DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, VICKSBURG DISTRICT
4155 CLAY STREET
VICKSBURG, MS 39183-3435

SUBJECT: J Bennett Johnston Waterway 12-FT Channel Project, Louisiana
EAXX-202-00-B4P-1755002448

PUBLIC NOTICE

To Whom It May Concern:

A draft Finding of No Significant Impact (FONSI), along with the draft Feasibility Report and integrated Environmental Assessment (EA) for the J Bennett Johnston Waterway 12-FT Channel Project is enclosed for your review and comment. This project features deviations, draft restrictions, and improvements to the existing dikes on the J. Bennett Johnston Waterway to achieve a 12-FT channel. Please provide comments by 20 November 2025, to the above address, ATTN: CEMVN-PDN-UDP.

If you have any questions or comments concerning the draft FONSI or draft report, please contact Mr. Taylor Piefke of this office by telephone 601-631-5087 or email Taylor.Piefke@usace.army.mil.

Sincerely,

Mark Smith
Chief, Environmental Compliance Branch
Regional Planning and Environment Division South

Enclosure

FINDING OF NO SIGNIFICANT IMPACT

J Bennett Johnston Waterway 12-FT Channel Project
Louisiana
EAXX-202-00-B4P-1755002448

The U.S. Army Corps of Engineers, Vicksburg District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Environmental Assessment (EA) dated DATE OF IFR/EA, for the J Bennett Johnston (JBJ) Study 12-FT Study addresses the possible impacts associated with increasing the J Bennett Johnston Waterway from a 9-FT draft to a 12-FT draft by improving existing dikes in the waterway in Louisiana. The final recommendation is contained in the Feasibility Report, dated DATE OF CHIEF'S REPORT and the EA.

The Final EA, incorporated herein by reference, evaluated various alternatives that would increase the JBJ Waterway from a 9-FT draft to a 12-FT draft. The recommended plan National Economic Development (NED) Plan provides the greatest benefits to cost ratio compared to the other alternatives. It includes:

- This alternative features deviations, draft restrictions, and improvements to the existing dikes.
    - Dike dimensions would be altered appropriately for supporting a 12-FT channel. Additional rock would be added to approximately 8 dike field locations. The total amount of stonework is estimated at 361,100 tons.
- No mitigation would be required for this alternative.
- All work is within the original project footprint for the original 9-FT channel designs.

In addition to a "no action" plan, five alternatives were evaluated. The alternatives included the no action alternative, Construction Dredging (Alternative 3), Improvement of Existing Dikes (Alternative 3a), Construction of New Dikes (Alternative 3b), Improvement of Existing Dikes and Construction of High Priority New Dikes (Alternative 3c), and Improvement of Existing Dikes and Construction of New Dikes (Alternative 3ab). Detailed descriptions of the alternatives are in the Feasibility Report.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Recreation and Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☐	☐	☒
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☒	☐	☐
Other cultural resources	☒	☐	☐
Floodplains	☒	☐	☐
Hazardous, toxic & radioactive waste	☒	☐	☐
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Public infrastructure	☐	☐	☒
Soils	☐	☐	☒
Tribal trust resources	☒	☐	☐
Water quality	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan.

Based on the information presented in this document, USACE MVK has determined that there are no historic properties, as defined in 36 CFR 800.16 (l), in the Area of Potential Effect (APE) for the J. Bennett Johnston Waterway 12-ft Feasibility Study TSP, Avoyelles, Rapides, Grant, Winn, Desoto, and Natchitoches Parishes, Louisiana. Therefore, USACE MVK is making a finding of **No Adverse Effects to Historic Properties/No Further Work Required** for this undertaking. This project will be subject to the standard change in scope of work, unexpected discovery, and unmarked human burial sites act provisions.

Public review of the draft IFR/EA and FONSI was completed on **XXX**. All comments submitted during the public review period were responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the Coprs identified: Tricolored Bat (*Perimyotis septentrionalsis*), Red-cockaded Woodpecker (Dryobates borealis), Whooping Crane (*Grus americana*), Alligator Snapping Turtle (*Macrochelys temminckii*), Pallid Sturgeon (*Scaphirhynchus albus*), and Monarch Butterfly (*Danaus plexippus*) is known to or may possibly occur in proposed project areas. It was determined that the recommended plan may affect but is not likely to adversely affect the following federally listed species or their designated critical habitat: Pallid Sturgeon and Alligator Snapping Turtle. It was determined that the recommended plan would have no effect on the other federally listed

species. The U.S. Fish and Wildlife Service (FWS) concurred with the Corps' determination on 7 August 2025.

Formal Section 106 consultation was initiated with Federally-recognized Tribes during the 2024 Mississippi Department of Archives and History (MS SHPO) Tribal Summit on 22 October 2024, and follow-up email correspondence to 12 Tribal parties (Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Muscogee [Creek] Nation, Quapaw Nation, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana) as well as the Louisiana SHPO on 05 November 2024, pursuant to 36 CFR § 800.3(c). Written receipt confirming the intent to participate as a consulting party to this undertaking was received from the Louisiana SHPO on 18 November, the Choctaw Nation of Oklahoma on 07 December, and the Alabama Coushatta Tribe of Texas on 09 December 2024. Virtual meetings were held 24 April, 23 July, and 27 August 2025, to further discuss this undertaking with Tribal consulting parties. All consulting parties were provided additional email correspondence of the Tentatively Selected Plan (TSP) selection, cultural analysis, and USACE Section 106 undertaking determination of **No Adverse Effects to Historic Properties/No Further Work Required** for the proposed project on 13 August 2025 for review and comment. Additional correspondence was provided to all consulting parties on 13 September 2025 further clarifying the scope and nature of the project. Section 106 concurrence was received from the LA SHPO on 18 September and the Quapaw Nation on 7 October 2025.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Section XXX of the accompanying Feasibility Report.

A water quality certification pursuant to section 401 of the Clean Water Act will be obtained from the Louisiana Department of Environmental Quality (LDEQ) prior to construction. A WQC letter from LDEQ dated DATE OF LETTER, the LDEQ stated that the recommended plan appears to meet the requirements of the water quality certification. All conditions of the water quality certification will be implemented in order to minimize adverse impacts to water quality.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.[1] Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse

[1] 40 CFR 1505.2(B) requires identification of relevant factors including any essential to national policy which were balanced in the agency decision.

effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.[2]

Date

Jeremiah A. Gipson
Colonel, Corps of Engineers
District Commander
Corps of Engineers

[2] 40 CFR 1508.13 stated the FONSI shall include an EA or a summary of it and shall note any other environmental documents related to it. If an assessment is included, the FONSI need not repeat any of the discussion in the assessment but may incorporate by reference.

Mississippi Valley Division,
Regional Planning and Environment Division South

J. Bennett Johnston Waterway 12-FT Channel

Draft Integrated Feasibility Report and Environmental Assessment

June 2025

EXECUTIVE SUMMARY

Introduction: The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), Vicksburg District, Regional Planning and Environment Division South (RPEDS), has prepared this Draft Integrated Feasibility Report and Environmental Assessment (DIFR-EA) for the J. Bennett Johnston Waterway (JBJ Waterway) 12-FT Channel study. This study effort was authorized by Water Resources Development Act (WRDA) 2018, Section 1201:

> The Secretary is authorized to conduct a feasibility study for the following projects for water resources development and conservation and other purposes, as identified in the reports titled "Report to Congress on Future Water Resources Development" submitted to Congress on March 17, 2017, and February 5, 2018, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress: (3) J. BENNETT JOHNSTON WATERWAY, LOUISIANA.—Project for navigation, J. Bennett Johnston Waterway, Louisiana.

This report includes input from non-Federal sponsors, natural resource agencies, federally recognized Indian Tribes, and the public. The non-Federal sponsors are the Louisiana Department of Transportation and Development and The Red River Waterway Commission.

The JBJ Waterway 12-FT Channel study is a navigational study that evaluates alternatives to increase the authorized draft from 9-FT to 12-FT within the JBJ Waterway, formerly referred to as the Red River Waterway. There are five locks and dams between river miles (RMs) 0 and 228: Lindy C. Boggs Lock and Dam (L&D 1), John H. Overton Lock and Dam (L&D 2), Lock and Dam 3 (L&D 3), Russell B. Long Lock and Dam (L&D 4), and Joe D. Waggonner Jr. Lock and Dam (L&D 5).

The study area includes the Louisiana parishes of Bossier, Caddo, Red River, Winn, Natchitoches, Grant, Rapides, Avoyelles, Catahoula, and Concordia (Figure ES-1). The JBJ Waterway is located in the central and northwestern part of Louisiana. The project area includes portions of the lower Red River at the intersection of the Mississippi River and upper Red River, extending to Shreveport, Louisiana. All proposed features of the project are located primarily within the JBJ Waterway, pictured in Figure ES-1. The JBJ Waterway is characterized by a series of sinuous curves, wide variations in depth, shifting beds and banks, and unpredictable shoaling. The river passes through lands comprised of alluvial soils rich in iron oxide, giving the water its rusty color. The aquatic habitats support diverse forms of phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles, fish, and mollusks.

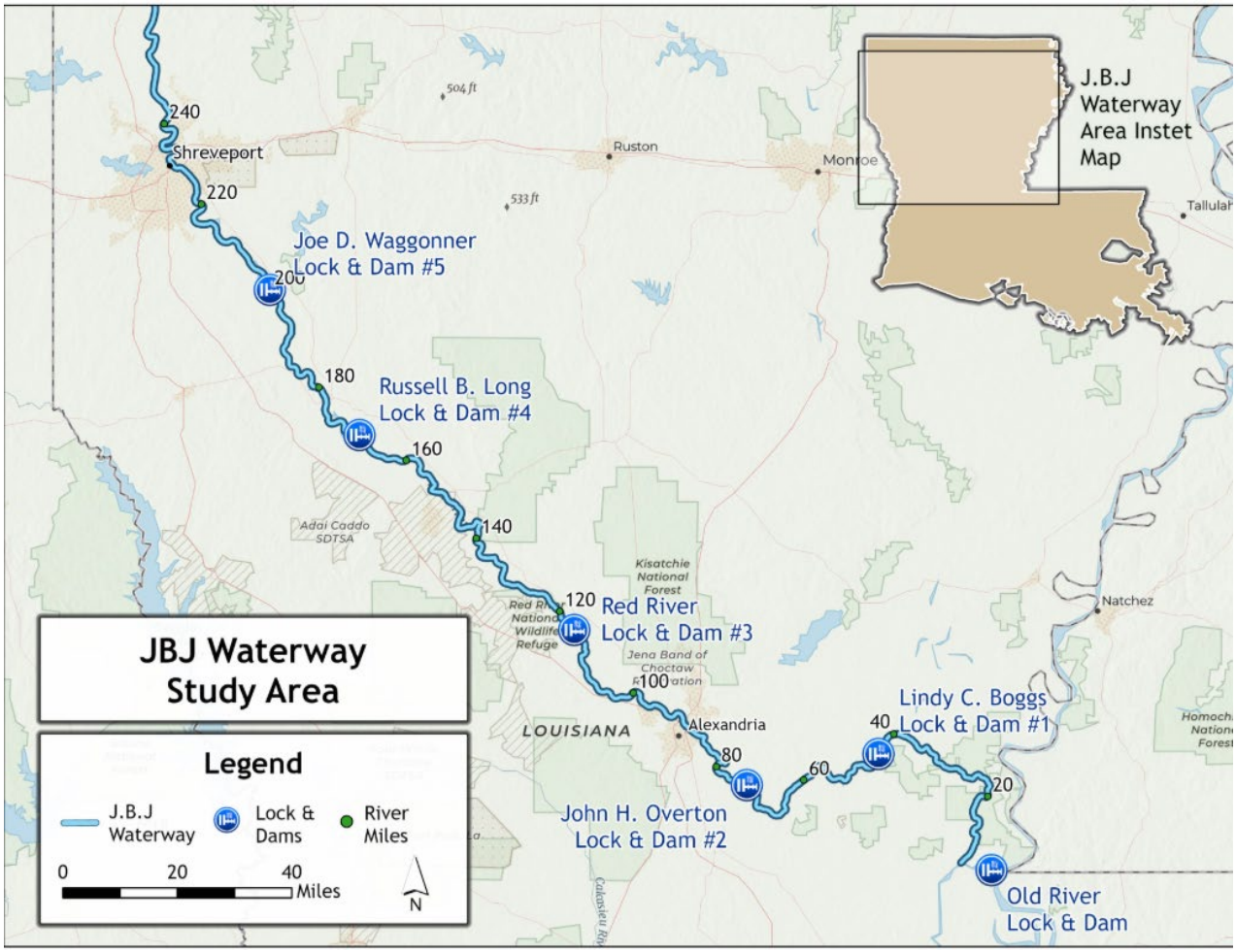

Figure ES-1. JBJ Waterway Channel Feasibility Study Area

Purpose and Need: The JBJ Waterway serves as a vital conduit for affordable transportation, driving economic prosperity in the region. The overall purpose and need is to improve navigation efficiencies for the channel through evaluating alternatives to provide an authorized 12-FT navigation channel depth in the JBJ Waterway and the five locks and dams between RMs 0 and 228, L&Ds 1 through 5. A 12-FT channel on the JBJ Waterway will result in transportation cost savings by increasing carrying capacity and eliminating the need for industries to "lightload."

The current authorized navigation channel for the JBJ Waterway has a 9-FT depth and 200-FT width. This is currently limiting the cargo capacity for industry. The primary cargo on the waterway includes limestone, sand, gravel, coal, petroleum, crude petroleum, aggregates, grains, chemicals, ore/minerals, and iron/steel. Tonnage on the JBJ Waterway averaged approximately 3 million annual tons from 2019–2023. Much of this cargo moves from the Mississippi River, which utilizes a 12-FT draft. Increasing the channel from a 9-FT depth to an authorized 12-FT depth will allow barges to carry more cargo per trip and is consistent

with the Mississippi River channel. This results in a transportation cost savings, which is a National Economic Development (NED) benefit.

The waterway also supports military operations by providing cost effective transportation of equipment, fuel, and supplies to Fort Polk near Leesville, Louisiana, and Barksdale Air Force Base in Bossier City, Louisiana. The ports along the JBJ Waterway are part of the U.S. Department of Defense (DOD) and the Department of Transportation Strategic Seaport Program, which ensures the DOD has access to sufficient seaport capacity to meet National security objectives. These ports are selected based on their capacity, infrastructure, and ability to handle military cargo efficiently.

The waterway is crucial for Fort Polk's Joint Readiness Training Center to its role in transporting military equipment and supplies. Fort Polk is one of the Army's three "Dirt" Combat Training Centers that focus on realistic, stressful training at the brigade combat team level and below, preparing units for a variety of conflict scenarios. The waterway provides a navigable route for barges, enabling the cost-effective and efficient movement of large quantities of equipment to and from the bases around the Nation, significantly enhancing military readiness and training capabilities. Currently, rotations from Fort Campbell, Kentucky, to Fort Polk, Louisiana, occur one to three times per year. These rotations normally include 30–48 barges containing military vehicles, such as tanks, artillery units, and supply units.

Increasing transportation efficiencies with these military operations aligns with the Department of the Army's Campaign Plan FY25, which lists "Effectively Resource the Army" as the second line of effort. This includes developing and implementing resource management best practices, improving resource allocation, budgeting processes, forecasting processes, and improving operational efficiency while ensuring that resource management practices align with the Army's overall strategic objectives and priorities.

Plan Formulation: The Project Delivery Team (PDT) implemented risk-informed specific, measurable, attainable, risk-informed, and timely (SMART) planning following USACE's planning process in accordance with USACE Engineer Regulation (ER) 1105-2-103. The planning process is an iterative six-step process. In Step 1, the PDT focused on identifying problems and opportunities within the study area. In Step 2, the PDT focused on inventorying and forecasting study area conditions. In Step 3, the PDT developed a range of potential actions to solve the problems identified in Step 1. In Step 4, the PDT evaluated actions, measures, and alternative plans. In Step 5, the PDT compared alternative plans. In Step 6, the PDT tentatively selected a plan.

A variety of measures that improve navigation on the JBJ Waterway were identified. These measures include draft restrictions, dredging, modification of dikes, construction of new dikes, and obtaining a waiver for the depth required at the locks for 12-FT draft vessels to pass through. See Chapter 3 for more detail on the measures. Modification of the locks and dam structures, construction of new locks, and deepening the pool in between locks was considered but screened due to high rough order-of-magnitude costs and the time that the river would be shut down to navigation to implement the referenced measures. The

remaining retained measures were combined in various combinations to form an initial array of alternatives. These alternatives were further modified through the planning process to be developed into a final array for consideration in the decision-making process.

The National Environmental Policy Act (NEPA) analysis, comprehensive benefits to NED, Regional Economic Development, Environmental Quality and Other Social Effects were considered in the decision-making process. Alternative 3a best met the study objectives and reasonably maximized benefits across the various categories of effects. Alternative 3a was identified as the NED plan and is supported by the non-Federal sponsors. For those reasons, Alternative 3a was identified as the tentatively selected plan (TSP).

TSP/Total Benefits Plan/NED Plan: The TSP for the JBJ Waterway 12-FT Channel study is Alternative 3a, which includes the following structural and nonstructural features:

Nonstructural: Draft restrictions will be enacted by the U.S. Coast Guard during periods of extreme drought or low water.

Nonstructural: Deviation from Engineer Manual 1110-2-1604 in order for 12-FT draft vessels to transit through the locks at a lesser depth than the required 1.5 times the draft of the vessel. The clearance depth is measured from the hull of the vessel to the lock sill.

Structural: Stonework improvements to the existing dikes in order to support 12-FT draft vessels.

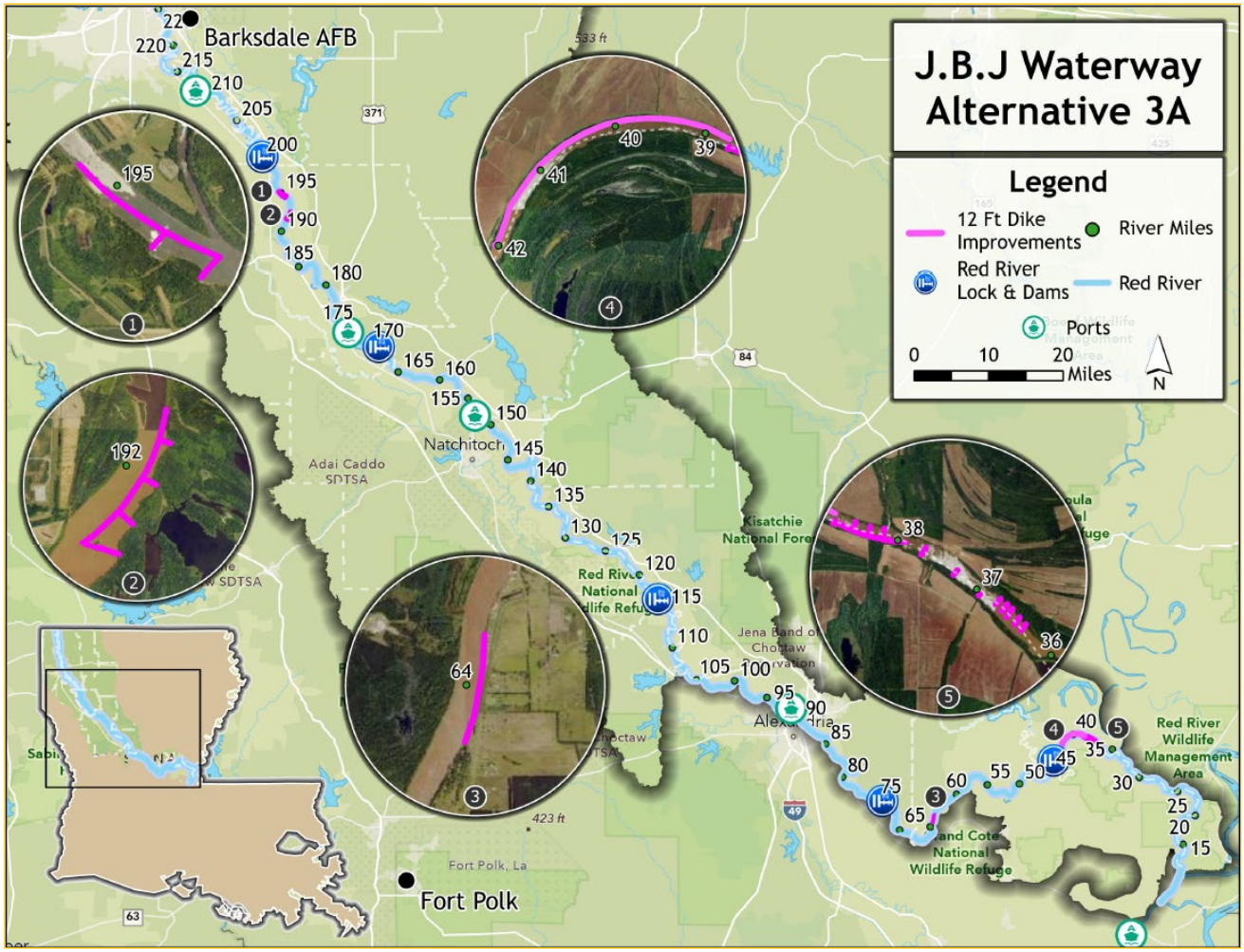

Figure ES-2. TSP Alternative 3a

The TSP would have minimal adverse impacts to the environment and no mitigation would be required. Approximately 0 acres of wetlands and 0 acres of wildlife habitat would be impacted. The TSP would have minimal aquatic impacts and no effects on bats.

The estimated project first cost of construction of the 12-FT channel is $49,949,919, which includes the cost of structural and nonstructural measures along with the value of land, easement, right-of-way, relocation, and disposal (LERRD) areas. The annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the TSP is estimated to be $1,275,000, assuming that the 9-FT channel emergency repairs are complete, thus reducing the 9-FT in-channel O&M dredging to a negligible amount. (Other O&M dredging costs, such as at the lock approachways, are not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they will function as designed for the project life and that no maintenance would be required). While many revetments along the river require repairs to be restored to their original design, the majority of these repairs are not considered essential at this time as they are not limiting

navigation of the 9-FT channel or the proposed TSP. Emergency repairs that are required for the 9-FT channel—which are assumed to be complete for the future without-project (FWOP) conditions—are the Westdale and Joffrion revetments. These repairs would have to take place before implementing the TSP. The total cost for emergency repairs at these locations is approximately $17,500,000 and are the responsibility of Vicksburg District's Operations Division. Ongoing maintenance of the rest of the structures will still be necessary on an as-needed basis to prevent further failures. It was assumed under the FWOP conditions that regardless of ongoing funding challenges, these potential future emergency actions would still occur over the 50-year period of analysis. See Appendix A *Engineering* for an overview of the potential future repair locations.

There is no expected acquisition of lands; all actions are expected to take place within the navigational servitude. However, there are some administrative costs for LERRD investigations in the amount of $170,000; this amount is not cost shared.

Funding for construction depends on both Congressional and administrative action, as well as action by the Inland Waterway Users Board to recommend allocation of Federal cost share funds from the Inland Waterways Trust Fund (IWTF). The cost share between the Construction General Account and the IWTF is 75 percent from the Constructions General Account and 25% from the IWTF. The construction cost is 100 percent Federal and split 75 percent from the Construction General Account and 25 percent from the IWTF, which is managed through the Inland Waterways User Board (IWUB).

The estimated general Federal share and IWUB share of the project first cost are $37,462,439 and $12,487,480, respectively. Based on a 3 percent discount rate and a 50-year period of analysis, the equivalent average annual benefits and costs are estimated at $5,189,000 and $3,183,000, respectively. The project is estimated to provide annual net benefits of $2 million and a benefit-to-cost ratio of 1.6.

Significant Resources/Environmental Considerations: The resources described in this section are those recognized as significant by laws, executive orders, regulations, and other standards of National, State, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

Based on input from scoping and the ecological features present in the proposed project area, this DIFR-EA addresses the following resources:

- Geology
- Topography, and Soils
- Aquatic Resources and Fisheries
- Air Quality
- Terrestrial Resources and Wildlife
- Water Quality
- Threatened, Endangered, and Protected Species
- Wetlands
- Cultural Resources
- Noise
- Recreation
- Hazardous, Toxic, and Radioactive Waste
- Socioeconomic Considerations

For this DIFR-EA, the PDT considered relevant environmental resources that would potentially be impacted by the proposed alternatives and eliminated resources from further evaluation that were either not in the area of potential effect or would not be impacted by any of the alternatives. These resources include the following.

- Wild and Scenic Rivers: No designated wild and scenic rivers in or near the study area)
- Coastal Zones: No coastal areas in the project area
- Prime and Unique Farmland: Only 0.58 acres of farmland would be impacted by the proposed alternatives and no farmland would be converted to unfarmable status
- Aesthetics: Areas where dikes would be constructed or modified already contain dikes and would not impact or alter the current aesthetics in the area

Views of the Public, Agencies, Stakeholders, and Tribes: To be updated after Draft Report

Reviews: To be updated after Draft Report

Unresolved Issues/Area of Controversy: To be updated after Draft Report

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

SECTION 1
Introduction

1.1 OVERVIEW

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), Vicksburg District Regional Planning and Environment Division South (RPEDS), has prepared this Draft Integrated Feasibility Report and Environmental Assessment (DIFR-EA) for the J. Bennett Johnston Waterway (JBJ Waterway) 12-FT Channel study. This report includes input from the non-Federal sponsors, natural resource agencies, federally recognized Indian Tribes, and the public. The JBJ Waterway study is a navigation study. This study is being conducted to improve navigation in the JBJ Waterway and better accommodate vessels with a 12-FT draft.

The results of the study are presented in this decision document, which is a Draft Integrated Feasibility Report and National Environmental Policy Act of 1969 (NEPA) Environmental Assessment (DIFR-EA) document, in accordance with the USACE Planning Guidance Notebook (1105-2-100); Engineer Regulation (ER) 1105-2-103 “Policy for Conducting Civil Works Planning Studies” dated 7 December 2023; ER 1105-2-101 “Risk Assessment for Flood Risk Management Studies” dated 15 July 2019; NEPA, and all other applicable laws, regulations, and policies.

1.2 STUDY SPONSORS

The Red River Waterway Commission (RRWC) and Louisiana Department of Transportation and Development (LDOTD) are the cost-sharing non-Federal sponsors (NFSs) of the study. The feasibility study is 50 percent federally funded and 50 percent funded by the NFSs. The Feasibility Cost-Sharing Agreement for this study was executed on 11 June 2024.

1.3 USACE PLANNING PROCESS

USACE incorporates specific, measurable, attainable, risk-informed, and timely (SMART) elements into feasibility studies to ensure an efficient feasibility study and to install accountability across all functional working groups.

Throughout the feasibility study, the study team followed USACE’s six-step planning process in accordance with USACE ER 1105-2-103. This process is a structured, systematic, and repeatable planning approach for quantitatively and qualitatively assessing water resource-related problems and opportunities, resulting in recommendations to address those problems and opportunities. The planning steps occur iteratively and occasionally concurrently. Iterations of steps are necessary to formulate and evaluate an efficient, effective, and reasonable array of alternative plans. As more information is acquired and is

revealed, it may be necessary to reiterate previous steps. The plan formulation for this study is further described in Section 3.

1.4 STUDY AUTHORITY

This study effort is authorized by Water Resources Development Act (WRDA) 2018, section 1201:

> The Secretary is authorized to conduct a feasibility study for the following projects for water resources development and conservation and other purposes, as identified in the reports titled "Report to Congress on Future Water Resources Development" submitted to Congress on March 17, 2017, and February 5, 2018, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 2282d) or otherwise reviewed by Congress: (3) J. BENNETT JOHNSTON WATERWAY, LOUISIANA.—Project for navigation, JBJ Waterway, Louisiana.

1.5 STUDY AREA (PLANNING AREA)

The JBJ Waterway crosses ten northwest and central Louisiana parishes: Bossier, Caddo, Red River, Winn, Natchitoches, Grant, Rapides, Avoyelles, Catahoula, and Concordia (shown in Figure 1-1). It supports the surrounding communities and military operations at Fort Polk (located in Vernon Parish) and Barksdale Air Force Base (located in Bossier City). The JBJ Waterway project is authorized from Old River Control Complex to the I-220 Bridge near Shreveport, Louisiana, as depicted in Figure 1-1. All proposed features of the project are located primarily within the JBJ Waterway. Within the project area, there are five lock and dams that control vessel traffic within the channel, as shown in Figure 1-1: L&Ds 1 through 5. The areas between the locks are referred to as pools (see Table 1-1 for relevant pools).

