4-9: TOP SITES FOR SAND AND GRAVEL PIT RESTORATION POTENTIAL EVALUATION

Site	Restoration Potential	Flood Control	Recreation	Sediment Sink	Ranking
17	✓	✓		✓	High
18	✓✓			✓	High
20	✓	✓	✓	✓✓	High

Other sites that ranked highly for recreation can be restored/utilized predominantly for recreation purposes. The classifications made in Section 3.6 were made based on quantitative and qualitative measurements using readily available data such as LiDAR and Imagery. Further modeling would be necessary to determine the actual flood control, sediment sink, and restoration benefits.

Recreation Opportunity Prioritization

While recreation is not a mission of the ARBC, there are several sites that present opportunities to make the Amite River and adjacent areas more accessible to the public through the creation of parks. Additionally, parks offer an opportunity to conserve and enhance the basins natural resources. Therefore, the ARBC will share these findings with other agencies and seek potential partners or leaders for these projects. Partners may include:

- Louisiana State Parks
- Local community Parks and Recreation Departments
- BREC
- Public-Private partnerships
- Louisiana Department of Wildlife and Fisheries

Identified sites with recreation potential include Sites 3, 6, 13, and 15. These sites were selected based on considerations such as the location of the sites, as well as the conditions of the sites.

CHAPTER 5

MASTER PLAN IMPLEMENTATION

This chapter focuses on both the short- and long-term implementation of the 2025 Master Plan as a regional approach by maximizing funding opportunities and sequencing projects to ensure improved resiliency.

MASTER PLAN PROCESS/ OVERVIEW | UNDERSTAND | PREDICT AND EVALUATE | TAKE ACTION | **MASTER PLAN IMPLEMENTATION**

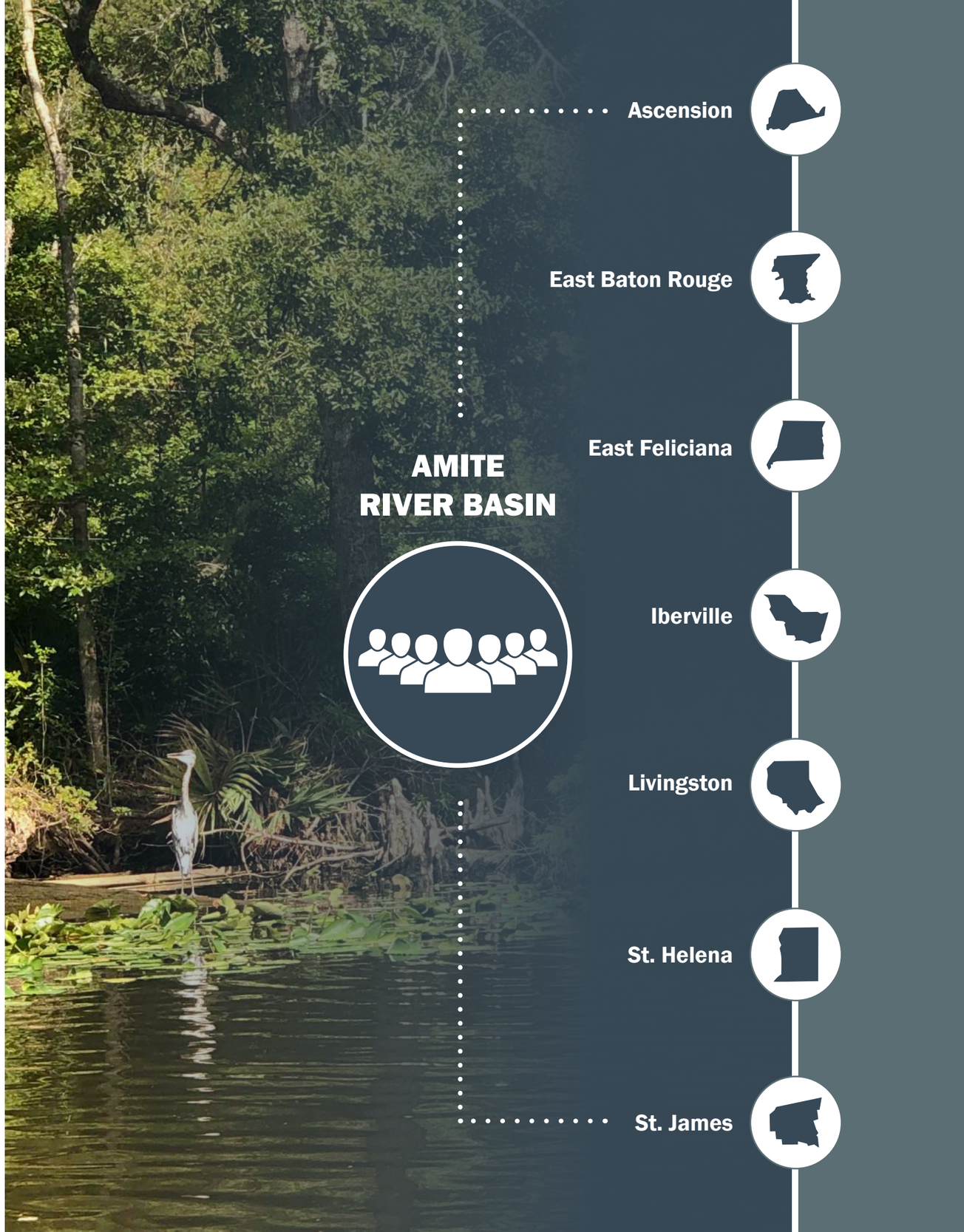
PHOTO SOURCE: ARBC

5.1 IMPLEMENTING THE PLAN

The ARBC Master Plan is a comprehensive, regional plan to lay out the road map towards efficiently managing the entire watershed as a single system to reduce flood risk, improve resilience and protect the natural resources within the basin. This represents the first time all seven parishes have been directly represented by the Board of Commissioners through their presidents or designees, supplemented by at-large appointees, coming together with shared goals. This regional approach ensures that any projects or programs developed within the basin will have no adverse impacts on surrounding land and residents. As detailed in Section 3.1, without adjusting for inflation, flood losses within the ARBC geographic area are expected to increase by nearly 25% by the year 2050 in today's dollars. When factoring for inflation, this increases to a staggering 260%.

