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)

NET ECONOMIC LOSSES AVOIDED (100-YEAR FLOOD)

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 manmade 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 overbanks, 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 Diversion Weir. For smaller particles, such as silts and clays, major settlement occurs in the vicinity of the Amite River Diversion Weir and continues to deposit towards Lake Maurepas.

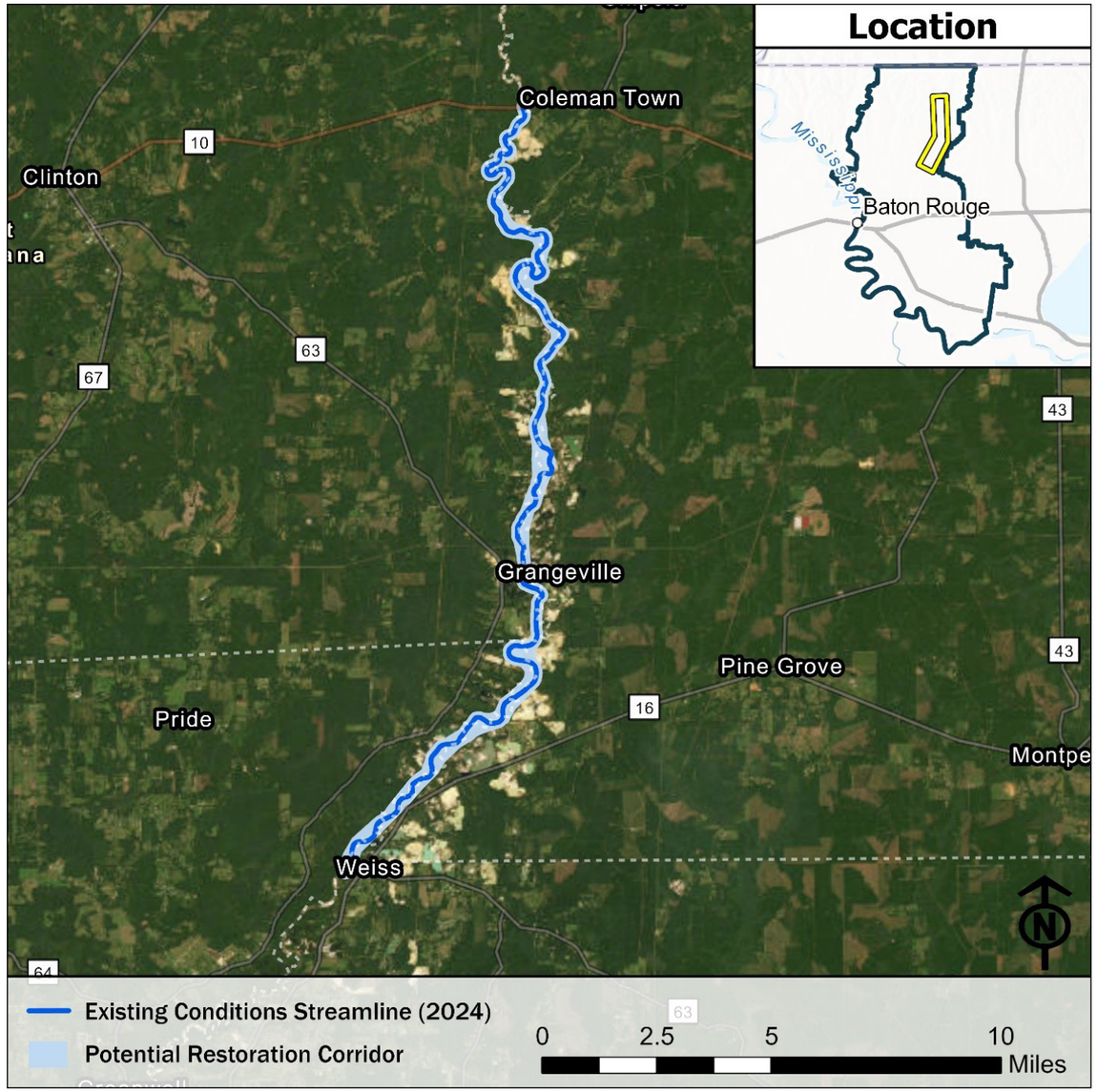
PROJECT SUMMARY

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 to 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 modelling 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.