Table 1-1. Pool Names on the JBJ Waterway

Location	Pool Name
Upstream of L&D 1	Pool 1
Upstream of L&D 2	Pool 2
Upstream of L&D 3	Pool 3
Upstream of L&D 4	Pool 4
Upstream of L&D 5	Pool 5

Additionally, there is an area referred to as "the Gauntlet" by industry and users, which is located between the Old River Lock and Dam and L&D 1. This region runs from river mile (RM) 42 to RM 33 and is between L&D 1 (RM 43) and the Mississippi River Old River Control Structure (RM 0). This reach is within the greater Lower Red River Backwater Area

and, thus, sees variations in flow velocities due to the backwater effects of the Mississippi River. This leads to greater wear on structures and general channel instability.

There are ports with 12 terminals used for various commodities and 19 recreational facilities along the river. The JBJ Waterway is characterized by a series of sinuous curves, wide variations in depth, shifting beds and banks, and unpredictable shoaling. The river passes through lands comprised of alluvial soils rich in iron oxide, giving the water its rusty color. The aquatic habitats support diverse forms of phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles, fish, and mollusks.

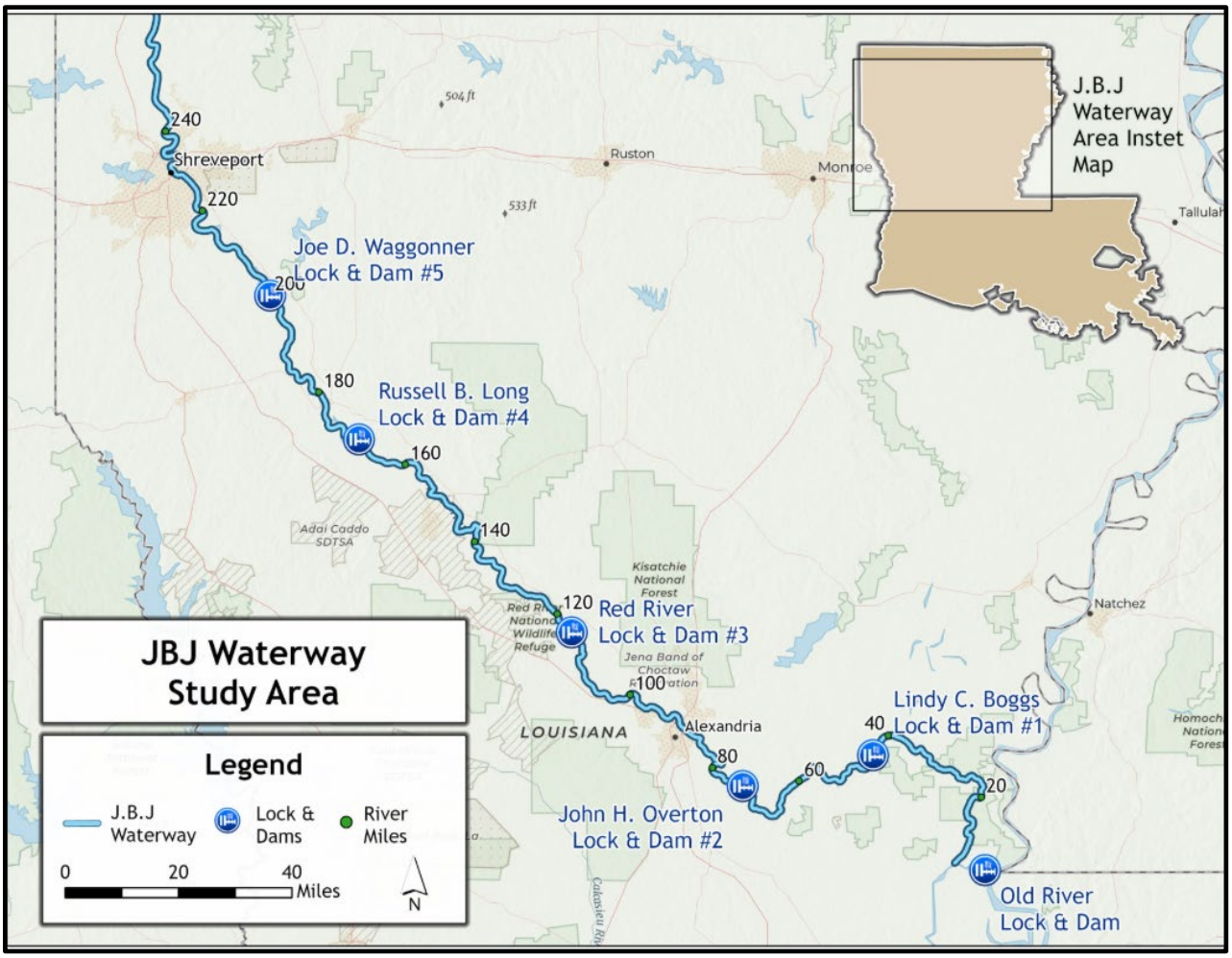

Figure 1-1. Feasibility Study Area

1.6 BACKGROUND AND HISTORY

The JBJ Waterway passes through lands comprised of alluvial soils rich in iron oxide, giving the water its rusty color and the Red River its name. The authorized JBJ Waterway project consists of a 9-FT deep by 200-FT wide navigation channel extending approximately 283 miles from the Mississippi River through Old River and up the Red River to the I-220 bridge in the vicinity of Shreveport. Five locks, with dimensions of 84 feet in width by 705 feet in length by 14 feet in depth, and adjacent dams provide the required lift of 141 feet. The project also provides for realigning the banks of the Red River from the Old River to Shreveport by means of dredging, cutoffs, and training works and for stabilizing its banks by means of revetments, dikes, and other methods. Since the waterway was opened in December 1994, a navigable channel has been maintained as far upstream as the Caddo-Bossier Port near RM 212. USACE spent the last three decades of the 20th century developing the lower 280 miles of the Red River channel in Louisiana for commercial navigation. The development included an extensive channel improvement program that included channel realignments, bank stabilization works, and channel contraction. There is an extensive database of former studies and programs that are being or have been prepared by USACE; other Federal, State, and local agencies; research institutions; and individuals to inform this report. The most relevant studies, reports, and projects in the study area are listed in Table 1-2.

Table 1-2. List of Relevant Prior Reports, Existing Water Projects, and Ongoing Programs

Year	Study/Report/Environmental Document Title	Document Type
2025	Greater Mississippi River Basin Precipitation Trends, Mississippi Valley Division	Technical Report
2027	Index, Arkansas Section 203	Environmental Impact Statement
2023	Lower Red River 1 percent and 0.2 percent AEP Water Surface Profile Update. Vicksburg District.	Water Surface Profile Update
2022	Red River Basin Master Water Control Manual. Tulsa, Little Rock, Fort Worth, and Vicksburg Districts.	Water Control Manual
2020	Red River near Shreveport Hydraulic and Geomorphic Analysis. Vicksburg and Tulsa District. Engineer Research and Development Center (ERDC) Coastal and Hydraulics Laboratory (CHL).	Geomorphic Analysis
2010	J. Bennett Johnston Waterway Navigation Charts. Shreveport, LA, to Mouth of Red RM 235 to 0. Vicksburg District.	Navigation Charts
2001	The management of sediment on the J. Bennett Johnston Waterway," Proceedings of the Seventh Interagency Sedimentation Conference, 2, March 25-29, Reno, Nevada, XI-9–XI-16.	White Paper

Year	Study/Report/Environmental Document Title	Document Type
2001	The management of sediment on the J. Bennett Johnston Waterway," Proceedings of the Seventh Interagency Sedimentation Conference, 2, March 25-29, Reno, Nevada, XI-9–XI-16.	Report
1991	Red River Waterway: Arkansas, Louisiana, Oklahoma, & Texas: Mississippi River to Shreveport, Louisiana. Design Memorandum No. 3 REVISED. Supplement No. 2. Hydrology, Pool Nos. 1-5, Revised Flowlines. Vicksburg District.	Design Memorandum
1988	Red River Waterway: Arkansas, Louisiana, Oklahoma, & Texas: Mississippi River to Shreveport, Louisiana. Design Memorandum No. 1. General Design Memorandum Phase II Project Design Stabilization and Cutoffs. New Orleans District.	Design Memorandum
1987	Channel Development in the Lower Reach of the Red River. Hydraulic Model Investigation by Waterways Experiment Station Hydraulics Laboratory. Waterways Experiment Station and New Orleans District. Technical Report HL-87-9.	Hydraulic Model Investigation
1987	Red River Waterway: Arkansas, Louisiana, Oklahoma, & Texas: Mississippi River to Shreveport, Louisiana. Design Memorandum No. 34 REVISED. Hydrology and Hydraulic Design. Lock and Dam No. 5. Vicksburg District.	Design Memorandum
1982	Development and Maintenance of Typical Navigation Channel, Red River. Hydraulic Model Investigation by Waterways Experiment Station Hydraulics Laboratory. Waterways Experiment Station and New Orleans District. Technical Report HL-82-6.	Hydraulic Model Investigation
1980	Red River Waterway: Arkansas, Louisiana, Oklahoma, & Texas: Mississippi River to Shreveport, Louisiana. Design Memorandum No. 3 REVISED. Hydrology. New Orleans District.	Design Memorandum
1972	Red River Waterway Sedimentation Study Downstream from Lock and Dam No. 1 Numerical Model Investigation by Waterways Experiment Station Hydraulics Laboratory. Waterways Experiment Station and Vicksburg District. Technical Report HL-88-15.	Numerical

1.7 PURPOSE AND NEED

The JBJ Waterway serves as a vital conduit for affordable transportation, driving economic prosperity in the region. The overall purpose and need is to improve navigation efficiencies for the channel through evaluating alternatives to provide an authorized 12-FT navigation channel depth in the JBJ Waterway and the five locks and dams between RMs 0 to 228, L&Ds 1 through 5. Maintaining a 12-FT channel on the JBJ Waterway will result in transportation cost savings by increasing carrying capacity and eliminating the need for industries to "lightload."

The current authorized navigation channel for the JBJ Waterway is 9-FT by 200-FT. This is currently limiting the cargo capacity for industry. The primary cargo on the waterway includes limestone, sand and gravel, coal, petroleum, crude petroleum, aggregates, grains, chemicals, ore/minerals, and iron/steel. Tonnage on the JBJ averaged around 3 million annual tons from 2019–2023. Much of this cargo moves from the Mississippi River, which utilizes a 12-FT draft. Maintaining an authorized 12-FT draft will allow barges to carry more cargo per trip and is consistent with the Mississippi River shallow draft channel. This results in a transportation cost savings, which is a NED benefit.

The waterway also supports military operations by providing cost effective transportation of equipment and supplies to Fort Polk near Leesville, Louisiana, and Barksdale Air Force Base in Bossier City, Louisiana. The ports along the JBJ Waterway are part of the U.S. Department of Defense (DOD) and the Department of Transportation Strategic Seaport Program, which ensures the DOD has access to sufficient seaport capacity to meet National security objectives. These ports are selected based on their capacity, infrastructure, and ability to handle military cargo efficiently.

The waterway is crucial for Fort Polk's Joint Readiness Training Center to its role in transporting military equipment and supplies. Fort Polk is one of the Army's three "Dirt" Combat Training Centers that focus on realistic, stressful training at the brigade combat team level and below, preparing units for a variety of conflict scenarios. The waterway provides a navigable route for barges, enabling the cost-effective and efficient movement of large quantities of equipment to and from the bases around the Nation, significantly enhancing military readiness and training capabilities. Currently, rotations from Fort Campbell, Kentucky, to Fort Polk, Louisiana, occur one to three times per year. These rotations normally include 30–48 barges containing military vehicles, such as tanks, artillery units, and supply units.

Increasing transportation efficiencies with these military operations aligns with the Department of the Army's Campaign Plan FY25, which lists "Effectively Resource the Army" as the second line of effort. This includes developing and implementing resource management best practices, improving resource allocation, budgeting processes, forecasting processes, and improving operational efficiency while ensuring that resource management practices align with the Army's overall strategic objectives and priorities.

1.8 PROBLEMS AND OPPORTUNITIES

The RRWC, in conjunction with USACE and other stakeholders, identified risks to navigation and impediments to navigation efficiency within the JBJ Waterway.

Problems identified included the following:

- Limited rate of commodity transportation
- Managing depths at the locks and dams
- Depths at approachways of locks and dams
- Sedimentation

Opportunities were also identified in conjunction with addressing the problems:

- Increase movement of commodities through the JBJ Waterway
- Potentially increase navigational efficiency by relying more on river training structures rather than annual dredging

1.9 GOALS, OBJECTIVES AND CONSTRAINTS

The goals are to improve the economic benefits to the JBJ Waterway users and the Nation and to increase the authorized navigable depth from 9-FT to 12-FT. The study planning objectives over the 50-year period of analysis (beginning in the year 2030) for the JBJ Waterway were to improve the navigational transportation within the Red River and the five locks and dams between the Old River Control Complex and the Shreveport area.

The study planning constraints included the following:

- Lock closure and/or temporary cessation of navigation due to construction and other factors
- Lock dimensions, miter gate sill elevations
- Avoid adverse impacts to environmental and cultural resources

The study planning objectives included the following:

- Improve channel navigability and reliability through the JBJ Waterway
- Increase movement of commodities through the JBJ Waterway
- Enhance economic opportunities in the region
- Decrease overall Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) costs

1.10 STUDY SCOPE

The scope for this study is to evaluate alternatives to provide a 12-FT navigation channel in order to achieve transportation cost efficiencies for the JBJ Waterway, maximizing net benefits while limiting/addressing any foreseeable impacts. The measures to achieve a 12-FT draft that were evaluated in this study include draft restrictions, a waiver for the draft required to navigate through L&D 2, dredging to achieve Operation and Maintenance (O&M) efficiencies and remove obstructions, and construction of dikes and improvement of dikes to achieve O&M efficiencies and remove obstructions.

SECTION 2
Existing and Future Without-Project Conditions*

**In accordance with NEPA regulations, the existing conditions contained in this section also represent the affected environment. Additionally, the future without-project (FWOP) condition is the same as the No Action Alternative, which is required for NEPA analysis.*

2.1 PERIOD OF ANALYSIS

This study investigated alternatives to address depth constraints for a 12-FT draft vessel in the JBJ Waterway over a 50-year period of analysis (beginning in the year 2030). The sections below provide an overview of the FWOP conditions over the next 50 years if there were no Federal actions to change the authorized navigable draft in the JBJ Waterway.

2.2 GENERAL SETTING

The JBJ Waterway, formerly referred to as the Red River Waterway, is characterized by a series of sinuous curves, wide variations in depth, shifting beds and banks, and unpredictable shoaling. The river passes through lands comprised of alluvial soils rich in iron oxide. The authorized JBJ Waterway project consists of a 9-FT deep by 200-FT wide navigation channel extending 283 miles (1967 mileage) from the Mississippi River through Old River and up the Red River to the I-220 bridge in the vicinity of Shreveport. Five locks, with dimensions of 84 feet in width by 705 feet in length by 14 feet in depth, and adjacent dams provide the required lift of 141 feet.

2.2.1 Description of Watershed

The Red River Basin is the second largest basin in the southern Great Plains. It rises in two branches in the Texas panhandle and flows eastward, serving as a border between Texas and Oklahoma. It also forms a short border between Texas and Arkansas before entering Arkansas. It forms much of the eastern border of Miller County, Arkansas, turning south near Fulton and flowing into Louisiana, where it feeds the Atchafalaya River. Figure 2-1 depicts the portion of the Red River Basin that lies within the Vicksburg District. The total length of the river is 1,360 miles (2,190 kilometer).

After the waterway crosses south into Louisiana, it flows through the sister cities of Shreveport and Bossier City, which were developed on either bank of the river, as were the downriver cities of Alexandria and Pineville. After being joined from the north by the Black River (downstream name of the Ouachita River, its largest tributary), the Red River broadens into a complex network of marshlands west of the Mississippi River. Its waters eventually become a tributary of the Atchafalaya River.

Figure 2-1. Red River Basin Within the Vicksburg District

2.2.2 Climate

The project area is located in the eastern portion of the Red River Basin. According to the Red River Master Water Control Manual, the climate in this area is generally mild, with long hot summers and short moderate winters. In the western portion of the basin, winters are more severe. The climate varies gradually from semiarid in the extreme western parts of the basin to humid in the eastern portion. In the western portion of the basin, weather patterns are under continental controls characteristic to the Great Plains region, which produces pronounced daily and seasonal temperature changes and considerable variation in seasonal and annual precipitation. Sudden changes in temperature due to frontal systems moving in and out of the area are common throughout most of the year, except during summer months when cold fronts seldom reach far enough south to noticeably affect the regional weather. The area lies close enough to the Gulf of America to be affected by tropical disturbances and is subject to intense local rainfall. During the spring and fall seasons, cool fronts move into the area quickly and mix with the warm moist air from the Gulf of America to form thunderstorms and tornadoes. During the winter months, Arctic cold fronts move into the area, causing the temperature to drop as much as 45 to 50 °F within a few hours and sometimes affecting the weather for several weeks.

The western portion of the basin is located in a semiarid region where wind movements are generally extreme, and the evaporation is high. In the central and eastern portions of the watershed, precipitation is usually adequate for agricultural purposes, and wind movements and evaporation are moderate. The zero index line of moisture deficiency–surplus is approximately aligned with the 97th Meridian, which runs north–south through the basin at the approximate upstream limits of Lake Texoma. This line separates areas with moist climates from those with dry climates. Significant amounts of precipitation occur in all seasons in most areas east of the 97th Meridian. Winter rainfall (and sometimes snowfall) is associated with large storms steering from west to east. Most summer rainfall occurs during thunderstorms and an occasional tropical storm or hurricane.

2.2.2.1 Temperature

Extreme temperatures vary from over 120 °F to values below zero. Severe cold weather rarely lasts longer than a few days. The western portion of the basin tends to experience more extreme temperature swings, though extreme temperatures can be experienced throughout the basin. Figure 2-1 shows the average monthly maximum and minimum temperatures for the different regions of the Red River Basin.

2.2.2.2 Precipitation

Rainfall distribution in the western portion of the basin is highly erratic. Drought periods of varying lengths interspersed with short violent storm periods are characteristic, particularly during the growing season. Further east, in the Ouachita Mountains portion of the basin, rainfall is normally abundant and usually occurs in the form of high intensity, local thunderstorms usually in the late spring and early fall. These storms are frequently accompanied by high winds, hail, and occasional tornadoes. The winter rains generally last

for several days and are more extensive than summer rains in terms of areal distribution. Periods of intense drought have also occurred in the general area.

AVERAGE MONTHLY TEMPERATURES (DEGREES F) FOR REGIONS OF THE RED RIVER BASIN

Region		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
SWT West of 97th Meridian	Max	52.2	56.3	64.6	73.8	81.6	89.5	94.3	93.6	85.9	75.2	63.1	52.5	73.5
	Min	26.9	30.5	37.7	46.1	56.4	65.0	69.2	68.3	60.4	48.9	37.4	28.0	47.9
SWT East of 97th Meridian	Max	52.5	57.1	65.0	73.4	80.2	87.7	92.6	93.6	86.0	75.7	64.2	53.9	73.5
	Min	30.4	34.3	41.9	49.7	59.1	67.0	70.6	69.9	62.4	51.4	41.8	32.2	50.9
SWL	Max	52.8	57.3	65.3	73.8	80.3	87.5	91.8	92.7	85.6	75.3	64.3	54.2	73.4
	Min	30.6	34.1	41.3	49.1	58.7	66.5	70.0	68.9	61.6	50.3	41.1	32.6	50.4
SWF	Max	55.4	59.5	67.2	75.2	82.1	89.2	93.2	94.2	87.4	77.3	66.4	56.7	75.3
	Min	33.4	36.6	44.0	51.4	60.8	68.3	71.6	70.9	63.6	52.4	43.6	40.4	52.6
MVK	Max	56.5	60.6	68.4	76.3	83.2	89.5	92.7	93.3	87.6	77.8	67.5	58.2	76.0
	Min	34.8	38.0	44.9	52.3	61.5	68.6	71.7	70.9	64.2	53.1	44.2	36.5	53.4

Data Source: http://www.prism.oregonstate.edu/normals/, 4km resolution

AVERAGE MONTHLY PRECIPITATION (INCHES) FOR REGIONS OF THE RED RIVER BASIN

Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
SWT West of 97th Meridian	0.35	1.28	2.07	2.24	3.71	4.03	2.22	2.68	2.80	2.79	1.49	1.29	27.62
SWT East of 97th Meridian	2.73	3.19	4.15	4.05	5.71	4.72	3.20	2.59	4.14	4.84	4.11	3.75	47.19
SWL	3.58	4.01	4.95	4.57	5.94	4.57	3.99	2.64	4.09	5.35	5.14	5.11	53.95
SWF	0.42	3.98	4.40	3.59	4.99	4.46	3.29	2.35	3.36	5.06	4.63	4.39	47.78
MVK	4.68	4.95	4.86	4.28	4.83	4.94	3.67	2.98	3.63	4.96	5.25	5.47	54.51

Data Source: http://www.prism.oregonstate.edu/normals/, 4km resolution

Figure 2-1. Average Monthly Temperatures (Top) and Precipitation (Bottom) in the Red River Basin

The National Oceanic and Atmospheric Administration's Historical Hurricane Tracks tool was used to analyze historical storm data in the project area. The tracking tool showed that a total of 73 hurricanes, tropical storms, tropical depressions, or extratropical events have passed within 100 miles of the project area since 1842. This includes one Category 4 hurricane: Hurricane Laura in 2020. Figure 2-2 displays the paths of Category 1 to Category 5 hurricanes that tracked within 100 miles of Alexandria in central Louisiana during the period of record (1842 to present).

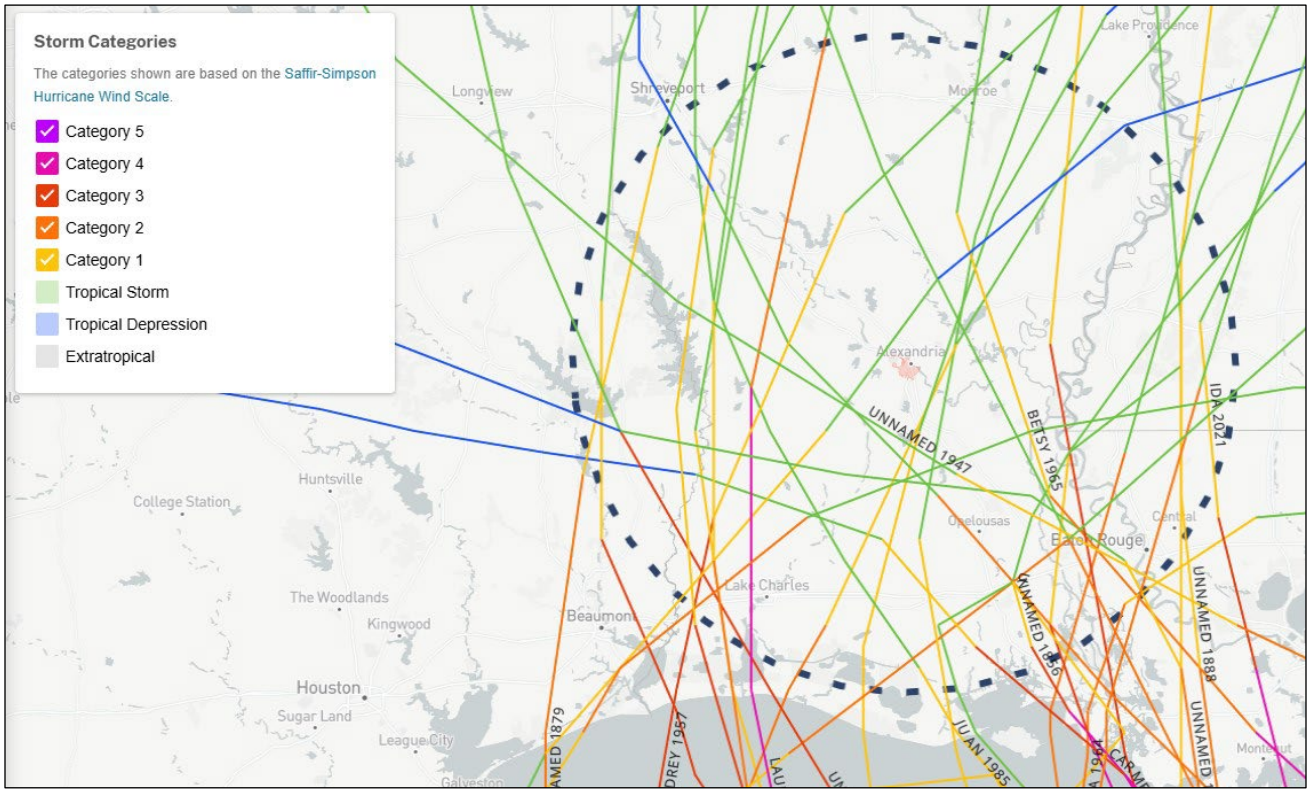

Figure 2-2. Historical Hurricane Data Within 100 Miles of Alexandria, Louisiana

An Infrastructure Installation and Resilience analysis was conducted. Results are presented as an attachment to Appendix A *Engineering*. According to the literature reviewed, warmer weather is expected in the future. There was a consensus that the temperature is expected to increase in the study region. Little consensus exists in projected trends of future precipitation in the study region, and streamflow is projected to mildly decrease in the study region, but that does not directly correlate to a consistent trend in streamflow. Due to this lack of consensus, any potential risks to the project were determined to be unlikely.

A March 2025 report by MVD, *Greater Mississippi River Basin Precipitation Trends,* described additional trends within the study area. The report concludes that annual precipitation and streamflow are on the rise throughout most of the Greater Mississippi River Basin; however, droughts are occurring more rapidly, and extreme transitions from low to high water or from dry to wet periods are occurring more frequently. Therefore, the lowermost reaches of the JBJ Waterway that lie within the Mississippi River floodplain, specifically the reach below L&D 1 referred to as the Gauntlet, is subjected to these trends because the area is highly influenced by Mississippi River conditions via the diversion of flows through the Old River Control Complex.

2.3 RELEVANT ECOLOGICAL RESOURCES

The resources described in this section are those recognized as significant by laws, executive orders (EOs), regulations, and other standards of National, State, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public.

Based on input from scoping and the ecological features present in the proposed project area, this EA addresses the following resources:

- Geology
- Topography, and Soils
- Aquatic Resources and Fisheries
- Air Quality
- Terrestrial Resources and Wildlife
- Water Quality
- Threatened, Endangered, and Protected Species
- Wetlands
- Cultural Resources
- Noise
- Recreation
- Hazardous, Toxic, and Radioactive Waste
- Socioeconomic Considerations

2.4 RESOURCES NOT EVALUATED IN DETAIL

This EA considered relevant environmental resources that would potentially be impacted by the proposed alternatives and eliminated resources from further evaluation that were either not in the area of potential effect or would not be impacted by any of the alternatives. These resources include the following:

- Wild and Scenic Rivers: No designated wild and scenic rivers in or near the study area)
- Coastal Zones: No coastal areas in the project area
- Prime and Unique Farmland: Only 0.58 acres of farmland would be impacted by the proposed alternatives and no farmland would be converted to unfarmable status
- Aesthetics: Areas where dikes would be constructed or modified already contain dikes and would not impact or alter the current aesthetics in the area

2.5 NATURAL ENVIRONMENT

2.5.1 Aquatic Resources and Fisheries

Aquatic resources within the vicinity of the project area consist of the current JBJ Waterway channel and tributary channels. These aquatic habitats support diverse forms of

phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles, fish, and mollusks.