The Master Plan includes major long-term projects for flood risk reduction, further supplemented by near-term projects of more localized nature that will have transformational flood risk reduction implications within the basin and demonstrate the potential to yield over $280M in average annual losses

FIGURE 5-1: IMPLEMENTATION OF THE ARBC MASTER PLAN FLOOD REDUCTION PROJECTS WILL SIGNIFICANTLY REDUCE THE FREQUENCY AND SEVERITY OF FLOODING WITHIN THE BASIN. (PHOTO SOURCE: BING; PETTY OFFICER 3RD CLASS BRANDON GILES)



FLOOD RISK REDUCTION PROJECTS

2025

Average Annual Direct Flood Losses

$210M[1]

2050

Average Annual Direct Flood Losses

WITH NO ACTION

$550M[2]

(260% INCREASE)

2050

Average Annual Direct Flood Losses

WITH IMPLEMENTATION OF THE MASTER PLAN

$264M[3]

(52% REDUCTION)

A 52% REDUCTION IN DIRECT FLOOD LOSSES CAN BE REALIZED BY IMPLEMENTATION OF THE MASTER PLAN PROJECTS

VALUES

- Reduce Flood Risk
- Improve Resilience
- Protect Natural Resources

1. Based on 2025-dollar values utilizing the LWI HEC-HMS, HEC-RAS and HEC-FIA models for baseline conditions
2. Based on 2050-dollar values utilizing the LWI HEC-HMS. HEC-RAS and HEC-FIA models modified by ARBC to reflect 2050 no-action conditions, factoring sea level rise, urbanization, and rainfall projections (as documented in Section 3.1) while adjusting for an average 3% annual inflation rate projected between 2025 and 2050 (Source: https://www.officialdata.org/us/inflation/)
3. Based on 2050-dollar values utilizing the LWI HEC-HMS. HEC-RAS and HEC-FIA models modified by ARBC to reflect 2050 conditions with implementation of the Master Plan projects.

Through a comprehensive evaluation of the existing flood risk, community needs, and available partnerships, this Master Plan identifies solutions and best practices to ultimately increase the resiliency of ARBC communities. These include 13 physical flood risk reduction projects throughout the basin as well as 26 actions intended to advance the overall flood risk identification, awareness, and planning for improved community resiliency. Implementation of these projects aim to:

1

See Section 4.2

PROGRAM RECOMMENDATIONS
National Flood Insurance Program

1. Improve the accuracy of FEMA flood maps

The rising cost of flood insurance within the Amite River Basin is a serious financial burden for its residents. Through this Master Plan, ARBC has determined that the average age of the underlying FEMA hydrologic and hydraulic predictive models used to define the SFHA on the FEMA FIRM's is over 33 years old. Additionally, many of these models were developed using outdated, low resolution topographic data and traditional 1D modeling techniques which are not well suited to many of the most populated areas of the basin.

ARBC is committed to working with DOTD, FEMA and local communities as an advocate for its residents to ensure FEMA FISs and FIRMs are updated to leverage to the fullest extents of the efforts of LWI, ARBC and their partners with the goals of potentially providing relief to over 30,000 structures within the basin currently within the FEMA SFHA and depicting a more accurate representation of flood risk with the potential to cumulatively save these **impacted residents over $25M dollars every year on flood insurance premiums.**

2

See Section 4.2

PROGRAM RECOMMENDATIONS
Community Rating Systems

2. Encourage participation and support ARBC communities in the CRS program

ARBC communities participating in CRS are estimated to save their residents nearly $11M annually in flood insurance costs. While thirteen ARBC communities currently do not participate in CRS, there is significant opportunities for communities to achieve flood insurance rate reduction for their residents, or for communities that do already participate to increase their current insurance rate reduction. ARBC has strategically aligned the Master Plan and its deliverables with CRS activity requirements to lessen the burden to ARBC communities when maintaining and improving their CRS rating. This includes making products from the Master Plan available to communities to leverage when managing floodplains including future conditions floodplain delineations, datasets to support flood forecasting and datasets to support the development of flood response plans that can all support the award of critical CRS activity points.

3

See Section 4.2

POLICIES/ REGULATIONS

3. Encourage ARBC communities to adopt more consistent ordinances and codes

Local ordinance and code requirements for ARBC communities vary considerably providing varying levels of flood risk resiliency for communities within the ABRC geographic boundary. Recommendations of this Master Plan seek to encourage greater consistency and higher standards in order to reduce flood risk, protect public health and safety, and ensure the long-term viability of the region's natural and built environments. ARBC's recommendations to communities include higher standards related to floodplain preservation, development, building and infrastructure, and drainage and erosion control with the goal of increasing basin-wide long term community resiliency. ARBC is a resource for communities as they look to update their ordinances and adopt higher standards.