Restoration efforts included 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 completed project include 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



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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 hydrographs 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% and 1% AEP 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

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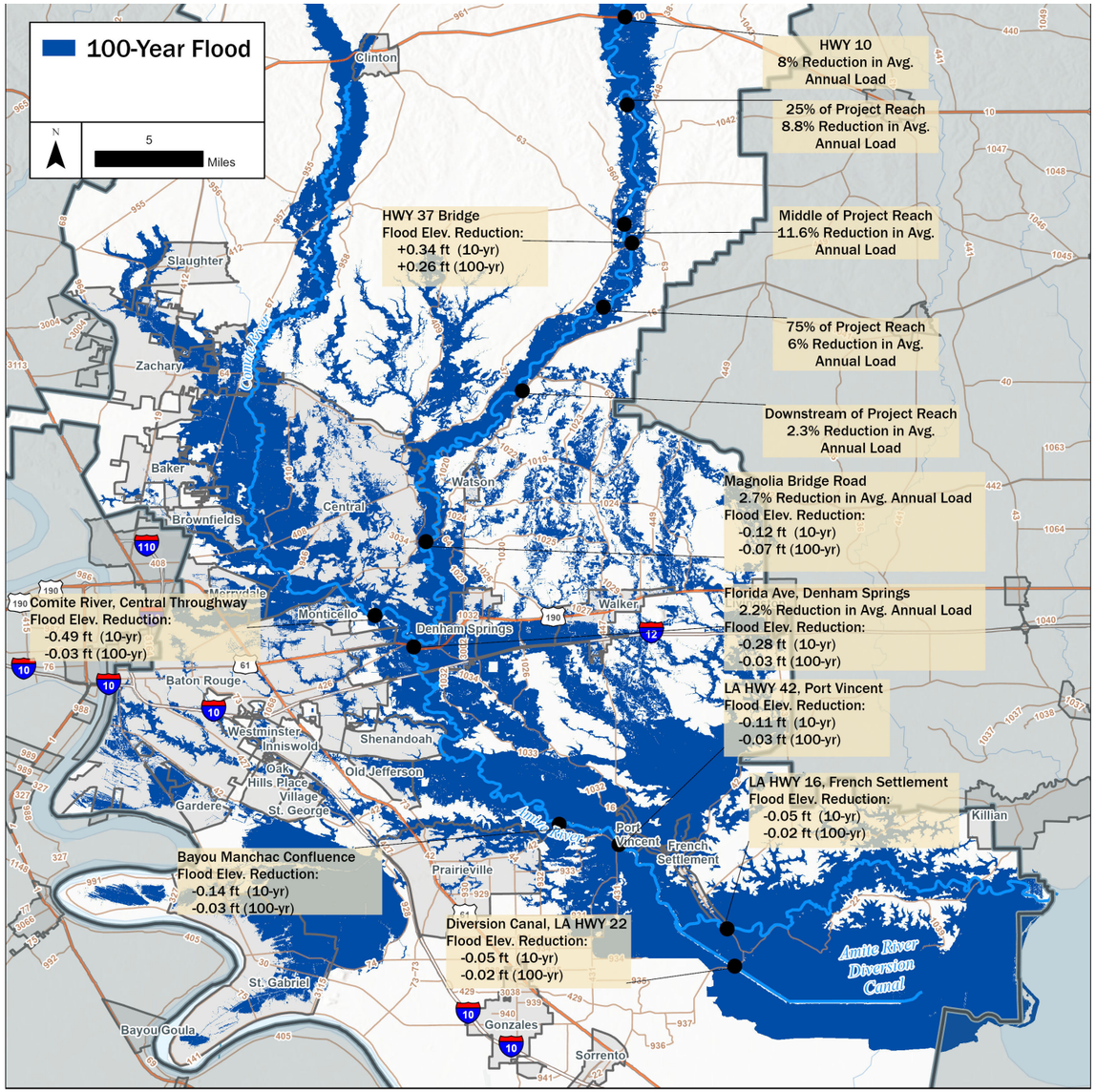
PROJECT IMPACTS MAP



ENVIRONMENTAL CONSIDERATIONS

Restoring the Upper Amite River has numerous potential environmental benefits. This can include and 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. Typically, the permitting process takes 3-6 months (American Rivers, 2024). 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 zones with regulatory floodway. 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): $500 (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 minor 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 Weir and dredging. Due to real estate constraints and funding, 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)