The JBJ Waterway is home to a diverse array of fish species native to Louisiana waters, including largemouth bass (*Micropterus nigricans*), smallmouth bass (*Micropterus dolomieu*), spotted bass (*Micropterus punctulatus*), bluegill (*Lepomis macrochirus),* green sunfish (*Lepomis cyanellus*), alligator gar (*Atractosteus spatula*), bream, catfish, and crappie. In addition to fish, a variety of aquatic and semiaquatic reptile and amphibian species are expected to inhabit the areas in and around the river and wetlands. Many species of aquatic turtles, watersnakes, salamanders, and frogs use these areas for shelter, feeding, and reproduction. Turtle species that are may be present in the project area include the alligator snapping turtle (*Macrochelys temminckii*), common snapping turtle (*Chelydra serpentina*), river cooter (*Pseudemys concinna*), southern painted turtle (*Chrysemys picta dorsalis*), pond slider (*Trachemys scripta*), and spiny softshell turtle (*Apalone spinifera*). Semi-aquatic snake wildlife such as species of garter snake, ribbon snake, watersnake, and pit viper are also likely present, utilizing the river and its associated wetlands for reproduction and foraging. These aquatic habitats are also used by the American toad (*Anaxyrus americanus),* spring peeper (*Pseudacris crucifer),* green frog (*Lithobates clamitans*), bullfrog (*Lithobates catesbeianus*), and the marbled salamander (*Ambystoma opacum*).

2.5.2 Terrestrial Resources and Wildlife

Terrestrial habitats adjacent to the JBJ Waterway project areas consist of agricultural lands, fields, mixed hardwood forests, herbaceous shrub wetlands, and bottomland hardwood forests. The forest habitats near the project areas consist of oaks, cottonwood, sycamores, elms, maples, and ashes including water oak (*Quercus nigra*), cedar elm (*Ulmus crassifolia*), red maple (*Acer rubrum*), and American elm (*Ulmus americana*).

Wildlife in vicinity of the proposed actions includes those typical for the southern U.S. and the usual compliment of mammal species found in Louisiana including white-tailed deer (*Odocoileus virginianus*), squirrels (*Sciuridae spp.),* rabbits (*Sylvilagus spp.*), eastern chipmunks (*Tamias striatus*), black rats (*Rattus rattus*) and raccoons (*Procyon lotor*). Various species of birds including the northern bobwhite, great blue heron, and red-eyed vireo may also occur in the project area. Multiple species of reptiles and amphibians including the American box turtle (*Terrapene carolina*), ring-necked snake (*Diadophis punctatus*), hognose snake (*Heterodon platirhinos*), timber rattlesnake (*Crotalus horridus*), and those listed in Section 4.2.1 can be found within the forested areas, herbaceous shrub zones, and fields. Many of these species can also be found utilizing the edges of the river for foraging, reproduction, and shelter.

2.5.3 Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33

Code of Federal Regulations § 328.3[b]; Regulatory Programs of the Corps of Engineers 1986).

Wetlands are dynamic systems that are subject to both human and natural alterations that may affect their abundance as well as their quality. Natural events, including subsidence, rise in sea level, and sedimentation can impact the number and type of wetlands found in any given region of the country. Human activities have mainly led to a reduction in the number of acres of wetlands due to drainage for agriculture, channelization of waterways, dredging, and placement of fill for urban or industrial development.

Inland wetlands are referred to as palustrine habitats or wetlands associated with riverine or lake systems. The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergent mosses or lichens, forest vegetation and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per trillion (ppt). It also includes wetlands lacking such vegetation but with all the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2.5 meters (8.2 feet) at low water; and (4) salinity due to ocean-derived salts less than 0.5 ppt.

With most of the proposed activities taking place within the river instead of on land, there are few to no wetlands directly within the project area. However, various types of wetlands border the edge of the river where the proposed actions would occur. The U.S. Fish and Wildlife Service (USFWS)'s National Wetlands Inventory (NWI) database was used to identify possible wetlands in the project area (USFWS National Inventory https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/). According to the NWI, most of the wetlands adjacent to the project area are comprised of bottomland hardwood (BLH). The trees in these wetlands are characterized as broad-leaved deciduous with relatively wide, flat leaves that are shed during the cold or dry season, making the canopy leafless sometime during the year. This type of wetland ranges from being temporarily flooded for brief periods (from a few days to a few weeks) during the growing season to being semipermanently flooded with surface water persisting throughout the entire growing season. Scrub-shrub wetlands can also be found along the riverbanks near the project area. These wetlands are comprised of young angiosperms and shrubs with relatively wide, flat leaves that are shed during the cold or dry season and are flooded temporarily or seasonally. Very few emergent wetlands are located near the project area.

2.5.4 Threatened, Endangered, and Protected Species

According to updated results obtained from the USFWS Information, Planning, and Conservation (IPaC) tool on 7 August 2025, there are a total of 6 threatened, endangered, or candidate species listed that could inhabit the immediate project area (Appendix C *Environmental* Section 2). The federally listed species that could occur in the project area are as follows:

- Tricolored bat (*Perimyotis septentrionalsis*): Proposed Endangered

- Red-cockaded woodpecker (*Dryobates borealis*): Threatened
- Whooping crane (*Grus americana*): Experimental Population
- Alligator snapping turtle (*Macrochelys temminckii*): Proposed Threatened
- Pallid sturgeon (*Scaphirhynchus albus*): Endangered
- Monarch butterfly (*Danaus plexippus*): Proposed threatened

2.5.4.1 **Tricolored Bat**

Legal Status:

The tricolored bat is federally listed as Proposed Endangered, and additional information regarding its legal status can be found on the USFWS Environmental Conservation System (ECOS) Species Profile.

Life History Information:

The tricolored bat is a small insectivorous bat that is distinguished by its unique tricolored fur and often appears yellowish to nearly orange. The once common species is wide ranging across the eastern and central U.S. and portions of southern Canada, Mexico, and Central America. During the winter, tricolored bats are often found in caves and abandoned mines, although in the southern U.S., where caves are sparse, tricolored bats are often found roosting in road-associated culverts where they exhibit shorter torpor bouts and forage during warm nights. During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but may also be found in Spanish moss, pine trees, and occasionally human structures. Tricolored bats mate during spring and fall and sometimes in winter. Maternity colonies begin forming in mid-April, and females bear 1 to 2 pups by late May to mid-July. Tricolored bats face extinction due primarily to the wide-ranging impacts of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the continent. White-nose syndrome has caused estimated declines of more than 90 percent in affected tricolored bat colonies across the majority of the species range.

2.5.4.2 **Red-Cockaded Woodpeckers**

Legal Status:

The red-cockaded woodpecker is federally listed as Threatened, and additional information regarding its legal status can be found on the ECOS species profile.

Life History Information:

The red-cockaded woodpecker is a threatened species typically found in mature pine stands or deciduous forest where at least 50 percent of the trees are pines. While other woodpeckers bore out cavities in dead trees where the wood is rotten and soft, the red-cockaded woodpecker is the only one that excavates cavities that are exclusively in living pine trees. The red-cockaded woodpecker feeds primarily on ants, beetles, cockroaches, caterpillars, wood-boring insects, and spiders and occasionally on fruit and berries. The vast

majority of foraging occurs on pines, with a strong preference for large trees, though they will occasionally forage on hardwoods and even in cornfields, for corn earworms. The red-cockaded woodpecker is a rather small black-and-white woodpecker with a longish bill. Feathers on top of the body are black barred white while those below are white with black spots on flanks. The red-cockaded woodpecker has a black crown, nape, and moustachial stripe that borders its white cheeks and side of neck. Red-cockaded woodpecker males have a small red mark on the side of the nape. Juveniles are browner with a variable extent of red on their crown.

2.5.4.3 **Whooping Crane**

Legal Status:

The whooping crane is federally listed as Endangered except for experimental populations, which are designated as nonessential. Additional information regarding its legal status can be found on the ECOS species profile.

Life History Information:

The whooping crane occurs only in North America and is North America's tallest bird, with males approaching 1.5 meters (5 feet) when standing erect. The whooping crane adult plumage is snowy white except for black primaries, black or grayish alula (specialized feathers attached to the upper leading end of the wing), sparse black bristly feathers on the carmine crown and malar region (side of the head from the bill to the angle of the jaw), and a dark gray–black wedge-shaped patch on the nape. The common name whooping crane probably originated from the loud, single-note vocalization given repeatedly by the birds when they are alarmed. Whooping cranes continue to face threats from alteration and destruction of habitat—including migratory habitat and winter habitat—from wetland drainage, increased development, and conversion of suitable habitat to agriculture. The increase in the frequency and severity of drought due to climate variability and the reduction in river flows degrade migration roost habitat.

2.5.4.4 **Alligator Snapping Turtle**

Legal Status:

The alligator snapping turtle is federally listed as Proposed Threatened, and additional information regarding its legal status can be found on the ECOS species profile.

Life History Information:

The alligator snapping turtle is proposed to be listed as threatened and is one of the largest freshwater turtles in the world, with adults sometimes exceeding two feet in shell length and weighing reach nearly 250 pounds. Its size and appearance give this creature a prehistoric likeness. The back of the shell is distinctly jagged, and the top of the shell (carapace) has three rows of "spikes" or knobs running lengthwise along entire length of the shell. These

turtles inhabit large rivers, sloughs, and oxbow lakes where they spend almost their entire lives in water, normally venturing onto land only to lay eggs. While beneath the water's surface, these turtles are able to use their unique worm-like appendage located on the bottom of their mouth to lure in potential prey.

2.5.4.5 **Pallid Sturgeon**

Legal Status:

The pallid sturgeon is federally listed as Endangered, and additional information regarding its legal status can be found on the ECOS species profile.

Life History Information:

The pallid sturgeon is an endangered species of ray-finned fish, endemic to the waters of the Missouri and lower Mississippi River Basins of the U.S. It may have even reached the St. Croix River before colonization. The pallid sturgeon was first recognized as a species different from shovelnose sturgeon by S. A. Forbes and R. E. Richardson in 1905 based on a study of nine specimens collected from the Mississippi River near Grafton, Illinois (Forbes and Richardson 1905). They named this new species *Parascaphirhynchus albus*. Later reclassification assigned it to the genus *Scaphirhynchus* where it has remained (Bailey and Cross 1954; Campton et al. 2000). Pallid sturgeon have a flattened shovel-shaped snout; a long, slender, and completely armored caudal peduncle (the tapered portion of the body which terminates at the tail); and lack a spiracle (small openings found on each side of the head) (Forbes and Richardson 1905). As with other sturgeon, the mouth is toothless, protrusible (capable of being extended and withdrawn from its natural position), and ventrally positioned under the head. The skeletal structure is primarily composed of cartilage rather than bone. The pallid sturgeon is closely related to the relatively common shovelnose sturgeon (*Scaphirhynchus platorynchus*), but is much larger, averaging between 30 and 60 inches in length and 85 pounds in weight at maturity. This species takes 15 years to mature and spawns infrequently, but can live up to a century.

Pallid sturgeon are a bottom-oriented, large river obligate fish inhabiting the Missouri and Mississippi rivers and some tributaries from Montana to Louisiana (Kallemeyn 1983). Pallid sturgeon can inhabit diverse environments including floodplains, backwaters, chutes, sloughs, islands, sandbars, and main channel waters.

2.5.4.6 **Monarch Butterfly**

Legal Status:

The monarch butterfly is federally listed as "Proposed Threatened" and additional information regarding its legal status can be found on the ECOS species profile.

Life History Information:

Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay

their eggs on their obligate milkweed host plant and larvae emerge after two to five days. The main monarch host plant is common milkweed (*Asclepias syriaca*), but other common hosts include swamp milkweed (*Asclepias incarnata*), butterflyweed (*Asclepias tuberosa*), whorled milkweed (*Asclepias verticillata*), and poke milkweed (*Asclepias exaltata*). Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites.

2.5.5 Migratory Birds

The Migratory Bird Treaty Act of 1918 provides protection for bird species native to North America. The project is within an important corridor, the Mississippi Flyway, for birds migrating to and from tropical wintering areas in the Caribbean, Mexico, and Central and South America. Due to this, a variety of migratory birds might occur in the project areas including species of waterfowl, wading birds, shorebirds, passerines, and raptors that use the JBJ Waterway during migration for resting, feeding, nesting, and other life-history needs. A list of possible migratory species and the likelihood of their presence was provided during the USFWS IPaC process (Appendix C *Environmental* Section 2).

2.5.6 Bald Eagles

Although the bald eagle (*Haliaeetus leucocephalus*) was removed from the Federal list of threatened and endangered species in 2007, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits unregulated take of bald eagles, including disturbance. Bald eagles occur regularly in Mississippi as both migrants and breeders, with some populations of year-round residents along major rivers and reservoirs in the State. There are not currently known eagle nests within the project footprint. If a nest is later discovered within 660 feet of the project area, then avoidance measures and permitting would be coordinated with USFWS.

2.5.7 Invasive Species

An invasive species is one that has been introduced by human activity—deliberately or accidentally—to geographic areas outside its native range and has caused ecological or economic impacts in that location. The discussion below focuses on invasive species that are known or could occur in the study area of both terrestrial and aquatic environments. Introduced or exotic species are plants and animals that generally adversely affect or alter the ecosystems they invade to the detriment of native (endemic) species.

Invasive species that are known to or could possibly inhabit the project area on the JBJ Waterway include bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), black carp (*Mylopharyngodon piceus*), zebra mussels (*Dreissena polymorpha*), hydrilla (*Hydrilla verticillate*), and nutria (*Myocastor coypus*).

2.6 PHYSICAL ENVIRONMENT

2.6.1 Geology, Topography, and Soils

The Red River in Louisiana is characterized by alluvial sediments, particularly in the Red River Valley. These sediments, ranging from clay to gravel, form the Red River Alluvial aquifer, a significant source of freshwater. The river's geological history includes avulsion events when the Mississippi River shifted and captured the Red River, leading to the deposition of sediments and the formation of terraces. Soils in the project area are mostly comprised Roxana very fine sandy loam, Coushatta silty clay loam, Tensas-Alligator complex, and Severn very fine sandy loam. All of these soil types with the exception of Tensas-Alligator complex soils are well drained, have moderate to high permeability, and slope 0–3 percent. Tensas-Alligator complex soils are poorly drained, have low permeability, and slope 1–5 percent.

2.6.2 Water Quality

The Clean Water Act (CWA) is environmental legislation enacted in the U.S. in 1972 to address the widespread degradation of the Nation's water bodies. Its primary aim is to restore and maintain the integrity of the Nation's waters by regulating pollutant discharges, setting water quality standards, and ensuring the protection of aquatic ecosystems. The CWA empowers the U.S. Environmental Protection Agency (EPA) and State agencies to enforce stringent controls over industrial, municipal, and agricultural waste, thereby safeguarding public health and preserving natural habitats.

Water quality standards are the foundation of the CWA, and water pollution control programs are designed to protect the beneficial uses of the water resources. Each State has the responsibility to set water quality standards that protect these beneficial uses, also called designated uses. The Louisiana Department of Environmental Quality (LDEQ) is responsible for setting water quality standards to protect designated uses and for issuing State environmental permits. Louisiana waters are designated for a variety of uses including recreation, public water supply, ephemeral water bodies, and fish and wildlife habitats. The JBJ Waterway is designated for navigation, drinking water, and recreation.

Section 303(d) of the CWA requires States to identify water bodies that are considered impaired due to not meeting one or more applicable water quality standards. According to the EPA’s Waterway website, the Red River, including the JBJ Waterway, is listed as impaired from the Arkansas border to Alexandria, Louisiana (Figure 2-3), due to issues with drinking water supply. The JBJ Waterway south of Alexandria, Louisiana, is not designated as impaired. There are no scenic or wild rivers within the project area.

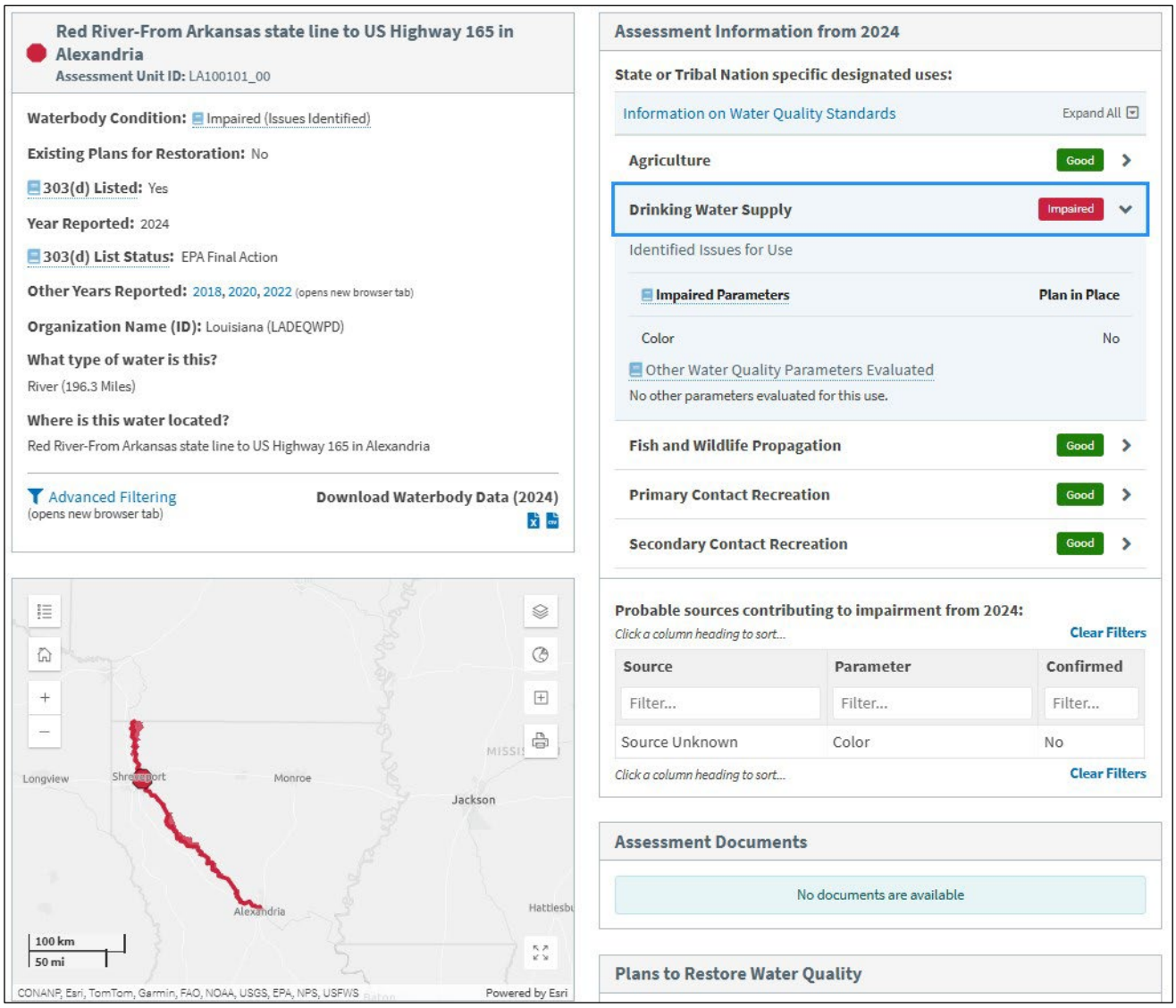

Figure 2-3. Red River Water Quality Information

2.6.3 Air Quality

The Clean Air Act of 1963 requires the EPA to designate National Ambient Air Quality Standards (NAAQS) and secondary standards of public welfare to protect ecosystems, including plants and animals, from harm, as well as protecting visibility and damage to crops, vegetation, and buildings. Ambient air quality is determined by the type and concentration of pollutants emitted into the atmosphere, the size and topography of the air basin in question, and the prevailing meteorological conditions in that air basin. The EPA has set NAAQS for six principal air pollutants: ground-level ozone (O_3), particulate matter (PM_{10} = less than 10

microns; $PM_{2.5}$ = less than 2.5 microns in diameter), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The EPA Green Book database was used to determine if a Clean Air Act conformity determination would be required and whether the project area is currently in compliance with the NAAQS (https://www3.epa.gov/airquality/greenbook/anayo_la.html). All parishes the project would occur in are in attainment and compliant with the NAAQS (data are current as of 28 August 2025).

2.6.4 Noise

Inadequately controlled noise presents a risk for adverse impact to humans and animals. Sound is measured in decibels (dB). A whisper is approximately 30 dB, normal conversation is approximately 60 dB, and a motorcycle engine running is approximately 95 dB. Noise levels above 70 dB over a prolonged period may start to damage human hearing. Noise levels above 120 dB can cause immediate harm to human ears. The EPA and the World Health Organization recommend maintaining environmental noises below 70 dBA over 24 hours (75 dBA over 8 hours) to prevent noise-induced hearing loss.

Noise levels along the JBJ Waterway are characteristic of a variety of soundscapes including agricultural, urban, rural, domestic, and recreational. Human-made and nature sounds such as cars and bird calls comprise a large part of the regular ambient soundscape along the river. Boating, recreation activities, construction, and vehicle traffic within the urban areas generate higher than ambient noise levels compared to the surrounding rural farming areas. Additionally, vegetation management activities may occasionally contribute to higher-than-ambient noise levels.

2.6.5 Floodplain

Under the No Action Alternative, the future change in water levels given specific flows (stage–flow relationship) and the annual frequency of interaction between the river and the floodplain are complex but observed trends, and existing analyses may provide crucial foresight. In 2020, the Red River Hydraulic Analysis at Shreveport was completed by the USACE Vicksburg District's Hydraulics and Hydrology Division (H&H) and the ERDC CHL, followed by a Red River Flowline Analysis completed in 2023 by Vicksburg District's H&H. The 2020 analysis focused on the changes that occurred in the Shreveport-to-L&D 5 reach between the 1990 and 2015 floods, since the 2015 flood experienced higher water levels than the 1990 flood given their similar flow rates. The 2020 and 2023 analyses collectively provide good information about changes that have occurred throughout the entirety of the waterway.

Trends between the 1990 flood and the 2015 flood illustrated that the middle to upper reaches (Shreveport, Coushatta, and Grand Ecore) of the waterway channels and floodplain had experienced aggradation while the lower reaches from Alexandria and reaches downstream of Alexandria had incised or degraded. It is noted that although the reach below L&D 1 (specifically RM 34 to 40) has experienced degradation over time with the project in place, considerable dredging efforts are still required here to maintain navigable depths, but

those dredging efforts are significantly smaller compared to those reflected in the dredge data recorded in the 1990s. That time frame includes the completion of the final major piece of the waterway, which was L&D 5, in 1995; L&D 5 is situated approximately 28 RM downstream of Shreveport. The 2020 Red River Hydraulic Analysis at Shreveport concluded that aggradation in the river channel, along with increased sedimentation and vegetation in the dike fields and adjacent floodplain, was the major contributor to the increase in water levels during the 2015 flood when compared to the 1990 flood. It was concluded that the majority of these changes occurred during the first five years after L&D 5 was established in 1995. These analyses were not completed to predict the future but suggest that the channel conditions may have stabilized approximately five years after the completion of the final major piece of the waterway in 1995. In general, the aggraded reaches of the river have less channel capacity than the degraded reaches. In other words, aggraded reaches are more prone to bank overflow and floodplain inundation than degraded reaches. The overall channel or bankfull capacity varies along the river, and even from reach to reach in some cases as the river transitions through varying degrees of channelization. The middle to upper reaches of the waterway generally have an approximate bankfull capacity of 100,000 cubic feet per second (cfs), closely correlating to a 50 percent annual exceedance probability (AEP) or 2-year flood based on the 2023 Flowline Flow–Frequency Analyses. The lower reaches of the waterway are greatly incised, with higher riverbanks and a less frequent bankfull capacity of approximately 150,000 cfs, corresponding to a 20 percent AEP or 5-year flood based on the 2023 Flowline Flow–Frequency Analyses. Based on the recent analyses and observed trends, these conditions have appeared to remain somewhat stabilized; however, targeted sediment transport and geomorphic analyses would be required to provide higher confidence in the projection of future conditions. Notably, L&D 3 operates via hinge pool control, meaning that as the river flows rise, the gates are opened sufficiently to lower the operating pool by many feet as a mitigation to the adjacent floodplain. These operations were set in place when the structure was first completed in 1991 and are not anticipated to change. Additional detail can be found in the water control manual.

Another aspect of hydraulic-related influences on the floodplain are the presence of river training structures. The Red River has an extensive system of river training structures such as dikes and revetments that influence channel and floodplain conditions by contracting the river channel, redirecting the concentration of flow into the main channel, and sometimes modifying flooding patterns. As dikes redirect flow into the channel, the dike fields, or areas behind the dikes, often undergo sediment deposition and vegetation, leading to increased roughness and higher water levels. Vegetation within the dike fields can fluctuate depending on the combination of the climate, hydraulics, and hydrology, such as the frequency of high-water events to somewhat flush out the vegetation in the dike fields or even to replenish sediment in the dike fields. Conversely, a lack of high-water events may allow for vegetation to become dense and mature, leading to a more influential obstruction to the flow of water. In general, Mississippi River Geomorphology and Potamology studies, particularly Mississippi River Geomorphology and Potamology reports Nos. 37 and 44, have shown that dikes on the Mississippi River impose inch-level variability on water surface elevations at

flood flows due to the presence of the dikes and the sediment deposition and vegetation that occur within the dike fields. While the responses from the dike systems on the Mississippi River cannot be directly transposed to the Red River, the results of the aforementioned studies are informative. In general, dikes scour the main channel and deposit sediment in the dike field, which can lead to vegetation growth. The typical expectation is that the decreased conveyance in the dike field is offset by the increased conveyance due to the scouring in the main channel. However, vegetation can develop such that the vegetation exceeds the increased capacity of the main channel leading to a lesser overall channel conveyance. The 2020 Red River at Shreveport Hydraulic Analysis considered hydraulic model sensitivities using the 2015 flood flows to assess the direct and secondary influences of the dikes and the vegetation within the dike fields located in Pool 5 on the peak water surface elevations. The direct influence of the dikes on water levels (versus no dikes) under the existing conditions was found to be negligible, but when significantly increasing the height of the dikes by several feet, the direct influence of the dikes on water levels was found to be significantly impactful. Due to the presence of this significant vegetation growth, the analysis focused on the reduction in roughness or removal of the vegetation to assess the impacts to water surface elevations. The analysis illustrated that the removal of the vegetation (by assuming the same roughness coefficient as the main channel) within the dike fields between L&D 5 (RM 200) and Shreveport (RM 228.8) resulted in a significant decrease in water surface elevations throughout the reach, with a peak decrease of nearly 1 foot near RM 225. If vegetation continues to grow and mature within the dike fields, then the influence could become even greater than it is under existing conditions.

It should also be noted that dikes can redirect flow, leading to the erosion of banks across river (or downstream), which can threaten the adjacent floodplain acreage or even adjacent levees.

Another factor related to channel conveyance and the adjacent floodplain is the process of dredging, or removing sediment from the riverbed. USACE dredging practices for maintaining the navigation channel are summarized in Section 1.2.3.7 of Appendix A *Engineering*. Additional dredging occurs on the Red River by private entities for sand mining. There are multiple permitted sand mining operations on the Red River below Fulton, Arkansas. These activities are expected to continue for the foreseeable future. The impacts to geomorphology and the sediment budget of the river system are unknown.

The Red River is comprised of highly erosive banks and can experience hundreds of feet of lateral migration during flood events (“The Management of Sediment Management on the JBJ Waterway,” Pinkard-Steward 2001). Controlling bank erosion is complex, especially along river systems with the size and characteristics of the Red River, but the Vicksburg District River Stabilization Section closely monitors historically known problem areas that may prove to be good indicators of how future conditions may evolve. Sediment regimes and transport also play important roles in the stability of a river system and its adjacent floodplains. Notably, the primary source of sediment transported on the Red River comes from the erosion of unrevetted banks, especially those upstream of Shreveport (Pinkard-Steward, 2001). The areas upstream of Shreveport are not within the waterway footprints; therefore, bank stabilization from a navigation standpoint is not a focus in the river north of

the waterway. However, some bank stabilization measures are present to keep the river in a desired alignment and protect adjacent levees. Further, the 2020 Red River Hydraulic Analysis assessed the transport of sediment (suspended coarse loads) at L&D 5 and concluded that very little suspended coarse loads can move past L&D 5 until higher flows are experienced, such as those of a bankfull type of magnitude.

Observed trends are not necessarily indicative of future trends; however, observations can provide crucial insight into the possibilities of the future conditions.