3

See Section 4.2

PROGRAM RECOMMENDATIONS
Voluntary Elevation and Acquisition/ Relocation Programs

4. Implement programs that reduce flood risk

Beyond just physical projects to reduce flood risk, communities can implement other programs including elevation, relocation and voluntary acquisition projects to mitigate risks to structures and assets. Implementing these programs can be cost effective measures in reducing flood risk, and this Master Plan can be used by communities to streamline identification of structures that would achieve the greatest flood risk reduction benefits by participating in these voluntary programs, as well as be a resource for communities to develop a funding roadmap for implementation.

5

See Section 4.4

MAINTENANCE

5. Implement robust operation and maintenance programs

The Master Plan identifies the need for periodic maintenance of waterways and infrastructure and makes recommendations pertaining to the need for updated operations and maintenance manuals and periodic maintenance. ARBC is committed to exploring funding opportunities and partnerships to continue to support the preservation of the ecological health and functionality of the watershed while ensuring reliable flood protection for surrounding communities.

6

See Section 4.5

CAPACITY BUILDING

6. Facilitate capacity building for the local community of practice and public

The Master Plan identified the need to expand the community of practice in floodplain management, and strengthen the skills, abilities, and resources that local communities, agencies, and all stakeholders within the ARBC need to implement this Master Plan. ARBC is committed to working with other agencies including LWI to facilitate capacity building to achieve the common goal of mitigating flood risk, increasing resilience and preserving the natural resources of the Amite River Basin. This may include:

- Hands on floodplain management training for local officials
- Advance technical training for local engineers and geospatial professionals on the use of predictive models
- Promotion of flood safety awareness and preparedness

7

See Section 4.5

CAPACITY BUILDING
Emergency Planning and Response

Simplified Flood Forecasting

Advanced Real-Time Forecasting

7. Provide tools and datasets to support emergency preparedness and response

Through the efforts LWI and other partners who have supported development of this Master Plan, advanced technical data is now available to support emergency preparedness and response. This Master Plan provides several proposed applications of the technical data to provide the ARBC communities with tools and data to rapidly perform informed emergency planning and response to improve public safety and resilience including:

- Advance flood risk information including depth, velocity and associated danger to support emergency planning
- Advanced datasets to support simplified real time flood forecasting
- Outlining the long-term plan for real time flood forecasting and warnings

8

See Section 2.8

FUNDING SCENARIOS

8. Funding

ARBC will seek to maximize funding opportunities to implement the Master Plan projects both as a project sponsor and as an advocate for ARBC communities implementing projects aligning with the goals of this Master Plan. This will include maximizing both state and federal grant opportunities to ensure the benefits of the Master Plan are realized.

9

See Section 4.1

PROGRAM IMPLEMENTATION

9. Reduce flood risk through physical projects

As flood events become more frequent and extreme, combined with increased population growth and development, it is critical that communities work together to implement physical flood risk reduction projects both on a large scale, basin-wide approach, as well as smaller localized drainage improvements. This Master Plan identifies the critical sequencing considerations that communities should consider as physical flood risk reduction projects are implemented. ARBC is committed to facilitating coordination for both these long term and near term project implementations and assisting project partners acquire funding for implementation.

5.2 PROJECT COMMUNICATION AND MARKETING

Public awareness, perception and understanding of projects included within this Master Plan varies widely. While major projects under construction including the Comite River Diversion Canal and the Laurel Ridge Levee Extension are well known to the public, other projects contained within this Master Plan and the associated impacts may have less public visibility. Further, media coverage of concept projects within the basin can often be misleading and at times erroneous while primarily focusing on negative aspects of a project without adequately communicating the project benefits.

During the September 19, 2024, ARBC Master Plan Committee Project workshop, committee members and the Master Plan consultant team reviewed each project concept and collaboratively rated the public perception of projects on a scale of 0 through 10, whereby 10 represented strong public knowledge and support of a project, 5 represented projects generally unknown to the public and 0 represented strong public disapproval and objection to projects.

Table 5-1: summarizes the public perception ratings collaboratively determined by the ARBC Master Plan committee and consultant team for each project included within this Master Plan. It should be noted that the perception score does not reflect on the project's effectiveness or prioritization, but rather helps ARBC identify stakeholder engagement and communications needs when implementing projects.

TABLE 5-1: PUBLIC PERCEPTION RATINGS FOR MASTER PLAN PROJECTS

Project	Public Perception Ratings (1 – 10)	Notes
Bayou Manchac Channel Improvements and Ward Creek Realignment	10	Public are generally aware of this project and show strong support.
Lower Amite River Sediment Removal	10	Public are generally aware of this project and show strong support.
New River Stormwater Management Pump Station	7	Generally strong support, although some have expressed concern with reliance on pumps
West Shore Connector Levee	10	Public are generally aware of this project and show strong support.
Upstream Detention or Retention Area 1 (Baywood)	5	Public is generally unaware of this project concept.
Major Upstream Detention or Retention Area 2 (Darlington)	2	Strong public opposition in vicinity of reservoir. Public is generally unaware of major project benefits within impact area.
Major Upstream Detention or Retention Area 3 (Highway 432)	5	Public is generally unaware of this project concept.
Amite River Diversion Canal Weir Rehabilitation	7	Public are generally aware of this project and show support while perceiving weir as problematic to flooding.
Ascension (Sorrento) Storm Surge	7	Public is generally aware of this project concept and support it.
Bayou Manchac Backflow Prevention Gate	5	Public is generally unaware of this project concept.
Bayou Manchac Floodplain Preservation	5	Public is generally unaware of this project concept.
Louisiana Highway 22 Gapping	7	Public is generally aware of this project concept and support it.
Marvin Braud Pump Station/ Levee Elevation Upgrades	7	Public is generally aware of this project concept and support it.
Upper Amite River Flood Risk Reduction and Restoration	5	Public is generally unaware of this project concept.
Willow Glen Pump Station	5	Public is generally unaware of this project concept.