2.7 HUMAN ENVIRONMENT

2.7.1 Cultural Resources

Cultural and historic resources are past and present expressions of human activity across the landscape. What follows is a description of the various cultural periods derived primarily from comprehensive state plans prepared by the region's various historic preservation and academic communities. Only those resources identified/inventoried within 1 mile (1.6 kilometer) of this portion of the Red River waterway were analyzed as part of this study. Resources were identified for inventory and analysis based on a review of multiple data sources, including but not limited to the National Register of Historic Places (NRHP) database, Louisiana Office of Cultural Development, Division of Archaeology's (hereafter referred to as LA SHPO) Louisiana Cultural Resources Map and resource databases, historic aerial photography, historic maps, local histories, and cultural resources survey (CSR) reports in order to properly chronicle cultural contexts for and existing conditions of the study area (Table 2-2, and Table 2-3 seen below)

The results of this search revealed a wide range of cultural resources, both above-ground (i.e., cemeteries, historic buildings and districts, landscape features, and structures) (n=216) and archaeological sites (n=366). Based upon established date ranges/time periods of those above-ground resources that could be dated, which excludes active/in-use cemeteries, they date to the 20th century, which for the purposes of this analysis is between 1900 and 1975 (Table 2-1). Most of these resources are historic residences (66 percent), with smaller numbers of historic commercial (13 percent), educational (9 percent), medical (4 percent), and religious (2 percent) buildings, residential districts (2 percent), and earthen embankments/fortifications, public buildings, recorded historic cemeteries, and transportation structures (1 percent each) (see Cultural Tables 1 and 2).

Table 2-1. Known Date Ranges and Types of Previously Recorded Above-Ground Resources

Categories	Number
Established Date Ranges	(n=174)*
Circa 1850–1900	17
Circa 1900–1925	50
Circa 1925–1950	52
Circa 1950–1975	51
Circa post-1975	4
Resource Types	(n=216)
Active/In-Use Cemeteries	42
Commercial Buildings	22
Earthen Embankments/Fortifications	2
Educational Buildings	15
Medical Buildings	7
Public Buildings	2
Recorded Historic Cemeteries	2
Religious Buildings	4
Residences	114
Residential Districts	4
Transportation Structures	2

*Total minus 42 active/in-use cemeteries.

The Red River Basin is a rich and diverse cultural and historical landscape. As such, nearly 10,000 years of occupation have been identified and documented within the study area. The earliest occupations date to the Archaic Stage and are mostly characterized as dating to the wider Archaic date range; only two occupations were found to be associated with the Poverty Point Culture (see Table 2-2). More Woodland Stage occupations were noted, slightly more than twice the number of Archaic Stage occupations, and were found to be associated with an individual culture (Tchefuncte) and specific periods (Marksville and Troyville-Coles Creek) rather than the Woodland Stage in general. Only a small number of Mississippian Stage occupations were noted, a reduction of approximately 71.43 percent from the preceding Woodland Stage; all are assigned to the Plaquemine–Mississippian Period. Some 59 prehistoric occupations were unable to be assigned to a specific prehistoric era and remain undetermined (see Cultural Table 2). Generalized Woodland and Middle/Late Woodland period occupations account for 62 percent of all prehistoric

archaeological components; the remaining consisting of Archaic and Mississippian, both at 15 percent, and Undetermined Prehistoric at 8 percent (see Cultural Table 2). Historic-period archaeological occupations are considerably greater in overall number by a factor of approximately 5.233. The early historic eras (Early Exploration and the Colonial Era as well as Territorial/Antebellum Era) are the least common, increasingly only slightly in number into the subsequent Civil War era, before increasing exponentially in number during the following Reconstruction/Postbellum and 20th Century to Modern eras. Only 27 historic occupations were unable to be assigned to a specific historic era and remain undetermined (see Table 2-2).

Table 2-2. Temporal Component/Occupations of Previously Recorded Archaeological Resources

Temporal Component/Occupation	Number
Prehistoric Eras	(n=120)
Paleoindian Stage (10,000 to 7,000 B.C.)	-
General Paleoindian Stage	0
Archaic Stage (8,000 to 500 B.C.)	-
General Archaic Stage	8
Poverty Point Culture (2,000 to 500 B.C.)	2
Woodland Stage (500 B.C. to A.D. 700)	-
Tchefuncte Culture (500 B.C. to A.D. 1)	1
Marksville Period (100 B.C. to A.D. 400)	9
Troyville-Coles Creek Period (A.D. 400 to 1200)	11
Mississippian Stage (A.D. 1200 to 1700)	-
Plaquemine to Mississippian Period	6
Caddoan Culture (A.D. 900 to 1835)	24
Undetermined Prehistoric Era	59
Historic Eras	(n=628)
Early Exploration and the Colonial Era (A.D. 1699 to 1803)	14
Territorial/Antebellum Era (A.D. 1803 to 1861)	33
Civil War (A.D. 1861 to 1865)	41
Reconstruction/Postbellum Era (A.D. 1865 to 1900)	264

20th Century to Modern (A.D. 1900 to Modern)	249
Undetermined Historic Era	27

Of the 174 above-ground resources and 366 archaeological resources, 23 percent and 34 percent, respectively, have not been evaluated for listing to the NRHP and are simply listed as undetermined. Of the remaining above-ground resources, 38 percent are considered ineligible for listing, followed by 25 percent eligible for listing, 13 percent listed to the NRHP, and 1 percent delisted from the NRHP. Conversely, over half (54 percent) of archaeological resources are considered ineligible for listing, followed by 9 percent potentially eligible for listing (meaning additional assessment/evaluation is needed before a conclusive determination can be made), and 1 percent each eligible for listing and NRHP-listed (Table 2-3).

Table 2-3. NRHP Eligibility of all Previously Recorded Cultural Resources

NRHP Determination	Number
Above-Ground Resources	(174)
Eligible	42
Ineligible	66
NRHP De-Listed	2
NRHP Listed	24
Undetermined	40
Archaeological Resources	(366)
Eligible	4
Ineligible	198
NRHP Listed	4
Potentially Eligible	34
Undetermined	126

A total of 107 cultural resources efforts have been conducted across the study area, dating between 1975 and 2024 (Cultural Table 4). When sorted by date range, decades, the distribution is surprisingly consistent, between 17 and 23 per year. The highest numbers occurred between 1975 and 1989, corresponding with 15 compliance-related cultural resources efforts conducted in association with construction of 14 revetments, all five locks and dams, and one levee construction and one levee realignment project. Between 1990 and 1999, another 11 compliance-related efforts were conducted in association with all five navigation pools, an additional three levee realignments, two locks and dams, and an additional two revetments. Navigation pools, created by dams and made navigable by locks, allow boats to travel along rivers with varying water levels. Dams raise the water level on the

upstream side, creating a pool of navigable water associated with the adjacent L&D system (e.g., navigation Pool 3 is upstream of L&D 3). These pools extend from the dam to the next dam upstream. Between 2000 and 2019, the number of waterway-related compliance projects decreased significantly, consisting of five levee stabilizations, one levee realignment, and one involving navigation Pools 3–5.

Most (69 percent) of these CSR efforts consist of full phase I-level CRS efforts, with the remainder consisting of assessments (13 percent), site excavations/research (11 percent), and reconnaissance (7 percent). Most of the reconnaissance (86 percent) and CRS efforts (64 percent) represent waterway-related projects (flood control measures, feasibility studies, levee work [construction, realignment, and stabilization], locks and dams [including navigation pools], and revetments), while nearly all the assessments (71 percent) are related to site excavation/research efforts. The remainder of all cultural resources efforts are associated with borrow/construction, transportation, and utility projects (see Table 2-4).

Table 2-4. Previously Recorded Cultural Resources Investigative Efforts

Cultural Resources Effort	Number (n=107)
Assessment	14
Red River Waterway Study	1
Research/Site Excavation	10
Transportation	2
Utility	1
Cultural Resources Survey	74
Borrow/Construction	7
Flood Control Project	1
Levee Work	(19)
Enlargement	1
Realignment	5
Stabilization	3
Lock and Dam	(14)
L&D 1	1
L&D 2	1
L&D 3	1
L&D 4	2

Cultural Resources Effort	Number (n=107)
L&D 5	1
L&Ds 2–5	1
Pool 3	1
Pool 5	1
Pools 1 and 2	1
Pools 3 and 4	1
Pools 3 and 5	1
Pools 4 and 5	1
Pools 3–5	1
Red River Waterway Studies	3
Revetments	10
Transportation	5
Utility	25
Reconnaissance	7
Borrow/Construction	1
Levee Work	(3)
Construction	1
Enlargement	1
Stabilization	1
Flood Control Project	1
Red River Waterway Study	1
Research/Site Excavation	1
Research/Site Excavation	12

2.7.2 Socioeconomic Considerations

The socioeconomics of the communities in the study area are summarized in this section. The study area is exclusively within the State of Louisiana, though the waterway interconnectivity extends beyond the Louisiana State line. The JBJ Waterway extends through or along the borders of the parishes of Caddo, Bossier, Red River, Natchitoches, Grant, Rapides, Avoyelles, Catahoula, and Concordia.

2.7.2.1 Population

Louisiana ranks as the 25th largest State in the Union in terms of resident population as of the 2020 U.S. census. The population numbers for each parish along the JBJ Waterway are displayed in Table 2-5.

Table 2-5. Populations of Parishes in Project Area

Geographic Area	Total Population
Louisiana	4,621,025
Avoyelles Parish	39,176
Bossier Parish	129,134
Caddo Parish	232,973
Catahoula Parish	8,738
Concordia Parish	18,325
Grant Parish	22,123
Natchitoches Parish	37,047
Rapides Parish	128,470
Red River Parish	7,529

Source: American Community Survey, Demographic Estimates, 2020 5-Year Estimates

2.7.2.2 Employment

Louisiana employment for persons 16 and older in 2024 totaled approximately 2 million. Of the major industry sectors within the State, the educational services and healthcare and social assistance sector employed the most persons at 513,000. This industry was followed by retail trade (229,000) and professional, scientific, and management, and administrative and waste management services (195,000).

The proportions of workers per sector in the parishes in the study area fairly parallel what was observed at the State level (Table 2-6).

Table 2-6. Employment by Industry, 2024

	Louisiana	Avoyelles Parish	Bossier Parish	Caddo Parish	Catahoula Parish	Concordia Parish	Grant Parish	Natchitoches Parish	Rapides Parish	Red River Parish
Agriculture, forestry, fishing and hunting, and mining	3.3%	5.0%	3.3%	2.4%	15.1%	9.0%	6.2%	4.3%	2.3%	11.9%
Construction	8.3%	12.3%	7.1%	5.3%	7.4%	9.4%	9.3%	5.3%	7.4%	6.0%
Manufacturing	7.5%	4.2%	7.3%	5.5%	6.5%	5.9%	10.7%	9.6%	5.6%	14.0%
Wholesale trade	2.3%	3.1%	2.2%	2.7%	1.3%	3.3%	0.4%	0.7%	3.0%	1.6%
Retail trade	11.3%	12.9%	11.3%	11.8%	12.1%	8.8%	8.9%	13.2%	12.3%	7.8%
Transportation and warehousing, and utilities	5.8%	3.7%	5.6%	6.4%	3.3%	5.4%	7.7%	4.8%	5.5%	4.6%
Information	1.4%	1.5%	1.4%	1.1%	0.6%	0.2%	1.0%	0.7%	0.7%	0.0%
Finance and insurance, and real estate and rental and leasing	5.1%	5.2%	4.2%	5.3%	2.3%	5.0%	3.3%	4.9%	3.8%	1.5%
Professional, scientific, and management, and administrative and waste management services	9.6%	6.6%	8.7%	10.0%	8.0%	9.7%	9.1%	6.8%	7.1%	6.4%
Educational services, and health care and social assistance	25.3%	23.5%	25.5%	28.2%	23.7%	23.5%	23.3%	31.4%	29.2%	25.8%
Arts, entertainment, and recreation, and accommodation and food services	9.4%	10.3%	10.2%	10.1%	7.0%	7.3%	4.9%	8.3%	11.0%	8.1%
Other services, except public administration	5.2%	4.8%	6.5%	6.0%	2.4%	5.5%	9.1%	5.3%	4.2%	5.3%
Public administration	5.4%	6.9%	6.8%	5.3%	10.2%	7.1%	6.1%	4.6%	7.8%	7.1%

Source: American Community Survey, Economic Characteristics, 2020 5-Year Estimates

As shown in Table 2-7, the parish unemployment rates ranged from 3.2 percent (Red River Parish) to 11.7 percent (Concordia Parish). The average rate of 6.4 percent across the nine Louisiana parishes was very similar to the 6.3 percent for the State and higher than the National rate of 5.4 percent.

Table 2-7. Unemployment Rate, 2024

Geographic Area	Unemployment Rate
Louisiana	6.30%
Avoyelles Parish	6.80%
Bossier Parish	5.60%
Caddo Parish	8.40%
Catahoula Parish	6.30%
Concordia Parish	11.70%
Grant Parish	4.50%
Natchitoches Parish	6.20%
Rapides Parish	4.90%
Red River Parish	3.20%

Source: American Community Survey, Economic Characteristics, 2020 5-Year Estimates

2.7.2.3 Median Household Income for Selected Parishes

Median household incomes for the nine parishes in 2024 are shown in Table 2-8. The average median household income across the nine Louisiana parishes was $49,926, which was much lower than the State median of $60,023 and the National median of $64,994.

Table 2-8. Median Household Income, 2024

Geographic Area	Median Household Income (dollars)
Louisiana	60,023
Avoyelles Parish	39,439
Bossier Parish	66,336
Caddo Parish	50,067
Catahoula Parish	47,753
Concordia Parish	37,349
Grant Parish	61,112
Natchitoches Parish	46,798
Rapides Parish	55,946
Red River Parish	44,539

Source: American Community Survey, Economic Characteristics, 2020 5-Year Estimates

2.7.2.4 Race

In 2024, the majority population of Louisiana was characterized as “White” (63.6 percent). The next largest population was the “Black or African American” population. Louisiana’s “Black or African American” population percentage at 33.1 percent was nearly three times that of the National average (13 percent). The smallest population was the “Native Hawaiian” population at 0.1 percent (Table 2-9).

Table 2-9. Racial Composition, 2024

	Louisiana	Avoyelles Parish	Bossier Parish	Caddo Parish	Catahoula Parish	Concordia Parish	Grant Parish	Natchitoches Parish	Rapides Parish	Red River Parish
Total population	4,621,025	39,176	129,134	232,973	8,738	18,325	22,123	37,047	128,470	7,529
White	63.6%	69.8%	71.9%	47.8%	64.8%	59.2%	82.1%	55.3%	65.3%	59.8%
Black or African American	33.1%	30.3%	25.4%	50.9%	35.4%	39.5%	16.6%	42.5%	32.8%	42.1%
American Indian and Alaska Native	1.8%	4.2%	1.4%	1.1%	0.4%	1.0%	1.9%	2.5%	1.9%	0.7%
Asian	2.3%	0.7%	2.6%	1.8%	0.3%	0.4%	1.1%	0.9%	1.8%	0.0%
Native Hawaiian and Other Pacific Islander	0.1%	0.0%	0.1%	0.2%	0.0%	0.2%	0.0%	0.1%	0.1%	0.0%
Some Other Race	5.8%	2.4%	6.1%	2.9%	0.5%	2.0%	2.8%	4.6%	3.0%	0.1%
Hispanic or Latino (of any race)	6.9%	3.8%	8.0%	3.7%	1.1%	2.5%	6.0%	3.9%	4.0%	1.8%
Some Other Race alone	0.5%	0.1%	0.3%	0.2%	0.0%	0.0%	0.1%	1.2%	0.3%	0.0%
Two or More Races	3.3%	5.2%	3.5%	3.0%	1.3%	1.6%	3.6%	3.6%	3.2%	2.4%

Source: American Community Survey, Demographic Estimates, 2020 5-Year Estimates

2.7.2.5 Age Distribution

The estimated age characteristics of the nine parishes are shown in Table 2-10.

Table 2-10. Age Characteristics

	Louisiana	Avoyelles Parish	Bossier Parish	Caddo Parish	Catahoula Parish	Concordia Parish	Grant Parish	Natchitoches Parish	Rapides Parish	Red River Parish
Total population	4,621,025	39,176	129,134	232,973	8,738	18,325	22,123	37,047	128,470	7,529
Under 18 years	23.6%	23.9%	24.9%	23.7%	22.4%	23.6%	21.0%	23.1%	25.1%	23.7%
18 years to 65 years	60.1%	58.8%	60.1%	57.9%	59.4%	57.5%	63.6%	60.1%	58.2%	56.9%
65 years and over	16.3%	17.3%	15.0%	18.4%	18.2%	18.9%	15.4%	16.8%	16.7%	19.4%

Source: American Community Survey, Demographic Estimates, 2020 5-Year Estimates

2.7.2.6 Income and Poverty

Income and poverty data for the nine parishes for 2024 are summarized in Figure 2-11. Bossier Parish had the highest median income at $66,336, and Concordia Parish had the lowest median income at $37,349. All nine parishes had a greater percentage of persons below the poverty level compared to the National average of 12.8 percent. Concordia Parish had the highest percentage at 34.8 percent, while Grant Parish had the lowest percentage at 16.1 percent.

Table 2-11. Income and Poverty Data

Geographic Area	Median Household Income	Per Capita Income of Persons Below Poverty Level
Louisiana	$60,023	18.9%
Avoyelles Parish	$39,439	27.4%
Bossier Parish	$66,336	16.4%
Caddo Parish	$50,067	22.3%
Catahoula Parish	$47,753	28.1%
Concordia Parish	$37,349	34.8%
Grant Parish	$61,112	16.1%
Natchitoches Parish	$46,798	24.1%
Rapides Parish	$55,946	18.9%
Red River Parish	$44,539	29.4%

Source: American Community Survey, Economic Characteristics, 2020 5-Year Estimates

2.7.2.7 Education

The educational attainment levels for the parishes in 2024 are presented in Table 2-12. On average, across the parishes in the study area, 83.4 percent of persons aged 25 years and older had completed high school, while 18.8 percent had a bachelor's degree or higher.

Table 2-12. Educational Attainment by Parish

	Louisiana	Avoyelles Parish	Bossier Parish	Caddo Parish	Catahoula Parish	Concordia Parish	Grant Parish	Natchitoches Parish	Rapides Parish	Red River Parish
High school graduate or higher	86.9%	77.0%	90.7%	87.5%	74.2%	83.6%	81.5%	87.3%	87.4%	81.2%
Bachelor's degree or higher	26.6%	10.9%	27.3%	25.3%	16.6%	17.4%	12.8%	25.6%	22.4%	11.2%

Source: American Community Survey, Social Characteristics, 2020 5-Year Estimates

2.7.3 Recreation

This resource is institutionally important because of the Federal Water Project Recreation Act of 1965, as amended, and the Land and Water Conservation Fund Act of 1965, as amended. Recreational resources are technically important because of the high economic value recreational activities contribute to local, State, and National economies. Recreation resources are publicly important because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana and the large per-capita number of recreational boat registrations in Louisiana.

Table 2-13 below shows the number of fishing licenses, hunting licenses, and boat registrations, respectively, in the study area. The fishing and hunting license and boat registration data are provided by the Louisiana Department of Wildlife and Fisheries. Table 2-14 shows high-quality recreation opportunities by area.

Table 2-13. Fiscal Year 2019 Fishing/Hunting Licenses, Boater Registrations

Parish/County	Freshwater Licenses (Resident- Basic)	Saltwater Licenses (Resident- Basic)	Hunting Licenses (Resident- Basic)	Boating Licenses (Resident- Boat Registrations)
Avoyelles	3,945	1,170	2,517	4,347
Bossier	6,944	837	4,366	7,557
Caddo	9,220	1,170	4,720	10,769
Grant	2,726	334	1,814	2,669
Rapides	11,246	1,907	5,806	10,104
Red River	777	56	566	849
Natchitoches	2,858	366	1,962	2,802
Parish Average	**5,059**	**3,100**	**2,043**	**4,790**

Source: https://www.wlf.louisiana.gov/page/recreational-fishing-licenses-and-permits, accessed 3/12/25

Table 2-14. High-Quality Recreation Opportunities

Red River Commission Recreation Areas

Red River Commission Recreation Areas: Public Area	Parish	Consumptive Recreation	Non-consumptive Recreation	Boat Launch Lanes (Qty.)	Recreational Highlights
Alexandria Levee Park	Rapides	Fishing	Wildlife viewing, picnicking, hiking, boating, paddling	Yes (3)	Visitors can access a boat launch and 150-ft. floating wharf. Picnic areas, comfort stations, scenic overlook, and playgrounds available.
Ben Routh	Avoyelles	Fishing	Birding, Picnicking, hiking, wildlife viewing, boating	Yes (4)	Visitors can access a boat launch and boat dock. Picnic areas, playgrounds, comfort stations, and scenic overlook available.

Red River Commission Recreation Areas: Public Area	Parish	Consumptive Recreation	Non-consumptive Recreation	Boat Launch Lanes (Qty.)	Recreational Highlights
Bishop Point	Caddo	Fishing	Birding, Picnicking, wildlife viewing, boating, paddling	Yes (2)	Adjacent to Lock and Dam #5 on the Red River. Offers scenic views of the Red River, comfort station, and pavilion
Boyce	Rapides	Fishing	Birding, hiking, picnicking, paddling, boating	Yes (2)	Visitors have access to boat launch and pier and can participate in bank fishing. Playground and pavilion available
Brouillette	Avoyelles	Fishing	Birding, walking, paddling, boating	Yes (1)	Visitors have access to a walking track, boat launch, and views of the Red River
Colfax	Grant	Fishing	Birding, hiking, picnicking, paddling, boating	Yes (2)	Adjacent to L&D #3, offers boat launch and floating dock, picnic areas, comfort station, 25 RV sites and playground
Coushatta	Red River	Fishing	Picnicking, paddling, boating	Yes (2)	Access to picnic pavilion, comfort station, boat launch, and bank fishing
Fort Buhlow	Rapides	Fishing	Picnicking, paddling, boating, hiking, disc golf	Yes (3)	Visitors have access to a larger rec area, ballfields, comfort stations, pavilions, playgrounds, and floating dock
Grand Ecore	Natchitoches	Fishing	Picnicking, paddling, boating, camping, hiking	Yes (2)	Visitors have access to picnic area with pavilion, boat launch, floating dock, comfort station, and RV park
Montgomery	Grant	Fishing	Picnicking, paddling, boating	Yes (1)	Visitors have access to boat launch and bank fishing

Red River Commission Recreation Areas: Public Area	Parish	Consumptive Recreation	Non-consumptive Recreation	Boat Launch Lanes (Qty.)	Recreational Highlights
Natchitoches	Natchitoches	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat dock, bank fishing, comfort station, and picnic area
North Caddo Bossier	Caddo	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat launch and picnic area
Poland	Rapides	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat launch and bank fishing
Red Bayou	Natchitoches	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat launch and picnic area
Red Oak Lake	Red River	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat dock, bank fishing, comfort station, and picnic area. Boats launch into Red Oak lake with access to the Red River via a small channel
St. Maurice	Grant	Fishing	Picnicking, paddling, boating	Yes (2)	Visitors have access to boat launch and dock, pavilion, and picnic area

USFWS National Wildlife Refuge (NWR)

USFWS NWR: Public Area	Parish	Consumptive Recreation	Non-consumptive Recreation	Boat Launch Lanes (Qty.)	Recreational Highlights
Red River National Wildlife Refuge	Bossier, Caddo, Desoto, Red River, Natchitoches	fishing, hunting, trapping	birding, photography, hiking, biking, wildlife watching, boating	Yes	Established in 2001 from the USFWS, currently has acquired 16,000 acres of the proposed 50,000 acres. Focusing on managing wildlife habitat and providing recreational opportunities for the public.

Louisiana Department of Wildlife and Fisheries (LDWF) Wildlife Management Area (WMA)

LDWF WMA: Public Area	Parish	Consumptive Recreation	Non-consumptive Recreation	Boat Launch Lanes (Qty.)	Recreational Highlights
Grassy Lake Wildlife Management Area	Avoyelles	Fishing, hunting, trapping	birding, photography, hiking, biking, wildlife watching	No	Owned and managed by the Louisiana Department of Wildlife and Fisheries, Grassy Lake WMA is a nearly 13,000 acre protected area in the Red River alluvial floodplain with fishing and hunting opportunities. Access to river is limited.
Richard K. Yancey Wildlife Management Area	Concordia	Fishing, hunting, trapping	birding, photography, hiking, biking, wildlife watching	No	Owned and managed by the Louisiana Department of Wildlife and Fisheries and USACE, the nearly 70,000 acre area is a haven for duck hunters, fisherman, and nature enthusiasts.

Sources: https://redriverwaterway.com/recreation/; https://www.wlf.louisiana.gov/page/wmas-refuges-and-conservation-areas; https://www.fws.gov/program/national-wildlife-refuge-system

Recreational opportunities along the 200-mile stretch of the JBJ Waterway from Shreveport to the Mississippi River are abundant and diverse. While USACE operates the five locks and

dams within this reach, the RRWC operates the numerous recreation areas along the river (see Table 2-14). The locks are maintained and operated by USACE and, while numerous picnicking shelters are available for public use at the locks, there are no boat launch facilities available to the public at these locations. Recreational boaters and paddlers traveling up and down the waterway are able to use the locks to access all portions of the stretch down to the Old River Complex at the Mississippi River.

One of the primary consumptive recreational resources available in the river is fishing. Visitors have access to bank fishing as well as fishing from boats with popular species available including bass, catfish, bream, crappie, and sunfish. Nonconsumptive recreational resources include picnicking, camping, hiking, birding, paddling, boating, and photography. Hunting is allowed, but only in areas managed by the USFWS in the Red River NWR locations along the river or WMA managed by the Louisiana Department of Wildlife and Fisheries (see Table 2-14). Funds from the Land and Water Conservation Fund (L&WCF) have supported many of the recreational projects withing the Red River Basin since 1965. L&WCF provides funding for numerous boat ramps, other facilities or land that enhance opportunities for recreation.

The Red River NWR, established in 2001 by the USFWS, is made up of several units along the JBJ Waterway. At the headquarters located in Bossier City, there is a visitor center and over five miles of trails to explore. Currently, there are 6,000 acres of refuge available, with the goal of eventually having approximately 50,000 acres of Federal lands and waters available to the public along the Red River. The mission of the NWR to provide for the restoration and conservation of native plants and animal habitats lends to the recreational opportunities that currently exist in the refuges as well as the Red River Basin corridor.

2.7.4 Hazardous, Toxic, and Radioactive Waste

The USACE is obligated under ER 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all potential hazardous, toxic, and radioactive waste (HTRW) contamination within the vicinity of proposed actions during the feasibility phase. A Phase 1 Environmental Assessment, HTRW dated July 25, 2025 has been completed for the project and can found in Appendix C.

The objective for conducting the Preliminary Assessment Screening is to evaluate if any potential HTRW concerns are present that require further evaluation and/or likely remediation activities. To evaluate if potential HTRW concerns are present within the project area, a review of EPA’s environmental databases of known facilities permitted to handle, treat, store, or dispose of hazardous waste was performed. In addition, a review of reported spills, remediation projects and accidental releases of hazardous materials was performed. A review of the Strategic Online Natural Resources Information System (SONRIS) was performed on the project area due to Louisiana’s history of oil and gas extraction. SONRIS is an online database that provides detailed information on oil, gas, and natural resource

activity in Louisiana and is maintained by the Louisiana Department of Natural Resources. The review was conducted within a 1-mile buffer area of the sediment work areas.

The records search using the EPA's database identified three facilities maintaining an National Pollutant Discharge Elimination System (NPDES) permit and four Resource Conservation and Recovery Act facilities withing a 1-mile buffer of the project areas. Care should be taken where activities may be performed near this pipeline.

2.8 BUILT ENVIRONMENT

2.8.1 Navigation

The majority of navigational challenges on the JBJ Waterway are related to O&M dredging requirements and the dimensions of the locks and dams on the waterway. These challenges are described further in the sections below. Dike conditions, system hydraulics and hydrology, and current water management conditions are also described.

2.8.2 Dredging Requirements

JBJ Waterway dredge authorization allows for dredging of the JBJ Waterway from RM 0 (near the Mississippi River Old River Control Structure) up to RM 212 near the Caddo-Bossier Port, which is the most upstream port on the waterway. Typically, the farthest a dredge will travel upstream is to L&D 5 lower approach at RM 200. Figure 2-4 describes the O&M dredging locations on the JBJ Waterway.