Communication Collateral

Materials developed to facilitate communication and education of projects need to be varied and easy to understand for the greater public. Gaining public support for the Master Plan and individual projects will be crucial to meeting the goals of the ARBC. Where public perception for projects contained within this Master Plan is generally low to moderate, targeted outreach campaigns will be needed to change public perception and garner support for project implementation.

To enable the public to develop informed opinions, stakeholder communications by ARBC will become an integral component of the Master Plan and project implementation, providing unbiased communications. The key to unbiased communication will be clearly presenting the positive impacts, negative impacts and mitigating actions and the relative order of magnitude of each:

- Positive Impacts: Who will be impacted, where and how big will these impacts be
- Negative impacts: Who will be impacted, where and how big will these impacts be
- Mitigating Actions: Where and how will negative impacts be mitigated

Using common characteristics based on impacts enables people to compare each project to one another. This will allow members of the public to make their own decisions on selecting a project without having to understand technical engineering data. It should be noted that the benefits of projects may go well beyond the direct flood impacts. Several projects have the potential to create recreational opportunities as well as environmental restoration, improving the quality of life for those within the Amite River Basin.

These characteristics are included on each project sheets within Chapter 3: Predict and Evaluate. These sheets were created in such a way that they can be pulled from the report and easily reproduced as a graphic or PDF one-pager. These project sheets also enable easy communication to the media and other outlets as described below. Each sheet contains other basic pieces of information that are standardized for all projects, again, so the user can read and compare each project for themselves.

For prominent projects that require additional communications, graphic animations and videos of project construction schematics and benefits can be created. This could include a fly through of the design of the project structure. Benefits of the project that include the risk assessment data could be included to show a reduction in flood risk or economic losses.

Communications Method

The ARBC recognizes that public and political support and buy in is critical to the smooth implementation of the Master Plan and projects. Traditional media including local TV channels and newspapers supplemented by social media will be a powerful approach to communicating the actions of the Master Plan and individual projects, ensuring a wide array of demographics throughout the ARBC geographic area are reached. Multiple tactics will be utilized to inform the project stakeholders and public about projects and solicit feedback. These include utilizing the following:

ARBC social media accounts on Facebook, LinkedIn and other.

Emailing project sheets to our stakeholder list of constituents that includes NGOs and elected officials.

Publishing of information regarding projects and the Master Plan in local newspapers including The Advocate, The Weekly Citizen, Livingston Parish News, and other local editions.

Posting project information and updates on the ARBC website.

Broadcast media including infomercials on local stations including WAFB, WBRZ, Ascension 21, and WGNO.

In-person meetings with the public.

5.3 PRESERVING THE INVESTMENT THROUGH ASSET MANAGEMENT

A Digital Twin Approach for the Master Plan Implementation

NEED

ARBC, in coordination with other agencies including OCD through the LWI program, DOTD, PLD and USACE, has made significant investments in technical data collection, predictive modeling, and planning which have supported the development of this Master Plan. Collectively over $10 million in research and data-driven initiatives have shaped the development of this Master Plan. Further contributions by municipalities within the watershed magnify this amount to well over $30 million in current and prior works.

The Master Plan is included on the ARBC website for easy public viewing and download (Figure 5-2). Digital data used for this Master Plan is preserved by ARBC in a digital appendix (Figure 5-3) which includes exceptionally large predictive model files, survey data, GIS data, reports, and Master Plan document files. Key documents are served on the ARBC website for download, while larger data files may be requested directly from ARBC staff.

EXISTING MASTER PLAN ASSET MANAGEMENT FRAMEWORK

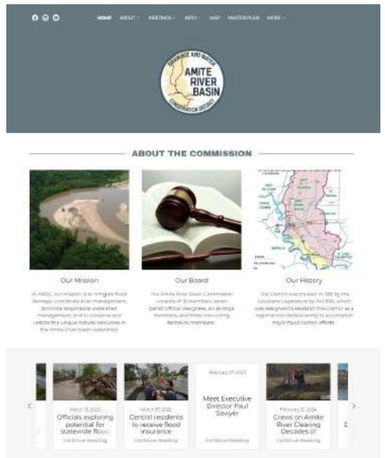


FIGURE 5-2: KEY MASTER PLAN DOCUMENTS AVAILABLE FROM THE MASTER PLAN SECTION OF THE ARBC WEBSITE

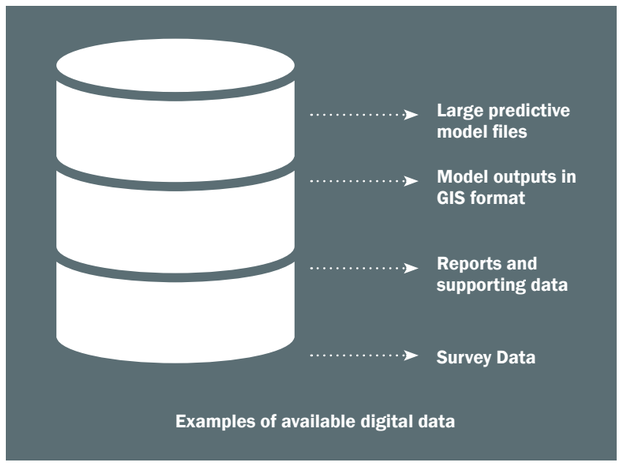


FIGURE 5-3: DIGITAL DATA ASSOCIATED WITH MASTER PLAN IS HELD BY ARBC STAFF AND IS AVAILABLE BY REQUEST

However, data collection alone does not solve problems. The true value lies in preserving, managing, and utilizing this data to inform future decisions—ensuring that floodplain management, mitigation strategies and master planning evolve rather than restart with each new study. The data must be accessible, actionable, and structured in a way that benefits technical experts, planners, policymakers, emergency responders, and the general public.

Managing the ARBC Master Plan Data

To achieve this, ARBC will seek funding to establish a Digital Twin—a next-generation asset management and predictive modeling system designed to preserve past investments, enhance future planning, and optimize flood protection strategies. By integrating AI into the Digital Twin, ARBC can incrementally unlock even greater potential, enabling advanced data integration, predictive analytics, and user-friendly interactions that make the system more dynamic, accurate, and accessible to multiple tiers of users.

Implementing a Digital Twin

A Digital Twin is a **living, interactive representation of the Amite River Basin**, integrating real-time data, predictive modeling, and geospatial analytics. It bridges the gap between complex technical datasets and practical decision-making, ensuring that historical and newly acquired data is structured, accessible, and continuously utilized.

The Digital Twin will serve as a **system of systems,** incorporating GIS as a foundational component but offering the ability to integrate all known datasets, imagery, Internet of Things (IoT) sensors, digital line-work, and scanned content. This integration allows for the seamless overlay of various data types, including real-time stream data from the USGS and other sources, live weather feeds, and rainfall model runs. By aggregating all officially known data, the Digital Twin will provide a **comprehensive envelope of risk measures and predictive scenarios,** enabling stakeholders to make informed decisions based on the most current and accurate information available.

AI can enhance this process by automating data cleaning and structuring, fusing real-time data streams with historical datasets, and linking related information through semantic analysis. For example, Machine Learning (ML) algorithms can refine hydrologic and hydraulic model returns within the digital twin through natural language interactions and consider real-time data. AI can also rapidly generate hypothetical flood scenarios, allowing stakeholders to explore “what-if” situations and identify optimal mitigation strategies.

Key Benefits of A Digital Twin

- **Preserves Investment in Research & Data** – Ensures technical reports, spatial datasets, and models remain available for use and refinement. AI can further preserve this investment by enabling self-learning models that continuously improve their predictive accuracy as new data becomes available.
- **Reduces Duplication of Efforts** – Local governments, agencies, and researchers can access existing data rather than recreating models, saving time and funding for direct flood mitigation projects. AI can streamline this process by automating data integration and harmonization across various sources.
- **Supports Informed Decision-Making** – Allows policymakers, emergency responders, and engineers to simulate flood scenarios, assess risks, and plan effectively. AI-powered optimization algorithms can recommend the best flood mitigation strategies by analyzing multiple variables, such as cost, effectiveness, and environmental impact.
- **Improves Public Accessibility & Transparency** – Provides a user-friendly interface where both technical users and the public can visualize data, fostering greater community engagement and understanding. AI-driven Natural Language Processing (NLP) can enable non-technical stakeholders to interact with the Digital Twin using plain language queries, while personalized risk communication tools can tailor flood risk information to individual users.
- **Enhances Emergency Preparedness** – Helps predict impacts in real-time by integrating NOAA/NWS Quantitative Precipitation Forecasts (QPF) and existing storm models. AI can enhance early warning systems by analyzing real-time data feeds and predicting flood impacts hours or even days in advance as further demonstrated in Section 4.6 Simplified Flood Forecasting.

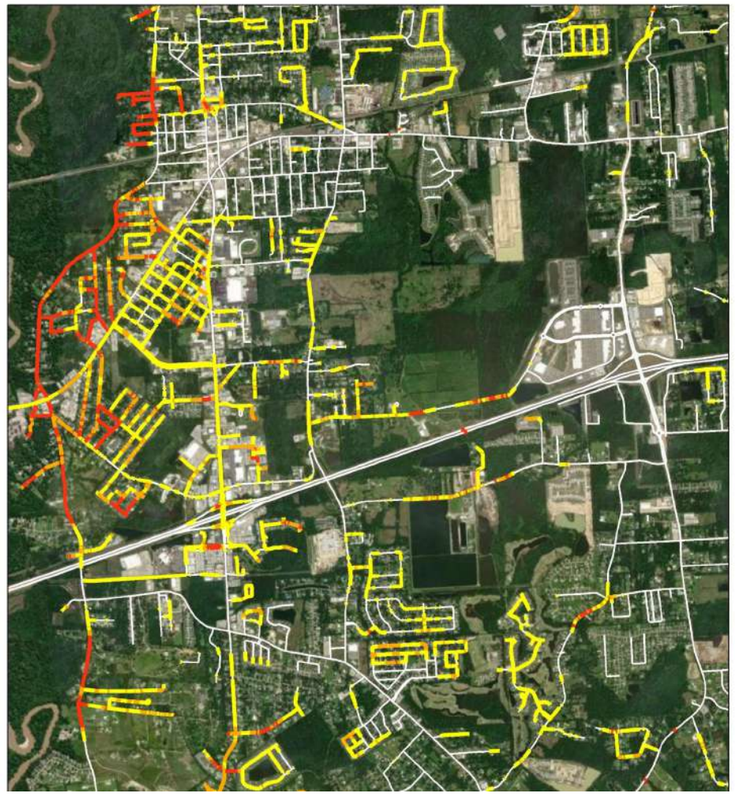


FIGURE 5-4: MODEL INPUTS INCLUDING DEPTH AND VELOCITY CAN BE USED TO HIGHLIGHT HAZARDOUS ROADS CONDITIONS FOR A WIDE RANGE OF POTENTIAL STORM EVENTS SUPPORTING IDENTIFYING INGRESS AND EGRESS HAZARDS FOR EMERGENCY PREPAREDNESS AND RESPONSE.