Dredging is the process of removing sediment from the bottom of the river within the navigation channel and placing it elsewhere within deeper parts of the river channel or outside of the river channel. USACE's Vicksburg District opts for in-channel displacement on the Red River. The contracted dredge coordinates with the Vicksburg District survey team to locate nearby areas of channel that have swift waters, usually coinciding with the deeper areas. The contractor then anchors the dredge discharge at this location, and the survey team monitors the depths during the dredging operations. There are many different types of dredges and many mitigation strategies to lessen the amount of dredging needed or to provide utility of the dredge disposal material. Neither sedimentation nor the physical act of dredging are exact sciences or procedures. Hydrographic survey data of the river bottom are essential to estimating quantities, but there are a variety of influential factors that impact dredging trends such as flow conditions, funding levels, district priorities and changes in the sediment load and riverbed.

Under current dredge authorizations, the Vicksburg District River Operations branch primarily maintains the JBJ Waterway from RM 0 up to RM 212. However, the furthest that a dredge will typically travel upstream is to the lower approach at L&D 5 (RM 200). Dredging is broken out into "advanced maintenance" and "allowable overdepth," per ER 1130-2-520. For the purpose of maintaining projects, USACE District Commanders may approve advanced maintenance dredging within the authorized project limits to avoid frequent redredging throughout the year. Such advanced maintenance (dredging to depths or widths in excess of authorized project dimensions) can be performed in critical, fast shoaling areas to the extent

it will result in the least overall cost. Allowable overdepth dredging (depth and/or width) outside the required prism is permitted to allow for inaccuracies in the dredging process. Authorization allows a 25 percent overdepth: therefore, 3 feet below the 9-FT channel. Regarding funding to maintain the channel, River Operations River Operations has faced initial budgetary funding constraints just to maintain navigation under existing conditions. Additionally, dredge records are not a complete picture of the total dredging needs in any given year. Sediment conditions may warrant more dredging than is actually accomplished due to the total need for dredging exceeding the district's ability to execute that dredging for reasons such as a lack of funding or resources or a higher-priority personnel or resource need. Commercial sand and gravel mining also occur on the Red River–JBJ Waterway and in areas upstream of the waterway limits, but this aspect is not included within this study in any manner. The impacts of this mining to geomorphology and sediment conditions are unknown, and the practices are assumed to continue for the foreseeable future.

A large majority of the annual O&M dredging occurs at the locks and dams, at Westdale (RM 191) and along a stretch of the river downstream of L&D 1 between RMs 33 and 42 often referred to as the Gauntlet. This lowermost stretch of the waterway is situated between L&D 1 (RM 43) and the Mississippi River Old River Control Structure (RM 0) within the greater Lower Red River Backwater Area. This lowermost area of the Red River is heavily influence by Mississippi River flows through the Mississippi River Old River Control Complex (Mississippi River Backwater).

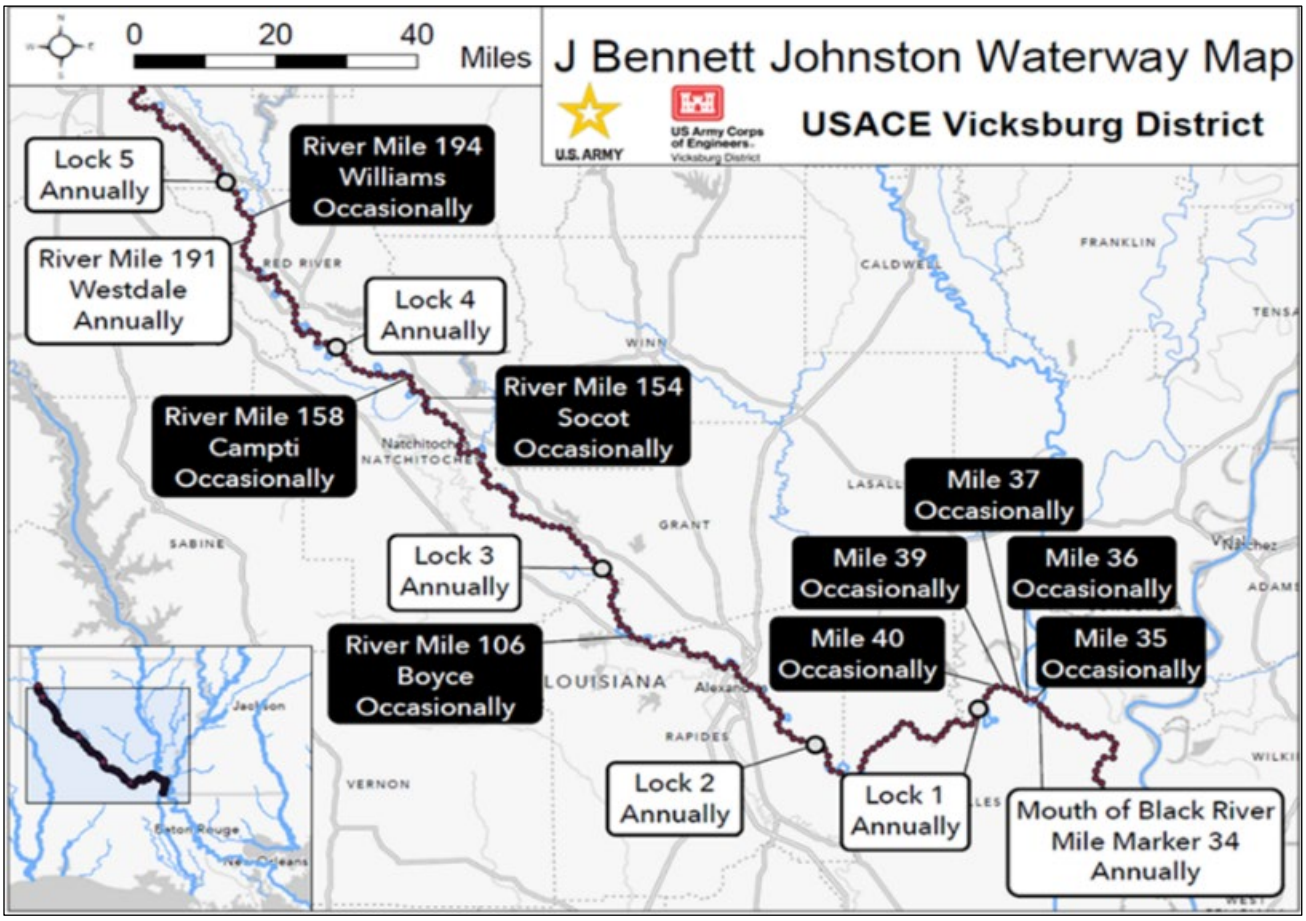

Figure 2-4. O&M Dredging Locations on the JBJ Waterway

Figure 2-5 provides a tabulation of the average annual dredge data for number of days dredged and volumes from 2012 to 2024 per location. Also provided is a summation of the total average annualized dredge data for number of days dredged and volumes. Lock and dam dredge data were not recorded for 2013, 2014, and 2016; however, these years were included as zero for the averaged calculations. In-channel dredge data were not recorded for 2013 and 2016; however, these years were included as zero for the averaged calculations.

Location Lock and Dam Dredging	Average Annual No. of Days Dredged (2012 to 2024)	% of Overall Total Average		Average Annual Dredge Volume (cubic yards) (2012 to 2024)	% of Overall Total Average
Lock 5	3.5	5.7%		19,869	3.4%
Lock 4	3.5	5.6%		26,997	4.7%
Lock 3	3.5	5.7%		19,983	3.5%
Lock 2	6.0	9.7%		34,853	6.0%
Lock 1	18.8	30.6%		210,880	36.4%
Total Lock and Dam	35.4	57.4%		312580.9	54.0%
Channel Dredging					
Williams RM 194	1.8	2.9%		11,584	2.0%
Westdale RM 191	3.4	5.5%		45,932	7.9%
Campti RM 158	0.6	1.0%		5,090	0.9%
Socot RM 154	1.8	2.9%		13,401	2.3%
RM 52	0.5	0.7%		1,908	0.3%
RM 42 to 33	18.2	29.6%		188,391	32.5%
Total Channel	26.2	42.6%		266,307	46.0%
Overall Total	61.6	100.0%		578,888	100.0%
Note: Dredge records are not a complete picture of the total dredging needs in any given year. In addition to sediment conditions that warrant dredging, dredging is also influenced by the availibility of funding and resources. Therefore, the total dredging needs in any given year may actually exceed the districts ability to execute that dredging.					

Figure 2-5. JBJ Waterway Average Annual Dredge Data, 2012 to 2024

2.8.3 Locks and Dams

The JBJ Waterway consists of a series of five navigational locks and dams. The most downstream lock and dam is L&D 1 near Marksville, Louisiana, which has been in operation since 1984. L&D 2 has been in operation since 1987 and is located near Alexandria, Louisiana. L&D 3 is located at Colfax, Louisiana, and has been in operation since 1991. L&D 4 is located near Coushatta, Louisiana, and L&D 5 is located downstream of Shreveport. Both L&D 4 and L&D 5 have been in operation since late 1994.

Based on Engineer Manual (EM) 1110-2-1604, a water depth less than 1.5 times (1.5x), the authorized navigable draft should not be considered for vessels to safely enter and exit the lock chambers. For a 12-FT channel, 18 feet of water depth over the sills is recommended. Figure 2-5 describes the depth requirements in the lock chamber for a 12-FT draft vessel. For the existing 9-FT channel, 13 feet of depth over the sills is required.

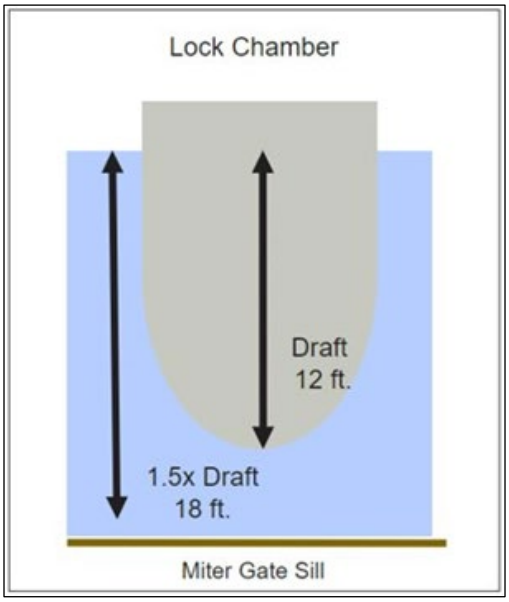

Figure 2-5. Lock Chamber Depth Requirements for a 12-FT Draft Vessel

Currently, L&Ds 1 and 2 do not have an 18-foot water depth over the lower approach miter gate sills at all times based on normal pool operations. L&Ds 3, 4, and 5 have an approximate minimum of 18 feet over the lower approach miter gate sills at all times based on existing normal pool operations. All five locks and dams have well over 18 feet of depth at their respective upper approach miter gate sills based on existing normal pool operations. Sill elevations versus normal pool elevations at each lock are shown below in Figure 2-6 with depth of the water at the sill.

L&D	SILL	NORMAL POOL EL. (feet, NAVD88)	SILL EL. (feet, NAVD88)	DEPTH OF WATER AT SILL (feet)	Percentage (%) of time 1.5x draft requirement is satisfied on an annual basis**
1	LOWER	4.1*	-9.6	13.7	89
	UPPER	40.1	18.1	22.0	100
2	LOWER	40.1	25.9	14.2	42
	UPPER	64.1	40.6	23.5	100
3	LOWER	64.0	46.1	17.9	100
	UPPER	95.0	70.1	24.9	100
4	LOWER	94.8	77.0	17.9	100
	UPPER	119.8	95.0	24.9	100
5	LOWER	119.8	101.8	18.0	100
	UPPER	144.8	119.8	25.0	100

*Lower pool cannot be controlled at Boggs L&D.

**Depth of Water at Sill must be 18 feet or greater to satisfy the 1.5x Draft Requirement for 12 Foot Channel Depths.

Figure 2-6. Normal Pool Depths over Miter Gate Sills

Any plan to achieve a 12-FT authorized channel in the future would have to address EM 1110-2-1604 requirements. Deviations from EM 1110-2-1604 can be pursued but require a greater understanding of the operational changes needed to safely pass a 12-FT vessel through the locks. Historically, this has been achieved through physical modeling or detailed monitoring and testing of vessels passing through the lock system.

The main concern with a deviation from EM 1110-2-1604 is with L&D 2, not L&D 1. L&D 1 has insufficient depth at the lower miter gate sill, but the Red River is uncontrolled below L&D 1, meaning there is no downstream structure to control pool levels. Even with this uncontrolled condition at the lower end, a 12-FT draft vessel still could meet the EM 1110-2-1604 standard approximately 90 percent of the time on an annual basis, based on the use of USACE's Hydrologic Engineering Center Data Storage System (HEC-DSS) duration exceedance analysis tool and daily tailwater records from 1987–2024.

The required water surface elevation at the sill for L&D 2 is of greater concern than that for L&D 1 since it is only available approximately 42 percent of the time on an annual basis according to HEC-DSS duration exceedance analysis. Based on this, L&D 2 is more critical to model for a deviation to EM 1110-2-1604 because the required depths are available for a smaller percentage of time compared to the conditions at L&D 1.

2.8.4 River Training Structures

In addition to the five locks and dams, a system of revetments has been constructed throughout the waterway to help manage sediment transport to provide for navigation. Structures such as trail dikes, standard dikes, kicker dikes, and tiebacks have been constructed to stabilize and realign the streambanks. Less commonly used structure types include trenchfill revetments, spur dikes, and timber pile dikes. These structures are designed for a service life of 50 years, with required maintenance to maintain the structures' ability to control velocities. Changes in river conditions—such as prolonged high water events or impacts from barge traffic—can also reduce longevity and create the need for repairs.

There are currently approximately 41 dike fields, 10 realignments, and 132 revetments within the JBJ Waterway. Repairs and maintenance on these structures are dependent on annual funding, with repairs occurring approximately once per decade. As a result of these funding constraints, many dikes that have passed their design life for the 9-FT channel have fallen into disrepair. Additionally, a channel cap-out program where dikes would be constructed in phases was never 100 percent implemented, leaving several dikes below design grade.

Many of the degradational issues, and therefore the repairs, have occurred within the Gauntlet as this portion of the river, which is not pooled and sees more variations in flow velocities. This leads to greater wear on structures and general channel instability. As of 2000, the Red River Channel Improvement Data Report showed that Pool 2 closely followed the Gauntlet in maintenance work. This was followed by Pools 3, 5, and then 4, the last of which had repairs only at the Campti Revetment (RM 193). Currently, the majority of the

channel can naturally accommodate a 12-FT draft. However, there are 11 reaches that could not naturally accommodate a 12-FT draft. For more details, see Appendix A *Engineering*.

Notably, while many revetments along the river require repairs to be restored to their original design, the majority of these repairs are not considered essential at this time, as they are not limiting navigation of the 9-FT channel. Emergency repairs that are required for the 9-FT channel–which are assumed to be complete for the FWOP conditions–are the Westdale and Joffrion revetments. The total cost for emergency repairs at these locations is approximately $17,500,000 and is the responsibility of Vicksburg District's Operations Division. Ongoing maintenance of the rest of the structures will still be necessary on an as-needed basis to prevent further failures. It was assumed under the FWOP conditions that regardless of ongoing funding challenges, these potential future emergency actions would still occur over the 50-year period of analysis. See Appendix A *Engineering* for an overview of the potential future repair locations.

2.8.5 Water Management and Hydraulics and Hydrology

The Red River drains an area of 92,600 square miles including parts of New Mexico, Texas, Oklahoma, Arkansas, and Louisiana. Of this drainage, 23,400 square miles are drained by the Ouachita-Black system, which is not part of the Red River system for operational purposes. The remaining 69,200 square miles of the Red River drainage is considered part of a single system for operational purposes. Since the Red River spans multiple States, several USACE districts assume responsibility for water management operations for reaches falling within their district boundary. Those districts include the Tulsa, Little Rock, Fort Worth, and Vicksburg Districts.

The portion of the Red River Basin managed by the Vicksburg District includes the Red River and its tributaries downstream of Index, Arkansas, excluding the tributaries managed by Fort Worth District. Elevations in this part of the basin range from over 350 feet in the upper basins of tributaries to below 4 feet at the head of the Atchafalaya River. The basin can generally be characterized as having a broad alluvial valley that is approximately 5 to 10 miles wide. It is surrounded by rolling hill lands with intercepting tributaries that pass through narrow, wooded bottoms. Surrounding tributary bottoms and hill areas are largely wooded. Much of the land has been converted into agricultural production.

Near Index, Arkansas, the Red River enters the Vicksburg District. From Index, Arkansas, downstream to Shreveport, Louisiana, the riverbanks generally range from 1,000 to 1,500 feet apart, rising 20 to 40 feet above low-water lines, and have channel-controlling capacities of approximately 90,000 cfs to 100,000 cfs. The riverbanks of the channel from Shreveport, Louisiana, to Alexandria, Louisiana, generally range from 500 to 1,000 feet apart, rising 15 to 20 feet above low-water lines, and have channel-controlling capacities ranging from approximately 100,000 cfs to 120,000 cfs. The riverbanks below Alexandria generally range from 500 to 1,000 feet apart between increasingly more stable banks rising 30 to 60 feet above low-water lines and have channel-controlling capacities ranging from 120,000 cfs to 150,000 cfs. Generally, the river reaches near Shreveport have experienced aggradational trends while the river reaches near Alexandria have experienced degradational trends. In the

lowermost portion of the waterway downstream of Alexandria, the channel traverses the floodplain of the Mississippi River where extreme fluctuations in stages are experienced due to Mississippi River backwater through Old River Control Complex. From Fulton, Arkansas, to the lowermost Red River south of Alexandria, Louisiana, there are a significant number of continuous and discontinuous levee systems that provide various levels of flood protection. The levees typically discontinue at high ground areas or tributary confluences. The major tributaries entering the Red River below Shreveport, Louisiana, are Twelve Mile Bayou, Bayou Bodcau, Cypress Bayou, Red Chute and Loggy Bayou, Bayou Pierre, and Saline Bayou. The Red River is confined by levees or high ground below Fulton, Arkansas, which has removed the river's connection to the natural floodplain. This confinement generally induces significant backwater flooding on intercepting tributaries including Little River (Arkansas), Sulphur River (Arkansas), Twelve Mile Bayou (Louisiana), Red Chute/Loggy Bayou (Louisiana), Bayou Pierre (Louisiana), and Saline and Black Bayous (Louisiana) during high flows.

Per the 2022 Red River Master Water Control Manual, there is not currently a system-wide plan for water control management. Projects in the basin operate individually or as part of smaller subsystems; however, because many projects share downstream control points, coordination does occur among USACE districts. The reservoirs with controlled outlets influencing flows on the Red River are controlled by three other districts upstream of the JBJ Waterway. The reservoirs nearest the JBJ Waterway that are maintained by the Vicksburg District have uncontrolled spillways and uncontrolled outlets and thus do not require or allow for any operation of flood control gates. The Vicksburg District does operate the series of lock and dam projects on the waterway to maintain navigation pools within +/- 0.5 feet of each project's designated pool levels. This is accomplished by adjusting the Tainter gates such that the pool level is maintained and the excess flow is passed downstream. When the upper pool elevation is higher than the designated pool level, all gates should be elevated sufficiently above the water to allow for the passage of drift. The frequency of gate adjustments is dependent on the rate of change of the flow in the river. Each project has a target normal pool elevation to maintain. There is also a maximum elevation identified where lock operations are suspended.

Notably, the reservoir water management projects influencing flows of the JBJ Waterway do not have operations to augment or supplement low flows in the waterway, and the five locks and dams are not operated to provide flood control during large events but are operated regularly to maintain navigable elevations in the river and to provide open river conditions during large flows (Tainter gates fully open for flow in to equal flow out). L&D 4 and L&D 5 do operate hinged crest gates to provide water quality and fish and wildlife benefits during low-flow periods by increasing dissolved oxygen in the river downstream. The river basin generally experiences fluctuating high flows from late winter to late spring and often sustained low-flow periods from summer to winter. It was assumed there would be no changes to upstream reservoir operations from current operations

The volume and rate of discharge (flow) of the Red River fluctuate over a wide range. The volume and flows on the mainstem of the Red River have been regulated by Denison Dam (Lake Texoma) since 1944. Flows on the tributaries have been regulated by Wright Patman Dam (Sulphur River) since 1956, Lake O' the Pines Reservoir or Ferrells Bridge Dam (Big Cypress Bayou) since 1959, and Millwood Dam (Little River) since 1965. These projects contain outlet structures with uncontrolled spillways. In addition to the large reservoirs are the Caddo Lake Dam (uncontrolled overflow weir) and Cross Lake Dam (uncontrolled spillway) regulating flow on Twelve Mile Bayou, Wallace Lake Dam (uncontrolled spillway and uncontrolled outlet structure) regulating flow in Cypress Bayou and Bayou Pierre, and Bodcau Dam (uncontrolled outlet structure and uncontrolled spillway) and Lake Bistineau (uncontrolled outlet structures and uncontrol spillway) regulating flows on Red Chute Bayou and Loggy Bayou.

The 98 percent duration exceedance probability (flow exceeded 98 percent of the time) flow on the Red River is generally between 1,600 cfs and 2,000 cfs between Shreveport and Alexandria, assuming peak daily flows from 1935 to 2024. At such a flow, the river slope is completely flat between the pools. Average annual flows based on peak daily flows are generally between 25,000 and 30,000 cfs between Shreveport and Alexandria, while median annual flows based on peak daily flows are generally between 15,000 cfs to 22,000 cfs. During open river flow conditions, the flow is generally high enough and potentially rising such that navigable channel depths are naturally maintained and sustained. Therefore, Tainter gates are generally completely open and raised above the water surface level. Open river flow provides enough depth such that the water flow should be unobstructed by the Tainter gates and tailwater levels equaling headwater levels. If the flow continues to rise, the fully open Tainter gates are designed to minimize the swellhead (rise in upstream water levels due to the structure) and mitigate resulting flood impacts. At the beginning of open river flow conditions, the flow varies per lock and dam. For instance, the open river flow initiation at L&D 5 is approximately 150,000 cfs, while open river flow at L&D 1 is approximately 70,000 cfs. During average-flow periods, the river slope is generally flat just above each lock and dam and slight (0.2 feet/mile) at the upper ends of each pool. During open river flow and flood periods, the river slope can fluctuate around 0.5 feet/mile. The typical high water period is from late winter to late spring, with high water periods often seeing flows up to 100,000 cfs, which is generally a 1 to 2 year frequency (99 percent and 50 percent AEP) type of flow. A high-flow event that leads to bankfull flows or greater, causing the pool levels to often rise several feet above normal pool, can arise within just a couple of days and generally last a couple of weeks to a couple of months depending on storm conditions such as isolated storms or successive storms.

The Red River is often discolored due to the amount of sediment it carries, especially during high-flow periods. In the natural state before dams and other developments, the particulate matter was deposited along the floodplain or carried to the Mississippi River (before the 1830s) or the Atchafalaya River (after the 1830s). This natural process continues but is altered to some degree by development within the basin. Furthermore, reservoirs tend to slow river flow and accelerate deposition in pools and irregular releases for flood control, water supply, or power generation, which often have an erosive effect downstream. The Red

River is a high-energy system characterized by high channel velocities. During highwater periods, mean channel velocities can range from 7 feet per second up to 10 feet per second. The high channel velocities and erodible banks generally result in very active bank caving in the portions of the river with no river training protection, most of which is upstream of the JBJ Waterway. Stage–discharge relationships, which are a simplistic relationship between stages and flows over a period of time, are informative to how the riverbed and overbank areas are changing. Such relationships at Shreveport have shown an aggradational trend over the last 30 years, meaning higher stages at lower flows, while the relationships at Alexandria have shown the opposite or degradational trends.

2.9 ECONOMIC ENVIRONMENT

The JBJ Waterway acts primarily as an ancillary artery of the greater Mississippi River system. The system primarily provides commercial navigation access to Alexandria and Shreveport, Louisiana. From 2013–2023, shipped or received tonnage on the JBJ Waterway has ranged between 2 million and 5 million tons. See Appendix E *Economic and Social Considerations* for more information.

Tonnage on the JBJ Waterway

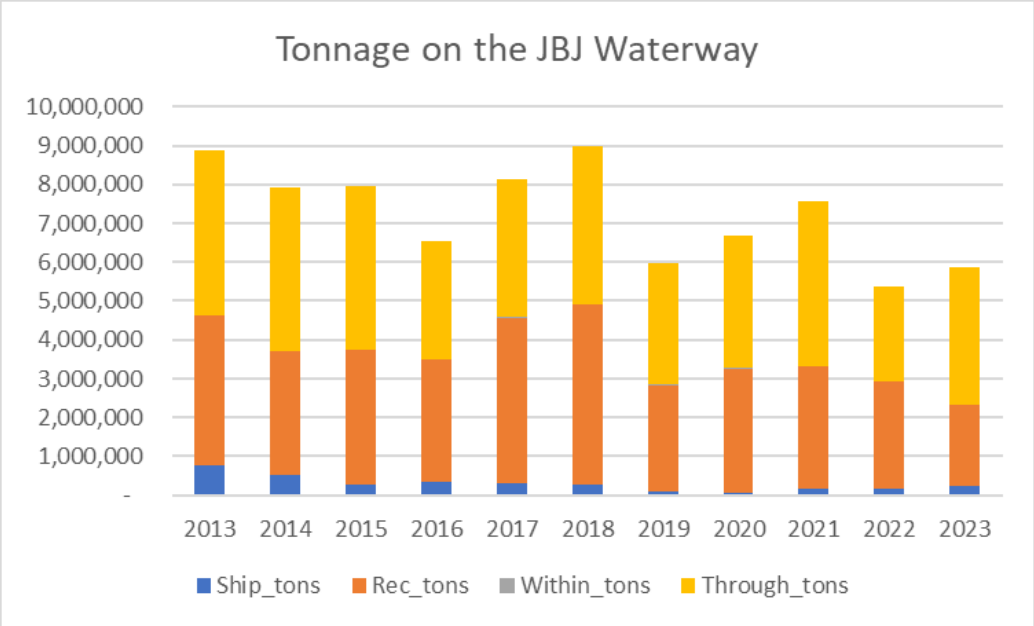

Figure 2-7. Waterborne Commerce Statistics Annual Recorded Tonnage on the JBJ Waterway 2013–2023

Tonnage that is shipped or received on the JBJ Waterway must pass through L&D 1. From 2013–2023, tonnage passing through L&D 1 ranged between 2 million and 5 million tons. This distinction between shipped/received tonnage and through tonnage is important, as

through tonnage does not see economic benefit from the study alternatives. See Appendix E *Economic and Social Considerations* for more information.

Tonnage by Pool on the JBJ Waterway

The system is broken up into pools beyond each of the five dams, as described in Section 1.4.

Table 2-8. Lock and Pool Names on the JBJ Waterway

Lock Name	Pool Name
L&D 1	Pool 1
L&D 2	Pool 2
L&D 3	Pool 3
L&D 4	Pool 4
L&D 5	Upstream Pool 5

Additionally, the Gauntlet has been identified as a critical area in need of stonework and dike enhancement.

Pool 1 – Pool 1 has no major facilities. All tonnage being shipped carries on to the Gauntlet and out to the Mississippi, and all tonnage being received carries on to Pool 2.

Pool 2 – This pool received 82 percent of the tonnage on the system over the past decade. It includes several private ports such as those of Luhr Brothers and Pine Bluff Sand and Gravel, the port authority of Central Louisiana Regional Port, and the Cleco power plant as well as Old England Airpark (military shipments).

Pool 3 – The Natchitoches port authority receives a small amount of tonnage in this pool, but the majority of tonnage carries on to Pool 4.

Pool 4 – This pool has critical shoal area that requires stonework. There are no major tonnage facilities in this pool, and the tonnage carries on to upstream of L&D 5.

Upstream Pool 5 – This includes Shreveport and the Caddo-Bossier Port, which is operated as a regional port authority. Additionally, the area supports the Barksdale Air Force Base.

Tonnage Activity Description

The overall tonnage passing through L&D 1 and onto the JBJ Waterway has been fairly consistent over the past decade, with the exclusion of 2017 and 2018 when there was an uptick in aggregate products (Figure 2-8). Most of the tonnage passing through L&D 1 is either aggregate or petroleum products. These two commodity categories accounted for 32 percent and 43 percent, respectively, of the overall tonnage in 2023.