Data Management & Accessibility

A robust Digital Twin will serve as a centralized hub for all collected and future data, making it readily accessible for ARBC stakeholders and partner agencies. This approach can eliminate reliance on specialized software or high-level expertise, ensuring that even local governments with limited resources can benefit. Examples can include making complex hydraulic modeling results accessible through a GIS interface without the need for complex engineering software.

AI integration with the digital twin can play a critical role in managing and structuring this data. For example, AI algorithms can pre-process raw data, removing inconsistencies and filling gaps, while semantic linking can automatically connect related datasets. AI can also generate dynamic, user-friendly dashboards tailored to different stakeholders, from technical experts to the general public.

What is Included in a Digital Twin

The digital system can house:

- **Survey Data** – Historical and newly collected datasets for terrain, structures, and waterways.
- **Predictive Models** – Hydrologic, hydraulic, sediment transport, and consequence assessment models. AI can enhance these models by incorporating real-time data and learning from historical events, improving their accuracy and reliability.
- **Geospatial Flood Risk Information** – Including probabilistic floodplain boundaries, depth grids, velocity maps, and hypothetical storm event simulations. AI can generate thousands of flood scenarios, enabling stakeholders to explore a wide range of potential outcomes.
- **Storm Event Simulations** – Ability to overlay forecasted rainfall (e.g., scenarios such as 20 inches of precipitation forecast over the basin within the next 3-days) onto existing models. AI can integrate real-time weather forecasts with historical data to provide more accurate and comprehensive risk assessments.
- **Photo Documentation** – Geo-located images and sediment sample data linked to spatial maps.
- **Reports & Planning Documents** – All technical reports, Master Plan supplements, and historical studies. AI can automate the generation of reports, summarizing key findings and saving time for technical experts.

ACCESSIBILITY FOR ALL USERS

Not all stakeholders are advanced users of predictive models. However, local agencies, emergency responders, and policymakers often have access to capable GIS users—or at a minimum are familiar with platforms like Google Earth which can significantly reduce the learning curve for other online GIS platforms.

By structuring the system with tiered accessibility, the right data reaches the right users:

- **General Public** – Simplified visualization tools for community engagement and flood awareness. AI-driven NLP and personalized risk communication tools can make the system more accessible and engaging for the public.
- **Technical Experts** – Direct access to raw datasets, predictive models, and analytical tools. AI can provide advanced analytical capabilities, such as anomaly detection and self-learning models, to support their work.
- **Planners & Policy Makers** – Interactive dashboards for scenario analysis and decision support. AI-powered optimization algorithms can help them identify the best flood mitigation strategies.
- **Emergency Responders & Public Officials** – Real-time data on flood risk, infrastructure vulnerabilities, and hazard zones. AI can enhance early warning systems, increase situational awareness, and optimize resource allocation during emergencies.

Built-in intelligence to on-the-fly create interactive maps from NWS realtime forecasts to support emergency response officials

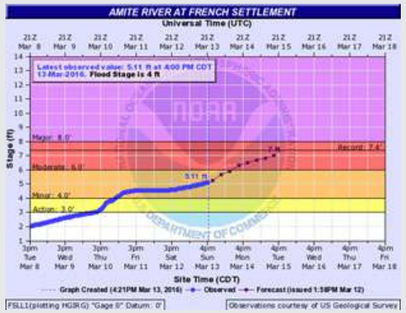


FIGURE 5-5: NWS REAL-TIME FORECASTS

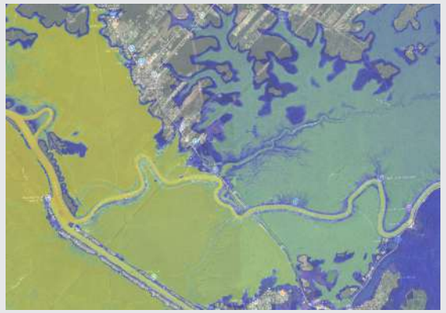


FIGURE 5-6: DIGITAL TWIN REAL-TIME INUNDATION MAPPING

Interactive Experience with Natural Language Models

Advances in NLMs should allow for an interactive experience with the Digital Twin. This will enable users to query the system using natural language, making it easier for non-technical stakeholders to access complex data and run expectation scenarios. For example, a state climatologist could input logical information about anticipated rainfall events, and the Digital Twin would integrate this data with real-time information to provide a more accurate and comprehensive risk assessment.

AI-powered NLP can take this a step further by enabling plain language queries, interactive dashboards, and automated reporting. For instance, a policymaker could ask, “What areas are at risk if Denham Springs receives 12 inches of rain?” and receive an instant, understandable response.

Funding & Future Development

Developing and maintaining a Digital Twin for ARBC requires funding. This initiative aligns perfectly with federal and state grant opportunities, particularly those related to flood risk reduction, floodplain management, and emergency preparedness.

Potential funding sources include:

- **Building Resilient Infrastructure and Communities (BRIC) Program** – FEMA-funded program designed to enhance disaster resilience through data-driven planning.
- **FEMA Flood Mitigation Assistance (FMA)** – Supports local floodplain management tools and risk assessments.
- **Louisiana Watershed Initiative (LWI)** – Provides funding for collaborative, data-driven flood risk reduction strategies.
- **Infrastructure Investment and Jobs Act (IIJA)** – Federal funds allocated for digital infrastructure and climate resilience.

Public-Private Partnerships – Engaging universities, research institutions, and private firms to expand data analytics and technological capabilities.

A Digital Twin would be a scalable virtual representation of the Amite River Basin, synchronized with static and dynamic data, making it more accessible to facilitate collaboration between ARBC and its stakeholders.

DIGITAL TWIN

PHYSICAL ASSETS

(PHOTO SOURCE: ARBC)

(PHOTO SOURCE: GOOGLE EARTH)

(PHOTO SOURCE: DOTD)

DIGITAL ASSETS

REPORTS

- Master Plan
- Supporting and Original Documents
- Historic Documents

PREDICTIVE MODELS

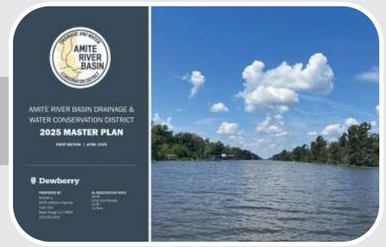
- HEC-HMS Hydrolic Models
- HEC-RAS Hydraulic Models
  - Flood Models
  - HEC-RAS Sediment Models
  - Project Specific Models
- HEC-FIA Consequence Models

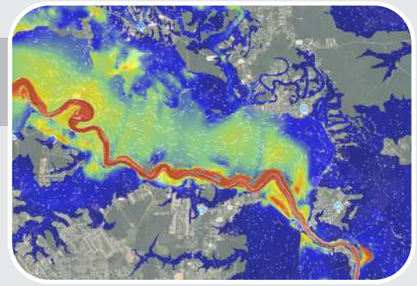
GIS AND OTHER TECHNICAL DATA

- Model Outputs
  - Inundations Layers
  - Detailed Model Outputs
  - Processed Layers
- Dated Survey
  - Bridge Scans
- Channel Survey
  - LiDAR
  - Bathymetry
- Sediment samples and lab reports
- Dated and Geolocated Field Photographs
- As Built/ Record Drawings

INFORMATION

- IoT Feeds
- USGS Gages
- NWS Forecasts
- Local Monitoring and SCADA

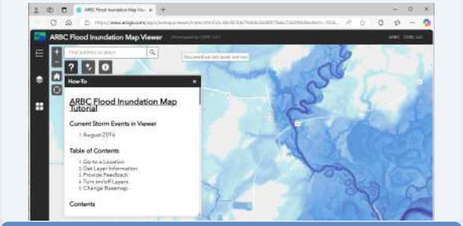




END USER INTERFACES AND INTERACTIVE TOOLS

TIER 1

- Flood Risk Information including inundations viewable within online GIS platform with public access for visualization



TIER 2

- Flood Risk Information GIS output and models available for download for registered Tier 2 users

TIER 3

- Advanced functionality including planning tools and flood forecasting

Input from local meteorologists and hydologists

RealTime flood forecasting automated processing and mapping

IoT Feeds: NWS, USGS, and local river gage, precipitation, and SCADA data

→

ENHANCED:

Situational awareness

Decision support

Risk communication

Tools for collaboration

FIGURE 5-7: DIGITAL TWIN

5.4 MASTER PLAN UPDATES

In accordance with the requirements of HB 686 of the 2022 regular legislative session, as promulgated by Act 490, this initial 2025 Master Plan was submitted for approval by the Senate and House Committees on Transportation, Highways and Public Works. Act 490 requirements stipulated that the ARBC shall review, revise, and amend this plan every six years thereafter.

Additionally, the board is required to develop annual plans for watershed management which lay out the critical actions for the coming year. Each annual plan shall include, at minimum, a three-year projection of funding for projects and programs, including funding sources.

Successful implementation and long-term success will require this Master Plan to be a nimble living document, continually adapting to changing conditions, funding, regulatory requirements, and local needs. Key to this will be the preservation of the investment made by ARBC in the development of this Master Plan and making the supporting technical data immediately available to stakeholders to support floodplain management, project implementation and the overall goals of the ARBC. Further, preservation of this data will support the 2031 and subsequent Master Plan updates, reducing duplication of effort and infusing greater consistency.

Section 5.3 further discussed the need for a digital library, critical to preserving documentation, data, predictive models, and GIS data developed in support of this Master Plan ensuring they are readily accessible to and used by local communities, planners, floodplain managers, scientists, and engineers to the fullest extent.

To ensure that the 2031 Master Plan update is effective and fully engages stakeholders, a three-year update period is planned which continuously engages stakeholders and uses the best available science and engineering.