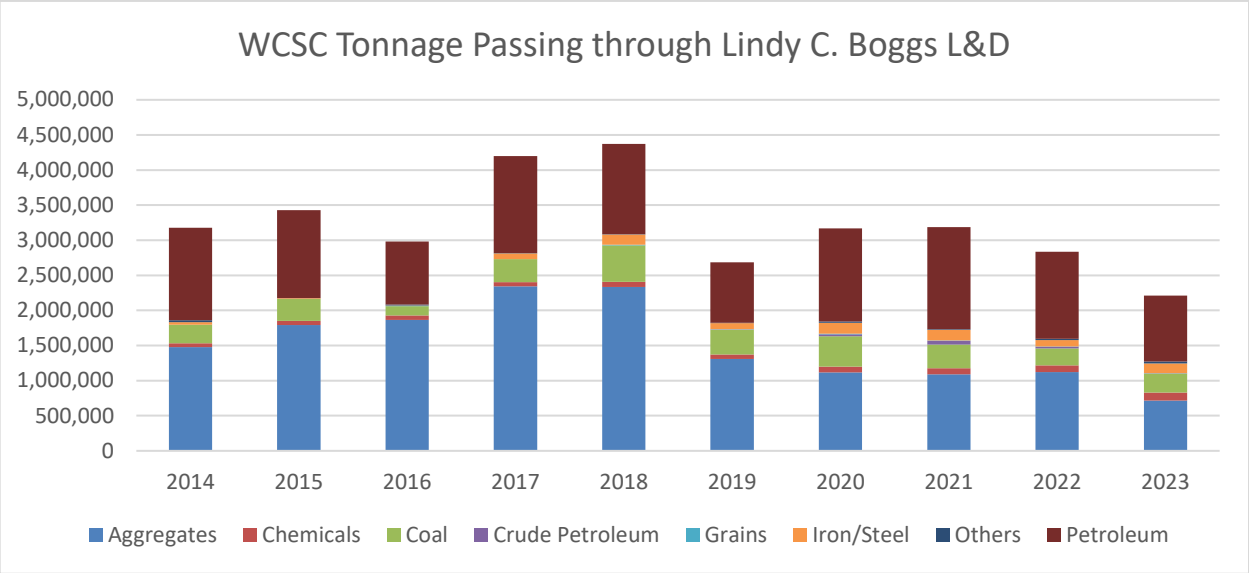

Figure 2-8. Waterborne Commerce Statistics Center Tonnage Passing Through L&D 1

Per aggregate shippers, there is a refleeting area at the confluence of the Old River Lock and Dam and the Mississippi River. Operators will bring larger tows down the Mississippi River to the refleeting area outside the Red River. There, they will rearrange the barges to smaller tow packages that then move to their final destination. The Red River is utilized as an overflow for these larger tow packages. If the typical large tow package is 15 barges and a shipper has demand for 12 barges, the shipper will send 15 down and leave the remaining three barges at the refleeting area to go to their facilities or ports on the JBJ Waterway in Alexandria or Caddo/Bossier once they get enough barges to create the typical six-pack tow configuration that goes up the JBJ Waterway. The more demand for aggregates in other locations leads to lower supply on the Red River and vice versa.

Petroleum tonnage is both shipped and received on the system. Operators have stated that they are particularly impacted by the lower draft given the larger size of petroleum barges. They stated that each trip of two barges can lose upwards of 10,000 tons due to lightloading at 9-FT compared to 12-FT. Additionally, water level constraints have led to timing issues, which cause one to three fewer tows annually than otherwise would be operated if the system were more reliable. The remaining tonnage on the JBJ is coal, chemicals (fertilizer), and iron/steel products.

The military, the 101st out of Fort Campbell, executes a rotation one to three times a year at Ft. Johnson. These rotations include 30–48 barges containing 800–1,500 pieces of equipment, loaded at Cumberland River Lock C. The move takes one to three days to make. The barges are staged at the Central Louisiana Regional port dock before moving out to the Old England Airpark. Training utilizes the Multiple Integrated Laser Engagement System.

SECTION 3
Plan Formulation and Evaluation

3.1 PLANNING FRAMEWORK

The Project Delivery Team (PDT) implemented the risk-informed SMART planning following USACE's six-step planning process, shown in Figure 3-1, in accordance with USACE ER 1105-2-103. ER 1105-2-103 describes the planning process for Federal water resource projects. This publication requires formulating alternative plans that support Federal objectives.

Plan formulation is the process of building alternative plans that meet planning objectives by addressing the identified problems while avoiding identified constraints. A systematic and repeatable planning approach is used to ensure that sound decisions are made in accordance with the processes laid out in the Planning Policy for Conducting Civil Works Planning Studies (ER 1105-2-103). This DIFR-EA describes the iterative process of identifying measures, continually reevaluating the measures, screening of measures, developing alternative plans and screening alternatives and ultimately identifying the TSP. The plan formulation process is consistent with protecting the Nation's environment, pursuant to National environmental statues, applicable EOs, and other Federal planning requirements. The plan formulation process considers all effects, beneficial and adverse, to each of the four evaluation accounts identified in the Principles and Guidelines (1983), which are NED, Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE).

The plan formulation process is a data-driven process, building upon previous data and information and developing more detail as necessary, including refinement of the measures identified and alternatives developed. Each review and screening iteration identified informational needs necessary to inform planning decisions. In the early phases of the study, the PDT used existing information and professional judgment. As the study progressed, additional data and analyses were deemed necessary to identify the differences between the measures and alternatives. Risk-informed decisions were incorporated into the planning process to balance the level of study detail necessary to make informed decisions and uncertainty that was acceptable in accordance with USACE policies, such as ER 1105-2-101 "Risk Assessment for Flood Risk Management Studies" and ER 1105-2-103 "Planning Policy for Conducting Civil Works Planning Studies."

Early iterations of measures were devoted to understanding the problems while identifying possible solutions (solutions to change from a 9-FT channel to a 12-FT channel) and critical uncertainties. In subsequent iterations, information was developed to reduce uncertainties that affected the choices at hand. While it was not possible to eliminate all uncertainty, priority was given to uncertainty that posed the greatest risk to inform decision making. As existing information was utilized to inform the comparison of alternatives, the risk of using

existing information was also measured to determine if the risk was acceptable when compared to the cost and time required to collect new data or develop new analyses.

Where information was determined to be insufficient on a critical aspect of the alternatives, consideration was given to the level of analysis and cost required to inform the decision versus the risk of obtaining the critical information at a later stage of the planning process.

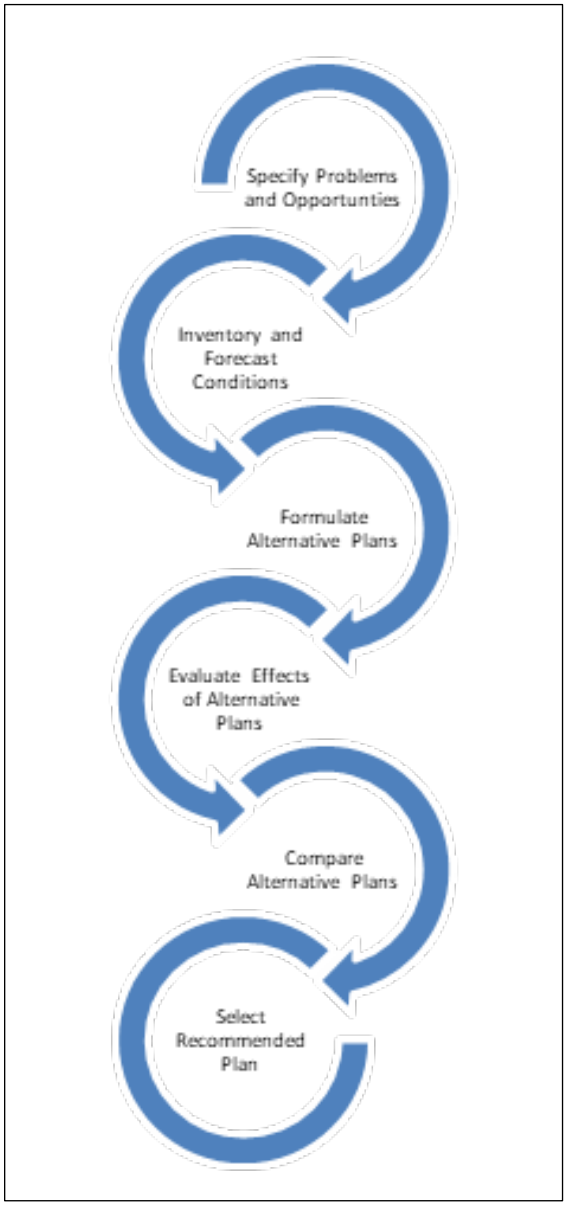

Figure 3-1. Planning Steps

3.2 ASSUMPTIONS

The following assumptions were applied throughout the planning process, including alternative evaluation.

- Efficiency: A 100 percent efficiency for each of the alternatives was assumed based on the performance of existing river training structures on the JBJ Waterway.
- Construction Funding: It was assumed that adequate funding to implement any of the alternatives proposed would be available and consistent.
- Design and Administration of Construction: It was assumed that the design and construction oversight will primarily be performed by the Vicksburg District.
    - It was assumed that the plans and specifications will be fully developed by USACE personnel.
    - In the field, it is possible that multiple subcontractors and vendors will be used; however, it was assumed that they will have a similar markup scheme for cost estimates.
- Benefits: It was assumed that 100 percent of benefits would be achieved from the Draft Deviation necessary for all measures considered.
- Barges: The forecasted mix of barges over the project life is based on the 2018–2023 historical mix and was assumed to remain constant over the project life.

3.2.1 FWOP Assumptions

- All required dike maintenance for the 9-FT channel would be complete: a self-scouring 9-FT channel would be achieved, and O&M channel dredging could be eliminated.
- The shoaling rate would remain the same at the lock approaches regardless of implementation, rehabilitation, and improvement of dikes. Therefore, O&M dredging at the lock approaches would remain the same between the with- and without-project conditions.
- Existing traffic would be limited by the depths within the lock chamber at L&D 2 under normal operations due to draft restrictions on the lower sill elevations (see Section 2.8.3).

3.2.2 FWOP Assumption Rationale

Many of the dikes within the existing 9-FT navigation channel have exceeded their 50-year design life. While much of the stone revetment construction along the Red River occurred during the 1970s and 1980s, earlier construction—including pile dikes and board revetments—dates back to the 1940s through 1960s. As a result, many structures are now at or beyond their intended service life. Although repairs have been performed on several structures, limited funding has contributed to the continued deterioration of revetments. In addition, some dikes were not constructed to full design grade under a planned cap-out program that was never fully implemented. The damage and degradation of these structures have increased dredging requirements to maintain the authorized 9-FT channel depth,

particularly in areas of critical need for dike repairs, such as the Gauntlet. According to O&M dredging records from the Vicksburg District's Operations Branch and a 2012 HEC-RAS model of the waterway, areas with higher dredging demands directly correspond to locations where dike degradation has occurred.

According to ER 1105-2-103, the PDT assumed that responsible parties have completed all dike construction and maintenance responsibilities required by law, including OMRR&R. Therefore, for the without-project condition analysis, the PDT assumed that the dikes for the 9-FT channel are fully built out to design specifications and that any critical needs for dike repairs would be addressed in the future. Fully functioning dikes at design grade constrict the channel to promote self-scouring. This increases velocities within the navigation channel and reduces the need for regular O&M dredging. Based on the documented success of dikes in the past, in-channel dredging would not be required if the dikes were built to design grade (see Appendix A *Engineering* for more details). Therefore, the FWOP condition assumes no annual in-channel O&M dredging. This is in contrast to actual existing conditions, which require approximately $1.2 million of in-channel O&M dredging annually. The PDT also assumed that O&M dredging at the lock approaches will remain the same between the with- and without-project conditions because dike rehabilitation, whether for a 9-FT channel or a 12-FT channel, will not impact shoaling rates at the approachway locations. Annually, approximately $5 million is spent dredging the approachway locations, and this cost is anticipated to remain constant for a 12-FT channel project; therefore, this cost was not considered when comparing alternatives.

3.3 MANAGEMENT MEASURES

ER 1105-2-103 describes the planning process for Federal water resource projects. This publication requires formulating Alternative plans that support Federal objectives. Each alternative plan is composed of one or more management measures. A management measure is a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives. Initial management measures were developed during the scoping phase. A planning charrette was held among USACE, stakeholders, and the non-Federal sponsors to collaborate on potential management measures and receive feedback on problems, objectives and opportunities.

In the planning charrette, the PDT reviewed the problems, opportunities, objectives and constraints with the agencies. Feedback received from the agencies as well as professional expertise was used to inform the following management measures:

Structural measures:

- Modification of the existing locks and dams
- Construction of new locks
- Construction of dikes
- Improvements of dikes

- Construction dredging
- Raise the pool of the locks and dams
- Tow hauling system installation

Nonstructural measures:

- Draft restrictions
- Obtain waiver for depth requirements in EM 1110-2-1604 at locks
- Beneficial use of dredged material

3.4 MEASURE SCREENING

The PDT established the decision criteria to formulate viable alternatives and to screen alternatives. The following screening criteria were applied to measures and the initial array of alternatives:

- Meets project objectives
- Avoids project constraints
- Best professional judgement
- Cultural resources impacted
- Environmental resources impacted
- Time to implement the project
- Rough order-of-magnitude (ROM) cost estimates

All proposed measures were carried forward and combined into to the alternatives in the Initial Array, except the following measures:

- Beneficial Use of Dredged Material
- Tow hauling system installation

The justification for screening these measures is described in the subsections below.

3.4.1 Beneficial Use of Dredged Material

Beneficial use of dredged material was considered initially as a management measure. Placing the dredged material behind the revetments could potentially contribute to bank stabilization and shoreline nourishment. However, according to Federal Standards, dredge disposal needs to follow the least costly option, which is in channel disposal. The additional cost to transport this material to the desired locations exceeds this threshold. The PDT also investigated the feasibility of beneficial use of dredged material placement for island building to support shorebird and terrestrial habitat, as well as beach building for recreation purposes. However, ROM costs for transporting and placing the material in these scenarios would also exceed the anticipated expenditures of this project beyond economic justification. Island building would also pose negative impacts to industry. Therefore, beneficial use of dredged material was screened out from consideration.

3.4.2 Tow hauling system installation

A tow hauling system installation was considered a measure to justify the deviation from EM 1110-2-1604. A tow hauling system helps pull the tow through the locks and offers more control and speed reduction for vessels transiting through the locks. However, tow hauling systems typically require fixed guide walls to operate properly. The locks and dams on the JBJ Waterway do not currently feature fixed guide walls to operating standards and new guide walls would need to be constructed. The additional required features of this measure require the river to be shut down for an extended period of time. Historically, extended lock closures have negatively impacted industry, and similar disruptions in the future are expected to result in the loss of industry users and negative economic consequences. Industries that operate on the JBJ Waterway indicated that the impact of shutting down the river would negatively impact operations to an unacceptable degree. Therefore, a tow hauling system installation was screened out from consideration.

3.5 INITIAL ARRAY OF ALTERNATIVES

From the measures considered, an initial array of 12 alternatives, including the No Action Alternative, was formulated. The initial array of alternatives included various options to deepen the waterway to 12-FT for navigating vessels using different formulation strategies. See Table 3-1 below for the initial array of alternatives. The development of the initial array of alternatives considered both major structural improvements and nonstructural systems to obtain an authorized 12-FT channel. The section below provides an overview of the formulation strategies that led to the individual alternatives in the final array.

Table 3-1. Initial Array of Alternatives

Alternative(s)	Description	Type
1	No Action	-
12-FT Draft Only	Update draft restrictions from 9-FT to 12-FT	Nonstructural
Pool Raise	Draft restrictions; raise the pool of L&D 1	Structural/Nonstructural
Limited Modification of Lock/Dams	Modify existing L&Ds 1 and 2 (two southernmost locks); other in-channel work	Structural
Limited New Lock/Dams	Construct two new locks at L&Ds 1 and 2 (two southernmost locks); other in-channel work	Structural
Modify Lock/Dams	Modify existing five locks and dams; other in-channel work	Structural
New Lock/Dams	Construct five new locks and dams; other in-channel work	Structural

Alternative(s)	Description	Type
2/3	Draft restrictions; deviation; dredging to 12-FT	Structural/Nonstructural
2/3a	Draft restrictions; deviation; dredging improvement of dikes to 12-FT	Structural/Nonstructural
2/3b	Draft restrictions; deviation; construction of new dikes to 12-FT	Structural/Nonstructural
2/3c	Draft restrictions; deviation; construction of high-priority dikes and improvement of dikes to 12-FT	Structural/Nonstructural
2/3ab	Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT	Structural/Nonstructural

3.5.1 Formulation Strategy for Alternative Development

3.5.1.1 **No Action Strategy**

The “no action" strategy and subsequent alternative is the baseline scenario used to compare against proposed project alternatives. It represents the situation if the proposed project does not move forward, providing a benchmark to understand the potential economic, social and environmental impacts, and effects of not implementing the project.

This strategy produced one alternative:

- Alternative 1, No Action Alternative

3.5.1.2 **First Strategy: 12-FT Channel with Expanded Draft Restrictions**

Draft restrictions are restrictions to the draft of passing vessels managed by the coast guard. In the event of a 12-FT authorized navigation channel, 12-FT draft vessels may use the waterway, but they would lightload when draft restrictions are in place. The existing 9-FT channel already undergoes draft restrictions to the channel when there are extreme low water conditions, so the first formulation strategy was to expand that draft restriction system while authorizing a 12-FT channel under the existing pool conditions. The strategy would not use any additional channel improvements and would rely on the existing conditions and associated existing 9-FT channel improvements to obtain a 12-FT channel during parts of the year.

A draft restriction notification system is already in place and managed primarily by the U.S. Coast Guard. The Coast Guard notifies the industries and the lock directors when the depths in the waterway are low, and the drafts of the passing vessels must be restricted for safe passage. A draft restriction notification system is a necessary mitigation strategy for the risk of unanticipated periods of low water. This system would be expanded to include times when the drafts of the passing vessels would not meet a 12-FT channel threshold. As discussed in Section 2, a large majority of the Red River has depths of 20 feet or greater at normal pool conditions, with the exception of some select areas in the upper ends of navigation pools

where water levels become critical at low flows and downstream of L&D 1 where the river is uncontrolled and heavily influenced by the Mississippi River flows through the Old River Control Complex. This strategy was included, absent a deviation from EM 1110-2-1604 discussed in Section 2.6.3. As discussed in Section 2.6.3, a 12-FT vessel would have access to pass only L&D 2, approximately 42 percent of the time, without a deviation from EM 1110-2-1604.

This strategy produced one alternative:

- 12-FT Draft Only Alternative

3.5.1.3 **Second Strategy: 12-FT Channel with Modified Pool Elevations**

The second formulation strategy was similar to the first, but USACE does have some ability to make modification to the existing pool elevation between the locks, so this strategy was to review modifying the operations of the existing locks and dams in the system to raise the normal pool elevation to allow for a 12-FT channel, particularly in the upper ends of navigation pools where water levels become critical at low flows. This strategy would still require the draft restriction notification system discussed with the second strategy.

This strategy produced one alternative:

- Pool Raise Alternative

3.5.1.4 **Third Strategy: Modifications to Locks/Dams or New Locks and Dams**

The third strategy was to review structural improvements or new structures. This strategy considered modifying the lock sills or developing entirely new lock systems. This strategy also considered segmenting the channel into two primary economic reaches. As discussed in Section 2.9, Pool 2 receives approximately 80 percent of the system tonnage, while the upper reaches (Pool 3, Pool 4, and Pool 5) serve an important role in National security due to the support to the Barksdale Air Force Base. Therefore, the PDT reviewed the economic and total benefits through two locks versus all five locks. The third strategy also has to include some channel improvements since sections of the river would have to be improved to obtain a 12-FT channel year-round.

This strategy produced four alternatives:

- Modify Locks/Dams Alternative
- New Locks/Dams Alternative
- Limited Modification of Locks/Dams Alternative
- Limited New Locks/Dams Alternative

3.5.1.5 **Fourth Strategy: Deviation, Draft Restrictions, and Channel Improvements**

The fourth and final strategy was to focus on a structural method of using channel improvements to obtain a 12-FT channel year-round while also including a nonstructural measure of addressing the draft restrictions associated L&Ds 1 and 2.

3.5.1.5.1 Deviation and Draft Restrictions Component of Fourth Strategy

As discussed in Section 2.6.3, EM 1110-2-1604 specifies that less than 1.5x the draft of a vessel should not be considered for passage through the locks for safety reasons. A 12-FT draft vessel thus requires 18-FT of depth in the locks. At L&D 2, the EM 1110-2-1604 standard is met only 42 percent of the year. L&Ds 3 through 5 typically have the required depth, while L&D 1 has the required depth around 90 percent of the year. Maximizing the amount of time (from 42 to 90 percent) that a 12-FT draft vessel can pass through the locks safely (particularly with L&D 2) is critical to maximizing the benefits of a 12-FT channel.

To evaluate all of the potential alternatives with this strategy, the PDT made the key assumption that a vessel can pass through L&D 2 safely with only the 15-FT depth clearance and assume that a deviation would be approved ahead of implementation. Experts at USACE's Inland Navigation Design Center and ERDC have recommended the use of a physical model to replicate the hydraulic conditions at the lock to test this assumption in the future. These tests would evaluate the tow squat, which is the degree to which the vessel sinks according to speed while transiting through the lock. They also would test the hydraulic forces or Hawser forces acting on the tow as it transits through the lock. These test results would determine if procedural changes in the filling and emptying system are needed for safe passage of a 12-FT draft vessel.

For benefit evaluations, the study assumed that a 12-FT vessel will have the required depth approximately 90 percent of the year through both L&Ds 1 and 2 and that the existing draft restriction notification system (but modified to 12-FT) would apply during time of the year when a 12-FT channel is not available.

3.5.1.5.2 Channel Improvements Component of Fourth Strategy

To fully evaluate using the deviation assumption and draft restrictions method, channel improvements were considered with the fourth strategy. As discussed in the existing conditions section, there are still potential challenges regarding the availability or lack thereof of a 12-FT channel throughout the waterway.

Various options of construction dredging, improvement of dikes, and construction of new dikes or combinations were evaluated for their effectiveness in obtaining an authorized 12-FT channel. Construction dredging and O&M dredging was evaluated separately from new dikes or improvement of dikes for comparison purposes. Construction dredging and O&M dredging was appropriately understood as a measure to achieve the same goal as construction of dikes and improvement of dikes. The team also considered high-priority new dikes in combination with other in-channel improvements. High-priority locations are those

that cause severe depth restraints in the channel and thus impact the navigability of the 9-FT channel.

To evaluate this strategy, hydraulic modeling, statistical analyses, and historical dredge records were utilized to assess known problem areas and identify other potential problem areas regarding the availability or lack thereof of a 12-FT channel throughout the waterway. As discussed in Section 2 and in the Hydraulics and Hydrology portion of Appendix A *Engineering*, the large majority of the Red River has depths of 20 feet or greater at normal pool conditions, with the exception of some select areas in the upper ends of navigation pools where water levels become critical at low flows and downstream of L&D 1 where the river is uncontrolled and heavily influenced by the Mississippi River flows through the Old River Control Complex. Of the roughly 230 miles of waterway from Old River to the Shreveport area, approximately 10-12 cumulative miles (approximately 5 percent) of waterway segments indicate potential problems regarding providing a 12-FT channel under existing conditions assuming a low-flow project design condition as the 98 percent duration exceedance probability, or a low flow that is exceeded 98 percent of the time.

Navigation channel depths were assessed with existing readily available models and data including an in-house calibrated 1D/2D Red River RAS Model, 2016 single-beam channel bathymetry data, and period of record and statistical flow data along with historical dredge records spanning 2012 to 2024. These models and data were used to identify potential problem areas regarding the availability of a 12-FT channel. The dredge records were used as a starting point to identify areas where current and past dredging has been required just to maintain a 9-FT channel. The hydraulic model was used to verify that it has the capability to illustrate that those same areas show insufficient depths for the 9-FT channel and to further identify areas that have insufficient depths for a 12-FT channel. Statistical analyses were completed to demonstrate the percentages of time certain channel depths and flows are available within the river and at the lock and dam structures. Additional information on the evaluations can be found in the Appendix A *Engineering*, specifically the Hydraulics and Hydrology portion of Appendix A *Engineering*. An additional detailed 2D hydraulic model (HEC-RAS) is expected to be tested at later phases of the study to provide additional numerical modeling results to support project decision making.

Similar to the third strategy, for this strategy, the PDT also initially evaluated segmenting the channel into two primary economic reaches. The PDT reviewed benefits of achieving a 12-FT channel through two locks versus achieving a 12-FT channel through all five locks. The prefix 2 was added to all alternatives that considered benefits of achieving a 12-FT channel through just two locks (through Pool 2). The prefix 3 was added to all alternatives that considered benefits of achieving a 12-FT channel through all locks (all pools). These combinations were labeled Alternatives 2/3, 2/3a, 2/3b, 2/3c, and 2/3ab, as shown in the initial array table. Each of the alternatives was further distinguished by reach across the river based on the benefits typically achieved from commodity movements in those areas. The first reach extends through Pool 2, from L&D 3 (RM 116) down to the mouth of the Red River (RM 0). The second reach begins at the Caddo-Bossier Port (RM 212) and also

extends down to the river's mouth (RM 0). This second region encompasses the entirety of the maintained navigation channel, while the more limited first region includes only Pools 1 and 2 and the Gauntlet. This division was selected to distinguish locations where the greatest benefits could be realized at the lowest cost with the various channel improvement methods. Most of these benefits were expected to be achieved from improving navigation through Alexandria, Louisiana, which established the boundaries at L&D 3, through Pool 2, for the first region.

In reviewing the various combinations of dredging, channel improvements, and channel segmentation, this strategy produced the following alternatives:

- Alternatives 2/3: Draft restrictions; deviation; dredging to 12-FT
- Alternatives 2/3a: Draft restrictions; deviation; improvement of dikes to 12-FT
- Alternatives 2/3b: Draft restrictions; deviation; construction of new dikes to 12-FT
- Alternatives 2/3c: Draft restrictions; deviation; construction of high-priority dikes and improvement of dikes to 12-FT
- Alternatives 2/3ab: Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT

3.5.2 Screening of the Initial Array of Alternatives

The Planning and Guidance evaluation criteria were applied to screen the initial array of alternatives to the final array of alternatives.

In accordance with planning guidance, alternatives must be compared to the following Policy and Guidance Section VI.1.6.2(c) criteria: completeness, effectiveness, efficiency, and acceptability (ER 1105-2-103). Completeness refers to the extent that an alternative plan provides all necessary investments or actions to assure realization of the planning objectives, including actions by other Federal and non-Federal entities. Effectiveness is the extent to which the alternative plans contribute to achieving the planning objectives. Efficiency is the extent to which an alternative plan is a cost-effective means of solving the problem and achieving the objectives. Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

Table 3-2 below summarizes the results of the Policy and Guidance criteria evaluation for the full initial array of alternatives. Alternatives under the first, second, and third strategies were screened out for failing to meet the Policy and Guidance criteria described in the table and text below. Alternatives highlighted in blue in Table 3-2 were carried forward to the final array of alternatives.

Table 3-2. Planning and Guidance Criteria

Alternative	Alternative Strategy and Description	Planning and Guidance Criteria			
		Complete	**Effective**	**Efficient**	**Acceptable**
1	No Action 9-FT baseline scenario used in to compare against proposed project alternatives	Conditions are generally navigable under the 9-FT channel. There are funding challenges with the existing project, but USACE focuses on funding repairs on the most critical that could impact the existing navigation channel.	The USACE maintains the 9-FT channel 90 percent of the year. Only during low water conditions is the channel impacted.	Conditions are generally navigable under the 9-FT channel and is managed through a combination of existing in channel features and O&M dredging. As the system degrades due the age of the in-channel features, USACE focuses on repairing the most critical features (see Section 2) before it significantly impacts the existing O&M dredging program.	The continued OMRR&R actions under the 9-FT project are generally acceptable to the public entities or the government. The ongoing actions have continued with limited concerns.
12-FT Draft Only	First Strategy 12-FT channel with expanded draft restrictions	No All necessary investments would not be available to obtain an authorized 12-FT channel, due to the fact the existing dredging program (9-FT) would not address some of the shoaling in some of the upper reaches of the pools between the locks.	No The USACE currently maintains the 9-FT channel 90 percent of the year. Just relying on existing water levels between the pools and having to address the sill elevation a L&D 1 would at most provide a 12-FT channel only 42 percent of the year. This would be the best case since it would have to assume that there was also available draft in the upper reaches of the pool.	No There is no Federal cost for this Alternative; however, waterway users would have to carefully plan trips to correspond to highwater conditions where there is available 12-FT. This could lead to transportation inefficiencies and waterway users could incur additional cost, such a storage cost for waiting for highwater conditions.	No This plan is not acceptable from a general public, and is not agreeable to various levels of government, since it would require coordination between the USACE, U.S. Coast Guard and waterway users. The approach also is not technically sound due to the high risk of limited 12-FT navigation channel availability and limited ability to maintain a 12-FT channel.