May 2025

2025 Master Plan Submitted to Senate and House Committees on Transportation, Highways and Public Works

April 2027

Secure Dedicated Funding for 2031 Master Plan Update

April 2028

2031 Master Plan Update Planning

- Establish Master Plan committee and facilitate planning workshop
  - Review of 2025 Master Plan and annual plans including best practices, stakeholders, partners, and lessons learned
  - Review metrics used to evaluate projects in 2025 Master Plan and revise, as necessary, ensuring consensus among the members of the committee and board
  - Determination of general consultant qualification requirements and procurement strategy and form selection committee

July 2028

Procure Contractor for Master Plan Update

- Issue qualifications-based Request for Qualifications (RFQ) for professional services
- Evaluation of proposals by selection committee and ranking of consultant responses for contractor negotiations
  - Development of detailed scope of work, schedule, and fee for Master Plan update services. Award of consultant contract by October 1, 2028

October 2028

Procure Contractor for Master Plan Update

- Master Plan update kickoff with consultant and Master Plan committee
- Initial stakeholder engagement meetings to gather input by end of November 2028
- Agency coordination, data gap analysis and data collection
- Existing conditions evaluation including predictive modeling updates, existing projects and program assessment
- Identification of mitigation needs and concept projects
- Project Workshop #1 by end of March 2029
  - Review of existing conditions and concept projects (new and existing)
  - Selection of projects to move forward to evaluation
- Science based evaluation of projects by end of September 2029
- Project Workshop #2 by end of October 2029
  - Review of project results
  - Selection of projects for final inclusion in Master Plan recommendations
- Draft Master Plan presented to board by June 2030
- Draft Master Plan preview stakeholder engagement meetings to gather comments by October 2030
- Final Master Plan presented to Board by February 2031

April 2031

2031 Master Plan Update Delivery to Senate and House Committees on Transportation, Highways and Public Works

- Updated Master Plan Submitted to Senate and House Committees on Transportation, Highways and Public Works
- Final stakeholder engagement meetings to present final plan

CHAPTER 6

ACRONYMS
REFERENCES
ACKNOWLEDGMENTS

ACRONYMS

Acronym	Terms
ARBC	Amite River Basin Commission
ARBIC	Amite River Basin Interagency Committee
ARBNM	Amite River Basin Numerical Model
AI	Artificial Intelligence
ACER 11	Assistant Commissioner - Engineering and Research, Technical Memorandum 11
ASFPM	Association of State Floodplain Managers
BFE	Base Flood Elevation
BLE	Base Level Engineering
BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BBA18	Bipartisan Budget Act of 2018
BLH	Bottomland Hardwood
BRIC	Building Resilient Infrastructure and Communities
CPU	Central Processing Unit
CPU	Central Processing Unit

Acronym	Terms
CFM	Certified Finance Manager
CEO	Chief Executive Officer
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
CISA	Climate-Informed Science Approach
CPR	Coastal Protection & Restoration
CPRA	Coastal Protection and Restoration Authority
CWPPRA	Coastal Wetlands Planning Protection and Restoration Act
CZMA	Coastal Zone Management Act
CAV	Community Assistance Visit
CDBG-DR	Community Development Block Grant Disaster Recovery
CDBG-MIT	Community Development Block Grant Mitigation
CRS	Community Rating System
CDS	Congressionally Directed Spending

Acronym	Terms
CTP	Cooperating Technical Partner
CNMS	Coordinated Needs Management Strategy
DOTD	Department of Transportation and Development
DOA	Division of Administrations
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standard
FFE	Finished Floor Elevations
USFWS	Fish and Wildlife Service
HEC-FIA	Flood Impact Assessment
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FVA	Freeboard Value Approach
GIS	Geographic Information System

Acronym	Terms
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness
GPU	Graphics Processing Unit
GOMESA	Gulf of Mexico Energy and Security Act
HMGP	Hazard Mitigation Grant Program
HEC-RTS	HEC Real Time Simulation
HB	House Bill
HUD	Housing and Urban Development
HEC	Hydrologic Engineering Center
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
IPAC	Information for Planning and Consultation
IPAC	Information for Planning and Consultation
IoT	Internet of Things
LOMC	Letter of Map Change
LOMR	Letter of Map Revision

Acronym	Terms
LAMP	Levee Analysis and Mapping Procedures
LiDAR	Light Detection and Ranging
LiMWA	Limit of Moderate Wave Action
LA	Louisiana
LDEQ	Louisiana Department of Environmental Quality
LWI	Louisiana Watershed Initiative
LWA	Louisiana Waterworks Association
DWF	Louisiana Department of Wildlife and Fisheries
LFMA	Louisiana Floodplain Managers Association
ML	Machine Learning
MAP	Mapping Assessment and Planning
MSL	Mean Sea Level
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program

Acronym	Terms
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
NLP	Natural Language Processing
NRCS	Natural Resources Conservation Service
NBS	Nature-Based Solutions
NGO	Non-government Organization
NPS	Nonpoint Source
NAVD88	North American Vertical Datum of 1988
OCD	Office of Community Development
OCD-DRU	Office of Community Development - Disaster Recovery Unit
1D	One Dimensional
OSE	Other Social Effects
PMR	Physical Map Revision
PLD	Pontchartrain Levee District

Acronym	Terms
PDM	Pre-Disaster Mitigation
PROTECT	Promoting Resilient Operations for Transformative Efficient and Cost-Saving Transportation
PAGP	Public Assistance Grant Program
P3	Public -Private Partnerships
QL	Quality Level
QPE	Quantitative Precipitation Estimates
QPF	Quantitative Precipitation Forecasts
RLP	Repetitive Loss Property
RLF	Revolving Loan Fund
ROW	Right of Way
SLEEC	Spanish Lake Ecological Education Center
SFHA	Special Flood Hazard Area
SFC	Statewide Flood Control
TIF	Tax Income Financing
2D	Two Dimensional

Acronym	Terms
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WRDA	Water Resource Development Act
WSE	Water Surface Elevation
WSPRO	Water-Surface Profile computations
WPC	Weather Prediction Center
WP	With Project
WOP	Without Project
WSLP	West Shore Lake Pontchartrain
SLBSA	Spanish Lakes and Bluff Swamp Area
CLOMR	Conditional Letter of Map Revision
CRDC	Comite River Diversion Canal
ROM	Rough Order of Magnitude

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