Alternative	Alternative Strategy and Description	Planning and Guidance Criteria			
		Complete	Effective	Efficient	Acceptable
Pool Raise	Second Strategy 12-FT channel with modified pool elevations	No Although the USACE has some ability to modify the pool levels. The JBJ Waterway is also part of the Red River Levee system. Without reviewing improvements to that system to address high stages the alternative would not be complete.	No Raising the pool levels could temporarily provide 12-FT draft, but the existing channel improvements would likely become ineffective in managing sediment in the system since it was designed based on a lower pool level. Eventually the channel would shoal in and dredging actions or dike improvements. would be needed. r to maintain a 12-FT channel with higher pool levels. A major limitation to this alternative was that the top of Tainter gate elevation when gates are closed is too low to raise Pool 1 to the elevation that would provide the desired 18 ft of depth at the L&D 2 lower miter gate sill. For a higher pool level, extensive structural and hydraulic analyses would also be required	No Significant modifications to the dam or a new dam would be required to hold a higher pool level which would significantly increase the cost beyond justification. Dike improvements or construction would also be required to maintain a self scouring channel at a higher pool level. There are potential significant costs to modify the existing Red River Levee systems. There are over 100 miles of levee along the JBJ Waterway that would have to be investigated to raise the existing pool levels to maintain a 12-FT channel. Extensive structural and hydraulic analysis would be required, which would increase the cost.	No This is not acceptable from a technical, economic, or financial perspective.
Modify Lock/Dams	Third Strategy Modify existing five locks and dams; other in-channel work, such as dredging, dike improvements, and adding new dikes	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	No There are significantly high preliminary costs for the modification of locks and dams and it would not have yielded a cost-effective solution compared to other methods.	No This alternative would require the river to be shut down for an extended period. This period of inactivity on the river would negatively impact industry and is unacceptable to the public as well as State and local governments.

Alternative	Alternative Strategy and Description	Planning and Guidance Criteria			
		Complete	Effective	Efficient	Acceptable
New Locks/Dams	Third Strategy Construct five new locks and dams; other in-channel work	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	No There are significantly high preliminary costs for new locks and dams, so this is not a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public. New locks and dams could be constructed in the dry to prevent shut downs of the river.
Limited Modification of Locks/Dams	Third Strategy Modify existing L&D 1 and L&D 2 (two southernmost locks); other in-channel work	Yes All necessary investments would be available for the desired effect.	No The action would not achieve planning objectives since it would only focus on the southernmost locks and would not provide National security interest for providing 12-FT access to Barksdale Air Force Base.	No There are significantly high preliminary costs for the modification of the two locks and dams, so this is not a cost-effective solution compared to other methods.	No This alternative would require the river to be shut down for an extended period. This period of inactivity on the river would negatively impact industry and is unacceptable to the public as well as State and local governments.

Alternative	Alternative Strategy and Description	Planning and Guidance Criteria			
		Complete	Effective	Efficient	Acceptable
Limited New Locks/Dams	Third Strategy Construct two new locks: L&D 1 and L&D 2; other in-channel work	Yes All necessary investments would be available for the desired effect.	No The action would not achieve planning objectives since it would only focus on the southernmost locks and would not provide National security interest for providing 12-FT access to Barksdale Air Force Base.	No There are significantly high preliminary costs for 2 new locks and dams, so this is not a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public. New Locks and Dams could be constructed in the dry to prevent shutdowns of the river.
2/3	Fourth Strategy Draft restrictions, deviation, dredging to 12-FT	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	Yes The preliminary cost ranges are within the range of 12-FT channel benefits, and it would have yielded a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public
2/3a	Fourth Strategy Draft restrictions; deviation; improvement of dikes to 12-FT	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	Yes The preliminary cost ranges are within the range of 12-FT channel benefits, and it would have yielded a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public

Alternative	Alternative Strategy and Description	Planning and Guidance Criteria			
		Complete	Effective	Efficient	Acceptable
2/3b	Fourth Strategy Draft restrictions; deviation; construction of new dikes to 12-FT	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	Yes The preliminary cost ranges are within the range of 12-Ft channel benefits, and it would have yielded a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public
2/3c	Fourth Strategy Draft restrictions; deviation; construction of high-priority dikes and improvement of dikes to 12-FT	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	Yes The preliminary cost ranges are within the range of 12-Ft channel benefits, and it would have yielded a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public
2/3c	Fourth Strategy Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT	Yes All necessary investments would be available for the desired effect.	Yes The action would achieve planning objectives.	Yes The preliminary cost ranges are within the range of 12-Ft channel benefits, and it would have yielded a cost-effective solution compared to other methods.	Yes Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public

3.5.2.1 **12-FT Draft Only Alternative – Screened**

The option of relying on existing conditions related to the 9-FT channel improvements to achieve a 12-FT channel for part of the year was eliminated from consideration. This approach would provide a 12-FT channel only approximately 42 percent of the time, which is likely a conservative estimate. There are periods during the year when channel depths fluctuate between 9-FT and 12-FT due to USACE's advanced maintenance practices associated with the 9-FT project and funding limitations within the O&M program.

3.5.2.2 **Pool Raise Alternative – Screened**

This alternative addressed insufficient depths at L&D 2 as well as other depth constraints found in Pool 1. A major limitation to this alternative was that the top of Tainter gate elevation when gates are closed is too low to raise Pool 1 to the elevation that would provide the desired 18 ft of depth at the L&D 2 lower miter gate sill. To achieve the necessary pool elevation for a 12-FT channel, extensive structural and hydraulic analyses would have been required. Structural analysis would have been necessary to determine if the locks and dams could support the elevated pool levels. This alternative would also have necessitated the raising of related levees and dikes along the Red River, resulting in substantial construction and material costs. There are potential significant costs to modify the existing Red River Levee systems. There are over 100 miles of levee along the JBJ Waterway that would have to be investigated to raise the existing pool levels to maintain a 12-FT channel, which would also increase the cost. Therefore, this alternative was screened based on initial ROM cost estimates.

3.5.2.3 Modify Lock/Dams Alternative – Screened

Deepening the locks and dams, via lowering the sill, is a technically challenging option due to existing infrastructure beneath the locks and dams. Any modification or reconstruction would necessitate a complete river shutdown with no temporary bypass options. Historically, extended lock closures have negatively impacted industry, and similar disruptions in the future are expected to result in the loss of industry users and negative economic consequences. Industries that operate on the JBJ Waterway indicated that the impact of shutting down the river would negatively impact operations to an unacceptable degree. The capability to support military operations by providing cost effective transportation of equipment and supplies to Fort Polk near Leesville, Louisiana, and Barksdale Air Force Base in Bossier City, Louisiana, would also be impacted. Thus, this alternative was screened for violating constraints related to avoiding extended river closures.

3.5.2.4 New Locks/Dams Alternative – Screened

Initial estimates for the cost of constructing new locks and dams indicated that this approach would not provide a cost-effective solution compared to other methods, leading to its exclusion from consideration. The cost estimates, which were based solely on construction cost, ranged from $340 million to $740 million for each lock. These estimates alone exceed the anticipated incremental benefits of deepening the channel from 9-FT to 12-FT. Additionally, this alternative would incur further expenses for channel improvements, as

certain sections of the river would need enhancements to maintain a 12-FT channel year-round. This further reduces the cost-effectiveness of the proposal.

3.5.2.5 Limited Modification of Locks/Dams Alternative – Screened

The most significant amount of commodity traffic on the JBJ Waterway is concentrated in the southernmost regions of the river. Therefore, modification of just the lowermost two locks was considered. Any modification or reconstruction would necessitate a complete river shutdown with no temporary bypass options. Historically, extended lock closures have negatively impacted industry, and similar disruptions in the future are expected to result in the loss of industry users and negative economic consequences. Industries that operate on the JBJ Waterway indicated that the impact of shutting down the river would negatively impact operations to an unacceptable degree. The capability to support military operations by providing cost effective transportation of equipment and supplies to Fort Polk near Leesville, Louisiana, and Barksdale Air Force Base in Bossier City, Louisiana, would also be impacted. This alternative was screened for violating constraints related to avoiding extended river closures.

3.5.2.6 Limited New Locks/Dams Alternative – Screened

The most significant amount of commodity traffic on the JBJ Waterway is concentrated in the southernmost regions. Therefore, constructing two new locks and dams was considered in pursuit of an economically justified project. To evaluate this alternative, the PDT used the same construction cost estimates between $410 million to $740 million for lock replacements but focused on only two locks versus five. Even with a lower overall estimate, its anticipated incremental benefits of deepening the channel from 9-FT to 12-FT would not exceed the cost. Additionally, this alternative would incur further expenses for channel improvements, as certain sections of the river would still need enhancements to maintain a 12-FT channel year-round. This further reduces the cost-effectiveness of the proposal, leading to screening of the alternative.

3.6 INTERMEDIATE ARRAY OF ALTERNATIVES: ALTERNATIVES FOR PARTIAL REGIONS OF THE JBJ WATERWAY SCREENED OUT

Alternatives that included channel improvements through Pool 2 only were screened out for failing to meet the goals of providing navigable benefits for the entire region and for failing to support National security interests. Table 3-3 displays final screened alternatives in red in an intermediate array of alternatives. Only the No Action Alternative and Alternatives 3 through 3ab were carried into the final array. Waterway activities for Barksdale Air Force Base, which is considered a National security interest, would not be supported by this set of alternatives since Barksdale lies north of the Caddo-Bossier Port. Alternatives through Pool 2 only were considered incomplete and failed to meet the completeness Policy and Guidance criteria; an authorized 12-FT channel would not be achieved in its entirety. These alternatives would also not meet objectives previously listed: to enhance economic opportunities in the region

and improve the navigability for a 12-FT channel. Non-Federal sponsor feedback also supported this screening.

Table 3-3. Intermediate Array

Location	Alternative	Alternative Description
-	1	No action
Through Pool 2	2	Draft restrictions; deviation; dredging to 12-FT
Through Pool 2	2a	Draft restrictions; deviation; improvement of dikes to 12-FT
Through Pool 2	2b	Draft restrictions; deviation; construction of new dikes to 12-FT
Through Pool 2	2c	Draft restrictions; deviation; construction of high-priority dikes and improvement of dikes to 12-FT
Through Pool 2	2ab	Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT
Through Caddo-Bossier Port	3	Draft restrictions; deviation; dredging to 12-FT
Through Caddo-Bossier Port	3a	Draft restrictions; deviation; improvement of dikes to 12-FT
Through Caddo-Bossier Port	3b	Draft restrictions; deviation; construction of dikes to 12-FT
Through Caddo-Bossier Port	3c	Draft restrictions; deviation; construction of high-priority dikes and improvement of dikes to 12-FT
Through Caddo-Bossier Port	3ab	Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT

3.7 FINAL ARRAY OF ALTERNATIVES

Pursuing a deviation from EM 1110-2-1604 and including a draft restriction were included in all action alternatives in the final array, in combination with other in-channel improvements.

Table 3-4. Final Array

Alternative	Description
1	No action
3	Draft restrictions; deviation; dredging to 12-FT
3a	Draft restrictions; deviation; improvement of dikes to 12-FT
3b	Draft restrictions; deviation; construction of dikes to 12-FT
3c	Draft restrictions; deviation; construction of high-priority new dikes and improvement of dikes to 12-FT
3ab	Draft restrictions; deviation; construction of new dikes and improvement of dikes to 12-FT

3.7.1 Alternative 1: No Action

Under the FWOP scenario, there would be no Federal action to address the navigation restrictions experienced on the JBJ Waterway to achieve a 12-FT channel. Industry would continue to be limited in their ability to carrying capacity per trip, and barges would continue to lightload.

3.7.2 Alternative 3: Draft Restrictions; Deviation; Dredging to 12-FT

This alternative features the deviation, draft restrictions, and construction dredging in 11 reaches, as described in Section 2.8.4, which would not naturally maintain a 12-FT channel. There would be 18 dredging locations within these reaches. The total amount of excavated material for the initial construction dredging from 9-FT to 12-FT would be 1,525,200 cubic yards.

The PDT estimated that approximately 28 days of O&M dredging on a yearly basis would be required. The O&M dredging requirement is on an annual basis and was estimated to be $1,275,000, assuming that the 9-FT channel emergency repairs would be complete, thus reducing the 9-FT in channel O&M dredging to a negligible amount. (Other O&M dredging costs, such as at the lock approachways, were not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they would function as designed for the project life and that no maintenance would be required). There would be minor aquatic impacts and no impacts to wetland or terrestrial resources. No mitigation would be required. All work would occur within the original project footprint for the 9-FT channel designs. The excavated material would be in-channel placement.

3.7.3 Alternative 3a: Draft Restrictions; Deviation; Improvement of Dikes to 12-FT

This alternative features the deviation, draft restrictions and improvements to the existing dikes to adjust the dike dimensions appropriately for supporting a 12-FT channel. Additional

rock would be added to approximately eight dike field locations. The total amount of stonework was estimated to be 361,100 tons.

The PDT estimated that approximately 28 days of O&M dredging every 2 years would be required. The O&M dredging cost requirement was estimated at $1,275,000 on a biennial basis, assuming that the 9-FT channel emergency repairs would be complete, thus reducing the 9-FT in-channel O&M dredging to a negligible amount. (Other O&M dredging costs, such as at the lock approachways, were not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they would function as designed for the project life and that no maintenance would be required). With the addition of the dike improvements to improve the channel efficiency, O&M dredging would be reduced by 50 percent for Alternative 3a in comparison to that for Alternative 3. There would be minimal aquatic impacts and no impacts to wetland or terrestrial resources. No mitigation would be required. All work would occur within the original project footprint for the 9-FT channel designs.

3.7.4 Alternative 3b: Draft Restrictions; Deviation; Construction of New Dikes to 12-FT

This alternative features the deviation, draft restrictions and new dike construction in approximately 20 dike field locations. The total amount of stonework was estimated to be 1,183,100 tons.

The PDT estimated that approximately 28 days of O&M dredging every 25 years would be required. The O&M dredging cost requirement was estimated to be $1,275,000, applied throughout the 25 year period, assuming that the 9-FT channel emergency repairs would be complete, thus reducing the 9-FT in-channel O&M dredging to a negligible amount. Other O&M dredging costs, such as at the lock approachways, were not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they would function as designed for the project life and that no maintenance would be required). With the new dike construction to address the channel inefficiencies, O&M dredging would be reduced by 90 percent for Alternative 3b in comparison to that for Alternative 3. There would be minor aquatic impacts, an expected 21.8 acres of wetlands would be impacted, and an expected 19.1 acres of wildlife habitat. Mitigation to offset these impacts would be required.

3.7.5 Alternative 3c: Draft Restrictions; Deviation; Construction of High-Priority Dikes and Improvement of Dikes to 12-FT

This alternative features the deviation, draft restrictions, and improvement to dikes as described in Alternative 3a as well as the construction of new dikes in seven high-priority locations. High-priority locations are those that cause severe depth restraints in the channel and that impact the navigability of the 9-FT channel. For more details, see Appendix A *Engineering*. The total amount of stonework is estimated to be 834,600 tons.

The PDT estimated that approximately 28 days of O&M dredging every 25 years will be required. The O&M dredging cost requirement is estimated at $1,275,000 applied throughout the 25 year period, assuming that the 9-FT channel emergency repairs are complete, thus

reducing the 9-FT in-channel O&M dredging to a negligible amount. (Other O&M dredging costs, such as at the lock approach ways, are not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they will function as designed for the project life and that no maintenance would be required). O&M dredging is reduced by 90 percent in comparison with Alternative 3. This is the same reduction in O&M compared to 3b; however, Alternative 3c focuses on improvements to existing dikes and new dikes at only the high-priority locations and avoids habitat impacts. There would be minor aquatic impacts, an anticipated 5.5 wetland acres impacted, and an anticipated 4.8 acres of wildlife habitat impacted. Mitigation would be required to offset impacts.

3.7.6 Alternative 3ab: Draft Restrictions; Deviation; Construction of New Dikes and Improvement of Dikes to 12-FT

This alternative features the deviation, draft restrictions, and new dike construction in 20 locations as described in Alternative 3b as well as the improvements to dikes as described in Alternative 3a. The total amount of stonework was estimated to be 1,544,900 tons.

The PDT estimated that O&M dredging would be reduced 100 percent, assuming that the 9-FT channel emergency repairs would be complete, thus reducing the 9-FT in-channel O&M dredging to a negligible amount. (Other O&M dredging costs, such as at the lock approachways, were not included in this estimate. Based on the historical performance of the existing dikes, the PDT assumed that they would function as designed for the project life and that no maintenance would be required). There would be minor aquatic impacts, an estimated 21.8 acres of wetland impacts, and 19.1 acres of wildlife habitat impacts. Mitigation would be required to offset these impacts.

3.8 CONTRIBUTION TO OBJECTIVES AND AVOIDANCE OF CONSTRAINTS

Table 3-5. Objective Ranking

Objective	Ranking Rationale	3	3a	3b	3c	3ab
1. Improve channel navigability and reliability throughout the JBJ Waterway	Alternatives were ranked based on their ability to enhance navigability by providing a self-scouring channel. To achieve a fully self-scouring condition, an alternative must generate flow velocities strong enough to prevent sediment deposition, while remaining slow enough to allow for safe navigation and to avoid excessive erosion of structures and banklines. Additionally, channel widths—specifically the required 200-FT on the JBJ Waterway—and alignments must support safe and efficient navigation. Although each alternative would provide a 12-FT channel, only Alternative 3ab is anticipated to create a fully self-scouring channel, thereby eliminating the need for annual in-channel maintenance dredging, a significant navigational disruptor. This alternative also best supports protection of, and adjustments to, the existing channel alignment. Therefore, Alternative 3ab ranks first. Alternatives 3b and 3c both limit required maintenance dredging to an estimated 28 days every 25 years. However, Alternative 3b ranks second because it provides more uniform hydraulic control throughout the system and includes greater optimization for the 12-FT channel beyond simply enhancing existing structures. Alternative 3c ranks third, as it does not address medium- and low-priority problem areas permanently. Alternative 3a ranks fourth, as it would still require biyearly dredging due to unaddressed priority areas. Finally, Alternative 3 ranks fifth, as dredging will impact navigation and does not improve the channel's ability to self-scour.	5th	4th	3rd	2nd	1st
2. Increase movement of commodities through the JBJ Waterway	This objective was not ranked because there is no discernable difference among the alternatives. However, dredging activities associated with Alternative 3 could pose some minor disruptions to movement of commodities while dredging actions occur.	-	-	-	-	-
3. Enhance efficiency of the navigation system	The alternatives are ranked according to their ability to provide a cost-effective means of solving the problem and achieving the objectives. Alternative 3a ranks first based on NED criteria discussed further in Section 5. Although Alternatives 3b, 3c, and 3ab do reduce the longer-term dredging cost, these alternatives also come with a higher initial construction cost.	2nd	1st	4th	3rd	5th

4. Enhance economic opportunities in the region	All of the alternatives provide equal economic enhancement opportunities because they provide a 12-FT draft throughout the year; however, Alternative 3a likely ranks highest from a regional aspect since it provides opportunities for construction contracts and while dredging operations continue in the region.	-	-	-	-	-
5. Decrease overall OMRR&R costs	The alternatives' ability to decrease overall OMRR&R dredging costs directly correlates to the alternatives' ability to provide a self-scouring channel with a channel alignment that provides for safe and efficient navigation. Alternative 3a provides opportunities to decrease O&M cost while balancing additional repair, rehabilitation, and replacement costs, as reflected in the ranking of objective 3. Although Alternatives 3b, 3c, and 3ab do significantly decrease the O&M dredging cost, they potentially significantly increase future repair, rehabilitation and replacement costs outside of the 50-year period of analysis. Therefore, this ranking is similar to objective 3; however, this ranking also reflects the amount of rock that could be required in future repair, rehabilitation, and replacement actions.	5th	1st	3rd	2nd	4th

For comparison purposes, objectives were labeled with a corresponding number.

Table 3-6. Constraint Ranking

Constraint	Ranking Rationale	3	3a	3b	3c	3ab
1. Lock closure and/or temporary cessation of navigation due to construction and other factors	Since contractors performing any dike or dredging work must remove any obstructions if a tow is passing through the area, it would cause delays in the construction period and add more coordination requirements with waterway users for alternatives with increasing construction footprints. Therefore, the ranking is based on the amount of work that must take place during the construction period or during dredging cycles.	1st	2nd	4th	3rd	5th
2. Lock dimensions; miter gate sill elevations	This constraint was not ranked because all of the alternatives include a measure to address the miter gate sill elevation constraint. Therefore, there is no difference among the alternatives.	-	-	-	-	-
3. Avoid adverse impacts to environmental and cultural resources	Alternative 3a, was ranked first for avoiding adverse impacts to environmental and cultural resources. The other alternatives were ranked according to their terrestrial, wetland, aquatic, wildlife, and other impacts.	3rd	1st	4th	2nd	5th

SECTION 4
Environmental Effects and Consequences

4.1 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The sections below discuss any potential environmental impacts associated with the FWOP Alternative and those associated with implementation of Alternatives 3, 3a, 3b, 3c, and 3ab.

In evaluating the significance of a project's effects, NEPA requires a consideration of both context and intensity. Context means that the significance must be analyzed in several contexts, such as the human environment, affected region, affected interests, and the local setting. The intensity of a potential impact relates to the impact's severity and includes consideration of beneficial and adverse effects, the level of controversy associated with a project's impacts on human health, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts, and whether the action threatens to violate Federal, State, or local laws established for the protection of the human and natural environment.

USACE uses quantitative and qualitative analyses, as appropriate, to determine the level of a potential impact caused by the proposed alternatives. Based on the results of the analyses, this DIFR-EA identifies whether a particular potential impact would have a significant effect on a resource and whether or not the impact would be adverse or beneficial.

- Intensity
    - Negligible: No noticeable effects to the resource in the project area.
    - Minor: A measurable effect on a resource. A slight impact that may not be readily obvious and is within accepted levels for permitting, continued resource sustainability, or human use.
    - Significant: A measurable and adverse effect to a resource. A major impact that is readily obvious and is not within accepted levels for permitting, continued resource sustainability, or human use. Impacts likely result in the need for mitigation.
- Duration
    - Short Term: Temporary effects caused by the construction and/or implementation of a selected alternative.
    - Long Term: Lasting effects caused by an alternative after the action has been completed and/or after the action is in full and complete operation

4.2 NATURAL ENVIRONMENT

4.2.1 Aquatic Resources and Fisheries

4.2.1.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with operating and maintaining the JBJ Waterway with a 9-FT navigation channel. Regular O&M dredging would continue in the area, and impacts to aquatic resources and fisheries would remain similar to existing conditions.

4.2.1.2 Future Conditions with Alternative 3

Alternative 3 would have minor temporary impacts on aquatic resources and fisheries within the project area caused by construction dredging. Due to noise and motion disturbances caused by dredging, fish and other mobile aquatic species are likely to avoid the project area during the proposed actions but are expected to return shortly after the project is complete. Dredging would also temporarily increase turbidity in the cut area, but water clarity would soon return to normal once dredging is complete. Benthic species within the dredge cuts would likely experience increased levels of mortality due to the physical removal of individuals and substrate that is used for habitat. Construction dredging areas would likely have higher impacts on mussels and benthic invertebrates than O&M dredge areas that are disturbed annually. Mussels and benthic species would be expected to recolonize the area after dredging is complete.

All dredged material would be pumped from the cutterhead and discharged via a dredge pipe. Dredged material would be cast out into currents of the JBJ Waterway that are swift enough to carry and disperse the dredged material as it travels downstream of the project area. With proper dispersal of the dredged material, impacts to benthic species such as mussels would be minor and temporary. The distance into the river needed to discharge all dredged material would be determined based on a hydrographic survey and river stages.

4.2.1.3 Future Conditions with Alternative 3a

Since only currently existing dikes would be modified and improved, Alternative 3a would have minimal impacts on aquatic resources and fisheries. Mobile aquatic species such as fish, macroinvertebrates, snakes, and turtles that utilize the rocks in these dikes for habitat and feeding would avoid the site during construction and utilize nearby similar habitats. These species would return to normal utilization of the area after construction concludes. Immobile benthic species such as mussels in the area may experience minor disturbances in habitat and possible mortalities as rocks are rearranged and added to the improve the dikes.

Beneficially, placement of the rock underwater would create habitat that can be used by various species of fish, mussels, and invertebrates for feeding, shelter, and reproduction or as refugia from currents.

4.2.1.4 Future Conditions with Alternatives 3b, 3c, and 3ab

Alternative 3 would have minor temporary impacts on aquatic resources and fisheries within the project area caused by the construction of new dikes. Due to noise and motion disturbances caused by placing the rock within the waterway, fish and other mobile aquatic species are likely to avoid the project area during the proposed actions but are expected to return shortly after the project is complete. Immobile benthic species in the construction areas would likely experience increased rates of mortality as the rock is placed on the riverbed. Similarly, if these three alternatives, Alternative 3b would have the most impacts, due to constructing more dikes than Alternatives 3c and 3ab.

Beneficially, placement of the rock underwater would create habitat that can be used by various species of fish, mussels, and invertebrates for feeding, shelter, and reproduction or as refuge from currents.

4.2.2 Terrestrial Resources and Wildlife

4.2.2.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Terrestrial resources and wildlife would not be impacted.

4.2.2.2 Future Conditions with Alternative 3

Under Alternative 3, no significant direct negative impacts to terrestrial resources or wildlife would arise. Since there is no land-based construction and all dredged material would be disposed of and dispersed in swift-flowing waters, no terrestrial resources would likely be impacted.

The movement and behaviors of wildlife that utilize the edges of the river around the project area would be temporarily influenced by the noise generated from operating construction equipment. Wildlife in the area would likely utilize the abundance of similar habitat in the area and would avoid the project site during construction dredging activities. However, this temporary impact is considered minimal, as species would be expected to return to the area upon completion of the construction dredging.

4.2.2.3 Future Conditions with Alternative 3a

Under Alternative 3a, no significant negative impacts to terrestrial resources or wildlife would arise. All improvement and rearrangement of dikes would occur in the river and would not directly impact terrestrial habitats or wildlife. Under this alternative, no land-based construction or tree clearing would occur.

The movement and behaviors of wildlife that utilize the edges of the river around the project area would be temporarily influenced by the noise generated from operating construction equipment. Wildlife in the area would likely utilize the abundance of similar habitat in the area and would avoid the project site during construction activities. However, this temporary impact is considered minimal, as species would be expected to return to the area upon completion of the construction.

4.2.2.4 **Future Conditions with Alternatives 3b, 3c, and 3ab**

Under Alternatives 3b, 3c, and 3ab, there would be temporary significant direct impacts to terrestrial resources and wildlife habitat. Construction of each new dike would require clearing 0.69 acres of land to create tiebacks for the dikes. Due the proposed clearing, Alternatives 3b, 3c, and 3ab would require mitigation to compensate for the loss of existing forest and wetland habitats.

After construction is complete, excavated dirt would be placed back on top of the rocks used to construct the tiebacks in order to create conditions that would allow for natural succession to occur. Regrowth through natural succession would reduce the habitat clearing impacts from permanent to temporary and would likely reduce the amount of mitigation required to compensate for the loss of average annual habitat units. Additional habitat modeling would be required to determine by what amount the mitigation requirements would be reduced.

Alternatives 3b and 3ab propose to construct more dikes and would therefore have greater impacts (40.9 acres) to terrestrial resources than Alternative 3c (10.3 acres). Terrestrial habitat types that would be cleared include agricultural land, BLH forests, and wetlands. Table 4-1 compares the terrestrial impacts between alternatives. Any impacted terrestrial resources would require compensatory mitigation.

Table 4-1. Terrestrial Impacts

Alternative	Wildlife Habitat Impacts (Acres)	Wetland Impacts (Acres)	Total Terrestrial Impacts (Acres)
3	0	0	0
3a	0	0	0
3b	19.1	21.8	40.9
3c	4.8	5.5	10.3
3ab	19.1	21.8	40.9

The movement and behaviors of wildlife that utilize the forested areas that would be cleared and edges of the river around the project area would be temporarily influenced by the clearing and noise generated from operating construction equipment. Due to the small size of each proposed area for clearing (0.69 acres) and the abundance of similar forested areas

surrounding the project sites, wildlife in the area would likely utilize the adjacent habitat areas and would avoid the project site during construction and clearing activities. Species would be expected to return to the area upon completion of construction and after tress regrow through natural succession.

4.2.3 Wetlands

4.2.3.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Wetlands would not be impacted.

4.2.3.2 Future Conditions with Alternative 3

Under Alternative 3, no significant negative impacts to wetlands would arise. No wetlands occur within the proposed dredge cuts. There would be no land-based construction, and all dredged material would be disposed of into waters that are flowing swiftly enough to prevent sedimentation of wetlands downstream. Due to this, no significant impacts to wetlands would be expected to occur under the proposed actions.

4.2.3.3 Future Conditions with Alternative 3a

Under Alternative 3a, wetlands would not be impacted. There are no wetlands directly in the construction area and adjacent wetlands would not be impacted. All improvement and rearrangement of dikes would occur in the river and no rock would be placed into wetlands. No land-based construction or tree clearing would occur.

4.2.3.4 Future Conditions with Alternative 3b, 3c, and 3ab

Under Alternatives 3b, 3c, and 3ab, there would be significant direct impacts to wetlands. Construction of each new dike would require clearing 0.69 acres of land to create tiebacks for the dikes. The NWI was used to identify multiple tieback locations that would be constructed within BLH wetlands. These wetland areas would be cleared, excavated, and have rock placed to construct the tiebacks. Due the proposed wetland clearing, Alternatives 3b, 3c, and 3ab would require mitigation to compensate for the loss of existing wetland habitats.

After construction is complete, excavated dirt would be placed back on top of the rocks used to construct the tiebacks in order to create conditions that would allow for natural succession to occur. Regrowth through natural succession would reduce the habitat clearing impacts from permanent to temporary and would likely reduce the amount of mitigation required to compensate for the loss of average annual habitat units. Additional habitat modeling would be required to determine by what amount the mitigation requirements would be reduced.

Alternatives 3b and 3ab propose to construct more dikes and would therefore have greater impacts (21.8 acres) to wetlands than Alternative 3c (5.5 acres). Table 4-2 compares

wetland impacts between alternatives. Any impacted wetland resource would require compensatory mitigation.

Table 4-2. Wetland Impacts

Alternative	Wetland Impacts (Acres)
3	0
3a	0
3b	21.8
3c	5.5
3ab	21.8

4.2.4 Threatened, Endangered, and Protected Species

USACE performed Section 7 consultation on 7 August 2025 through USFWS's IPaC website (Appendix C *Environmental* Section 2). USACE's determinations related to project effects on threatened and endangered species that could possibly occur in the project area are provided in Table 4-3. A letter from USFWS concurring with USACE's determinations was received on 25 August 2025.

Table 4-3. Impact Determinations for Threatened, Endangered, and Protected Species

Species	Alternative 3	Alternative 3a	Alternative 3b	Alternative 3c	Alternative 3ab
Tricolored Bat	No Effect	No Effect	May Affect	May Affect	May Affect
Red-Cockaded Woodpecker	No Effect	No Effect	NLAA	NLAA	NLAA
Whooping Crane	No Effect	No Effect	NLAA	NLAA	NLAA
Alligator Snapping Turtle	NLAA	NLAA	NLAA	NLAA	NLAA
Pallid Sturgeon	NLAA	NLAA	NLAA	NLAA	NLAA
Monarch Butterfly	No Effect	No Effect	NLAA	NLAA	NLAA

*NLAA= May Affect, Not Likely to Adversely Affect

4.2.4.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Threatened, endangered, and protected species would not be impacted beyond current O&M activities.

4.2.4.2 Future Conditions with Alternatives 3 and 3a

The proposed actions of Alternatives 3 and 3a would have similar minor impacts on threatened and endangered species (Table 9). Due to the lack of suitable habitat in the project area, no tree clearing, and all work occurring in the river, the proposed actions would have no effect on tricolored bats, red-cockaded woodpeckers, whooping cranes, and monarch butterflies. As part of the IPaC process, a range-wide determination key was completed for the Tricolored bat (Appendix C *Environmental* Section 4), red-cockaded woodpecker, and whooping crane (Appendix C *Environmental* Section 5) and concurred with USACE's determinations that the proposed actions of this project would have no effect on these species.

The alligator snapping turtle and pallid sturgeon could be present within the project area and may be affected by the proposed construction dredging and placement/ rearrangement of rock during dike improvement but would not likely be adversely affected. The proposed construction dredging for Alternative 3 would have minor impacts on turtles and sturgeons due the disruption of the water column and noise generated by the equipment. During dredging the species are likely to avoid the area but are expected to return to normal utilization of the area once construction is complete. Proper dredging procedures would be followed to reduce risk of impacting these species. As part of the IPaC process, a range-wide determination key was completed for the pallid sturgeon (Appendix C *Environmental* Section 5) and concurred with USACE's determination of may affect, not likely to adversely affect.

Alternative 3a would have fewer impacts than Alternative 3. Placement of rock and the reconfiguration of dikes may disturb turtles and sturgeons within the area of rock placement, but these impacts would be minimal an unlikely to adversely affect the species. The turtles and sturgeons would likely leave the area during construction. Since the dikes are already present as part of the aquatic habitat and no new dikes would be constructed the species would return to the area and normal behaviors after construction is complete. As part of the IPaC process, a range-wide determination key was completed for the pallid sturgeon (Appendix C *Environmental* Section 5) and concurred with USACE's determination of NLAA.

4.2.4.3 Future Conditions with Alternatives 3b, 3c, and 3ab

The proposed actions of Alternatives 3b, 3c, and 3ab would have similar impacts on threatened and endangered species (Table 9). Tricolored bats may occur in trees within the project area and may be affected by the tree clearing required for the dike tiebacks. To reduce the likelihood of adversely impacting bats tree clearing would not occur during maternity roosting season (1 May to 15 July) or winter torpor (15 December to 15 February).

The proposed tree clearing may disturb and affect the red-cockaded woodpecker, whooping crane, and monarch butterfly; however, due to the unlikelihood of the species presence in the clearing areas and the small size (0.69 acres) of each individual tieback, the proposed actions are not likely to adversely impact these species.

The alligator snapping turtle and pallid sturgeon could be present within the project area and may be affected by the proposed construction of new dikes and the improvement of existing dikes but would not likely be adversely affected. The proposed construction of new dikes would have minor impacts on turtles and sturgeons due the disruption of the water column, the placement of stone, and noise generated by the equipment. During construction the species are likely to avoid the area but are expected to return to normal utilization of the area once construction is complete.

Of these three alternatives, Alternative 3c would have fewer impacts than Alternatives 3b and 3ab. Alternative 3b and 3ab propose to construct more new dikes than Alternative 3c and would involve clearing more acres of forest.

4.2.5 Migratory Birds

4.2.5.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Migratory birds would not be impacted.

4.2.5.2 Future Conditions with Alternatives 3 and 3a

Under Alternatives 3 and 3a, there would only be minimal impacts to migratory birds in the project area. The noise generated by the operation of construction equipment could temporarily disturb migratory birds using the shores and forested areas near the dikes and dredge cuts. Due to the noise, migratory birds are likely to avoid this area during construction but would return after construction is complete. Under these alternatives, no migratory bird habitat would be removed.

4.2.5.3 Future Conditions with Alternatives 3b, 3c, and 3ab

Under Alternatives 3b, 3c, and 3ab, the operation of loud equipment and increased construction traffic would cause temporary minor adverse impacts to migratory birds that may be utilizing the shore and trees within the construction area. Additionally, direct adverse impacts would result from trees felled that could be used by migratory birds as habitat. The seasonal tree clearing restrictions put into place for bats (see Section 5.1.4.3) would also reduce potential impacts to nesting migratory birds.

Per the USFWS guidance, incidental take can result from the taking or killing of migratory birds that results from, but is not the purpose of, an activity. Based on avoiding tree removal

during key migration seasons, the small size of the areas (0.69 acres) to be cleared, and the amount of forest available in the vicinity, these impacts would be minor and short term.

4.2.5.3.1 Bald Eagles

There are not currently known eagle nests within the project footprint. If a nest is later discovered within 660 feet of the project area, then avoidance measures and permitting would be coordinated with USFWS.

4.2.6 Invasive Species

4.2.6.1 Future Conditions with No Action Alternative (FWOP*)*

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. There would be no expected environmental changes that would cause proliferation or reduction of invasive species in association with maintaining the JBJ Waterway.

4.2.6.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

The proposed actions for all alternatives would not have a significant impact on the proliferation of invasive species. The proposed construction dredging, the improvement of dikes, and the construction of new dikes would not introduce new invasive species and would not increase the spread of invasive species that currently occur in the JBJ Waterway. The aquatic habitat in the area would remain similar to current conditions and would not provide new habitat for invasive species such as non-native carp. USACE best management practices would be followed to prevent the further spread of invasive species in the project area.

Future maintenance will not result in additional impacts greater than those of current O&M activities that introduce or cause the continued existence or spread of invasive non-native species or noxious weeds into the environment.

4.3 PHYSICAL ENVIRONMENT

4.3.1 Geology, Topography, and Soils

4.3.1.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Geology, topography, and soils would not be impacted.

4.3.1.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

Under all alternatives, impacts to the local topography of the project area would be negligible since most work would occur in the river and no borrow material would be required. Any dirt excavated to construct tiebacks would be put back on top after the rock is placed. The underlying geology of the area would not be altered from existing conditions.

Soil composition is unlikely to change from the proposed actions since most of the work occurs within the river and any dredged material would be disposed of in water swift enough to transport and disperse the sediment downstream. Existing access would be used when available to avoid unnecessary soil disturbance.

Geology would not be affected by any alternative. Impacts to topography and soils would be negligible.

4.3.2 Water Quality

4.3.2.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Water quality would be expected to remain similar to current conditions.

4.3.2.2 Future Conditions with Alternative 3

Under Alternative 3, there would be temporary minor impacts to turbidity and total suspended solids during construction. All dredged material would be pumped from the cutterhead and discharged via a dredge pipe. Dredged material would be cast out into currents of the JBJ Waterway that are swift enough to carry and disperse the dredged material as it travels downstream of the project area.

Turbidity levels and total suspended solids are highly variable in the study area and are dependent on river stages and velocities. Due to the existing high silt load and elevated turbidity levels found in the project area, no significant impacts would be expected to total suspended solids and turbidity levels. Turbidity is expected to return to normal shortly after construction.

Best management practices that reduce the levels of total suspended solids would be incorporated into the final plans and specifications of the project. A water quality certification (WQC) from LDEQ would be required for the disposal of the dredged material.

According to the EPA's Waterway website, the Red River including the JBJ Waterway is listed as impaired from the Arkansas border to Alexandria, Louisiana, due to issues with drinking water supply. The JBJ Waterway south of Alexandria, Louisiana, is not designated as impaired. The proposed dredging would not adversely impact the JBJ Waterway drinking water supply. The are no scenic and wild rivers within the project area.

4.3.2.3 Future Conditions with Alternative 3a

Alternative 3a would have minimal impacts on water quality. Since no new dikes would be constructed, the main impacts would be slight increases in turbidity caused by the rearrangement and addition of rock to the existing dikes. Turbidity levels would return to normal after construction is complete.

Best management practices that reduce the levels of total suspended solids would be incorporated into the final plans and specifications of the project. A WQC from LDEQ would be required for placement of stone into the river.

According to the EPA's Waterway website, the Red River including the JBJ Waterway is listed as impaired from the Arkansas border to Alexandria, Louisiana, due to issues with drinking water supply. The JBJ Waterway south of Alexandria, Louisiana, is not designated as impaired. The proposed improvement of dikes would not further impact the JBJ Waterway drinking water. The are no scenic and wild rivers within the project area.

4.3.2.4 Future Conditions with Alternatives 3b, 3c, and 3ab

Alternatives 3b, 3c, and 3ab would have minor impacts on water quality caused by the placement of stone when constructing new dikes. Turbidity and suspended solids would temporarily increase during construction but would return to normal levels once construction is complete. Alternative 3c would have fewer impacts than Alternatives 3b and 3ab since Alternative 3c proposes to build fewer new dikes.

Since more than an acre of land would be disturbed during construction of the dike tiebacks, an NPDES permit and an erosion and sedimentation control plan would be required before construction begins to help avoid and reduce construction impacts.

Best management practices that reduce the levels of total suspended solids would be incorporated into the final plans and specifications of the project. A WQC from LDEQ would be required for placement of stone into the river.

According to the EPA's Waterway website, the Red River including the JBJ Waterway is listed as impaired from the Arkansas border to Alexandria, Louisiana, due to issues with drinking water supply. The JBJ Waterway south of Alexandria, Louisiana, is not designated as impaired. The proposed actions would not further impact the JBJ Waterway drinking water. The are no scenic and wild rivers within the project area.

4.3.3 Air Quality

4.3.3.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Air quality would be expected to remain similar to current conditions and continue to be in attainment.

4.3.3.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

Under all proposed alternatives, air quality would be minorly and temporarily impacted during construction due to dust-related sources and the use of internal combustion engines and heavy machinery that produce emissions. Effects to air quality from construction would be localized, minor, and short term, limited to the hours and site of construction. These impacts would not be expected to violate any State or Federal standards or cause the region

to be classified as being in nonattainment. Furthermore, the environmental conditions of the region favor rapid dispersal of the pollutants and thus would not allow concentrations to accumulate.

4.3.4 Noise

4.3.4.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway. Noise in the area would continue to be comprised of ambient sounds associated with agricultural, urban, rural, domestic, and recreational area soundscapes. Noise sources in the area include birds, wildlife, cars, boats, and farm equipment. Noise levels would be expected to remain similar to current conditions.

4.3.4.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

Under all alternatives minor short-term increases in ambient noise levels would occur due to the use of construction equipment. There are few to no sensitive noise receptors such as schools, hospitals, and libraries in the project area. Noise impacts would be limited to the hours and local vicinity of the construction and would return to normal levels after construction is complete.

4.3.5 Floodplain

The intent of the FWOP section is to provide a general overview of the observed trends throughout the Red River JBJ Waterway related to channel conditions and the adjacent floodplain. In addition, generalized overviews of existing analyses are provided for further context establishing a background by presenting some of the influencing variables. The future with-project alternatives are not meant to address floodplain concerns but were meant to be designed with the influencing variables and trends presented in the FWOP section in mind.

4.3.5.1 Future Conditions with No Action Alternative (FWOP)

The future conditions with the No Action Alternative are expected to be similar to the existing conditions (Section 2.6.5). However, observed trends such as those described in Section 2.6.5 are not necessarily indicative of future trends although existing conditions include observational trends that provide insight into the possibilities of future trends.

4.3.5.2 Future Conditions with Alternative 3

Under Alternative 3, the future changes in water levels given specific flows (stage–flow relationship) and the annual frequency of interaction between the river and the floodplain would be assumed to be similar to those discussed in the previous FWOP floodplain section, as construction dredging is the primary structural difference from the FWOP alternative.

Based on the hydraulic analyses, approximately 5 percent of the waterway would require construction dredging to 12-FT. The construction dredging measure to 12-FT may provide a somewhat but temporary increased channel capacity by deepening the river, allowing it to contain more water before overflowing its banks within the dredged reaches. However, it is likely that the river conditions would trend back towards the current channel conditions, which have appeared to remain steady for the approximately 25 years after the final major piece of the waterway—L&D 5—was completed in 1995. Only a relatively small extent (5 percent of the total waterway) of construction dredging would be required and would therefore not significantly alter the system-wide channel capacity or the ability and frequency of the river to overflow its banks into the floodplain.

The draft restrictions and deviation are operational measures that will not impact the channel conditions, water levels, or adjacent floodplain.

4.3.5.3 Future Conditions with Alternative 3a

The primary structural differences between Alternative 3a and Alternative 3 are that Alternative 3a has no construction dredging but does have the improvement of dikes. As noted in the FWOP floodplain impact discussion, dikes do have direct and secondary impacts to water levels therefore potentially impacting the frequency of riverine interaction with the floodplain. The impacts would primarily be focused on medium and high flows regarding the influences on the floodplain. Under Alternative 3a, it was assumed that water levels and floodplain conditions would not be significantly different than FWOP future conditions due to the structural measure being the incremental improvement of existing dikes (approximately 8 dike field locations) such as providing additional length and/or height to the existing dikes to further constrict the channel promoting more channel scouring for the 12-FT depth. The degree of improvement to the dikes was not assumed to be so significant that meaningful impacts to water levels and the floodplain are to occur throughout the system; however, some localized, minimal change or inch-level variability may be assumed nearest the locations of improvement. A significantly higher dike crest may lead to a higher water level required to overtop it and the potential development of a higher dike field (increased deposition and vegetation in the dike field) which decreases overall channel capacity potentially leading to more frequent out of overbank flow events. However, the height the dike is generally less influential than the length of the dike (contraction of the channel) regarding the promotion of channel scouring; therefore, the height was assumed to be altered less than the length was assumed to be altered in the Alternative 3a design. It was not assumed that improved dikes would deepen the river to the extent that the annual frequency of overbank flows decreases because the dike fields generally act as an offset to the overall channel capacity balance. Improved dikes could have the potential to induce erosion of banks at locations across river or downstream; therefore, the PDT will consider those adverse effects in design of Alternative 3a.

Site-specific 2D hydraulic modeling of the improved dikes, at high-priority problem reaches denoted in Appendix A *Engineering*, is to be completed primarily to illustrate that improved dikes are increasing velocities to move sediment. The model can also be used to show the

changes in water levels at different magnitudes of flow to show whether or not the floodplain would become inundated more frequently than current conditions.

The draft restrictions and deviation are operational measures that will not impact the channel conditions, water levels, or adjacent floodplain.

4.3.5.4 Future Conditions with Alternative 3b

Alternative 3b assumes new dike construction in approximately 20 dike field locations. It was assumed that a system of new dike fields could likely lead to direct and secondary impacts to water levels by acting as new obstructions to river flow and through the development of sediment deposition and vegetation within those dike fields creating higher water levels upstream and more frequent interaction with the floodplain. However, the 20 dike field locations would mostly be scattered throughout the waterway to different locations as opposed to isolated within specific reaches with the exception of the reach below L&D 1 where a continuous stretch of waterway (RM 34 to 40) is in need of the dike modifications to achieve 12-FT. It is not assumed that new dikes would deepen the river to the extent that the annual frequency of overbank flows decreases because the dike fields generally act as an offset to the overall channel capacity balance. However, a system of 20 new dike fields could have the potential to induce erosion of banks at locations across river or downstream.

The draft restrictions and deviation are operational measures that will not impact the channel conditions, water levels, or adjacent floodplain.

4.3.5.5 Future Conditions with Alternative 3c

Impacts to the floodplain under Alternative 3c would generally be similar to those discussed under Alternative 3a with the improvement of existing dikes. However, some potential additional site-specific water level and floodplain impacts would be assumed at the seven locations where new dikes would be constructed. It is not assumed that new dikes and improved dikes would deepen the river to the extent that the annual frequency of overbank flows decreases because the dike fields generally act as an offset to the overall channel capacity balance. However, a system of new and improved dike fields could have the potential to induce erosion of banks at locations across river or downstream.

The draft restrictions and deviation are operational measures that will not impact the channel conditions, water levels, or adjacent floodplain.

4.3.5.6 Future Conditions with Alternative 3ab

Under Alternative 3ab, the future impacts to the floodplain would be somewhat of a combination of those discussed in the Alternative 3a and 3b discussions.

The draft restrictions and deviation are operational measures that will not impact the channel conditions, water levels, or adjacent floodplain.

4.4 HUMAN ENVIRONMENT

4.4.1 Cultural Resources

4.4.1.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected cultural changes in association with maintaining the JBJ Waterway. No submerged nor terrestrial above-ground or archaeological resources would be impacted

4.4.1.2 Future Conditions with Alternative 3

Under Alternative 3, no direct impacts to terrestrial cultural resources would arise. Since there is no land-based construction and all dredged material would be disposed of and dispersed in swift-flowing waters, cultural impacts would be restricted to submerged resources. Based upon the results of previous waterway cultural resources investigations, which included the use of side-scan sonar and magnetometry to detect anomalies in the channel, and supplemented by extensive historic research into documented mid-19th through mid-20th century steamboat/vessel wrecks, there are no documented submerged resources within 152 meters (500 feet) of any potential dredging locations (Pearson et al. 1999). Furthermore, all proposed dredging work is within the original waterway project footprint for the 9-FT channel designs. These areas, as well as the footprints for the navigation pools and revetments, have been investigated under previous compliance-related cultural resources efforts (LA SHPO Report Nos. 22-0015, 22-0111, 22-0448, 22-0646, 22-0662, 22-0680, 22-1532, 22-1533, 22-1595, 22-1606, 22-1750, 22-1893, 22-2001, 22-2168, and 22-2453, dating between 1975 and 2000).

4.4.1.3 Future Conditions with Alternative 3a

Under Alternative 3a, there would be no direct impacts to terrestrial cultural resources since no land-based construction or tree clearing is planned. All improvement and rearrangement of dikes would occur in river areas subjected to previous cultural resources efforts/investigations associated with their initial construction and subsequent maintenance and modification as well as the construction of additional dikes and revetments, levee construction, realignment, or stabilization, navigation pool maintenance activities, and/or other engineered river navigation structures (see LA SHPO Report Nos. 22-0134, 22-0136, 22-0343, 22-0358, 22-0395, 22-0425, 22-0448, 22-0463, 22-0526, 22-0646, 22-0662, 22-0680, 22-0829, 22-0830, 22-0874, 22-0888, 22-0927, 22-0948, 22-0954, 22-0979, 22-1193, 22-1464, 22-1478, 22-1480, 22-1605, 22-1778, 22-1893, 22-2249, 22-2662, 22-3849, 22-4009, 22-6146, and 22-6627, dating between 1977 and 2020). These activities have provided ample data demonstrating the low potential for discovery of any cultural sites and/or deposits. As such, no further cultural resources investigations are warranted. However, USACE would still require the National Historic Preservation Act (NHPA) Standard Conditions related to changes in the Scope of Work, Inadvertent Discoveries, and encountering Unmarked Human Burials (NHPA Standard Conditions).

The closest archaeological resource to any of the proposed revetment improvements is Site 16CT148, a Plaquemine-era prehistoric site located landside approximately 65 meters (213 feet) north of the Larto Revetment, that was originally identified during the initial 1975 CSR of this portion of the waterway (Gulf South Research Institute 1975). It was subsequently archaeologically assessed, evaluated and tested in 1976–1978 by Coastal Environments and reported ineligible for listing to the NRHP (Weinstein et al. 1979 [Report No. 22-0526); USACE 1982 [Report No. 22-0828]). Given the distance from the proposed revetment and recommendations of previous identification and subsequent assessment/evaluation/testing results, this alternative poses no impact to Site 16CT148.

Furthermore, since all dredged material would be disposed of and dispersed in swift-flowing waters, any potential cultural impacts would be restricted to submerged resources. Based upon the results of previous waterway cultural resources investigations, which included the use of side-scan sonar and magnetometry to detect anomalies in the existing channel, as well as extensive historic research into documented mid-19th through mid-20th century steamboat/vessel wrecks, there are no documented submerged resources within 152 meters (500 feet) of any potential dredging or dike/revetment locations (Pearson et al. 1999).

4.4.1.4 Future Conditions with Alternatives 3b, 3c, and 3ab

Under Alternatives 3b, 3c, and 3ab, there could be more potential for direct impacts to terrestrial cultural resources. Construction of each new dike would require removal of vegetation from approximately 0.28 hectares (0.69 acres) of land to create individual tiebacks to anchor the dike systems. These areas would require clearing, excavation, and rock placement for each area of construction. After rock is placed for the tiebacks, the excavated dirt would be placed back on top and cleared wetlands would reforested through natural succession.

Cumulatively, Alternatives 3b and 3ab propose to construct more dikes and would therefore have greater potential impacts (16.6 hectares [40.9 acres]) to potential terrestrial cultural resources than Alternative 3c (4.2 hectares [10.3 acres]). Compliance cultural investigations conducted in association with construction of existing dikes and revetments, past levee construction, realignment, or stabilization, ongoing navigation pool maintenance activities, and/or other engineered river navigation structures elsewhere across the waterway have provided reasonable expectations of resource potential within the proposed tieback locations for these three alternatives (see LA SHPO Report Nos. 22-0134, 22-0136, 22-0343, 22-0358, 22-0395, 22-0425, 22-0448, 22-0463, 22-0526, 22-0646, 22-0662, 22-0680, 22-0829, 22-0830, 22-0874, 22-0888, 22-0927, 22-0948, 22-0954, 22-0979, 22-1193, 22-1464, 22-1478, 22-1480, 22-1605, 22-1778, 22-1893, 22-2249, 22-2662, 22-3849, 22-4009, 22-6146, and 22-6627, dating between 1977 and 2020).

Past cultural efforts have resulted in the identification of three archaeological sites (Sites 16NA536, 16RA222, and 16RR246) that fall within the projected locations of tiebacks for Alternatives 3b and 3ab. No above-ground resources have been identified in these same

areas. In fact, based upon the results of previous waterway cultural resources investigations, which included the use of side-scan sonar and magnetometry to detect anomalies in the river channel, and extensive historic research into documented mid-19th through mid-20th century steamboat/vessel wrecks, there are also no documented submerged resources within 152 meters (500 feet) of any potential tieback locations (Pearson et al. 1999).

Site 16NA536 corresponds to Tieback No. 32 (Socot RM 154.5 [Dike No. 1]. Site 16RA222 corresponds to Tieback No. 37 (Pointfield Dike No. 5). Site 16RR246 corresponds to Tieback No. 5 (Westdale RM 192 [Dike No. 1]). All three sites date to the late 19th through late 20th centuries and have been previously determined ineligible for listing to the NRHP according to these compliance-related identification-level efforts (see LA SHPO Report Nos. 22-0111, 22-0646, 22-0662, 22-1464, and 22-2249) (Gulf South Research Institute 1975; Hunter 1990; Mueller and Newkirk 1981; Pearson and Wells 2000; Saltus 1980). Only Site 16RR246 would be impacted by the proposed tieback locations for Alternative 3c. Considering that all proposed tieback locations have been previously investigated and all archaeological resources have been previously determined ineligible for listing to the NRHP, no further cultural resources investigation would be required. However, USACE would still require the NHPA Standard Conditions related to changes in the Scope of Work, Inadvertent Discoveries, and encountering Unmarked Human Burials (NHPA Standard Conditions).

Additionally, compliance-related cultural investigations conducted in association with construction of waterway features, such as dikes and revetments, ongoing levee construction, realignment, or stabilization, navigation pool maintenance activities, and/or other engineered river navigation structures have provided reasonable expectations of resource potential (see LA SHPO Report Nos. 22-0134, 22-0136, 22-0343, 22-0358, 22-0395, 22-0425, 22-0448, 22-0463, 22-0526, 22-0646, 22-0662, 22-0680, 22-0829, 22-0830, 22-0874, 22-0888, 22-0927, 22-0948, 22-0954, 22-0979, 22-1193, 22-1464, 22-1478, 22-1480, 22-1605, 22-1778, 22-1893, 22-2249, 22-2662, 22-3849, 22-4009, 22-6146, and 22-6627, dating between 1977 and 2020). Cumulatively, these efforts further support a little-to-no potential for intact cultural sites and/or deposits. As such, no further cultural resources investigations are warranted. However, USACE would still require the NHPA Standard Conditions related to changes in the Scope of Work, Inadvertent Discoveries, and encountering Unmarked Human Burials (NHPA Standard Conditions).

4.4.2 Socioeconomic Considerations

4.4.2.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue, and no direct impacts on the local communities would arise.

4.4.2.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

Under all alternatives, the proposed actions would have beneficial minor impacts on commerce in the area. At a 12-FT depth barges would not need to lightload to navigate the locks on the JBJ Waterway and would provide better navigation for commerce businesses.

4.4.3 Recreation

4.4.3.1 Future Conditions with No Action Alternative (FWOP)

With the No Action Alternative, recreational opportunities would continue to evolve as they have in the past and would be dictated by the natural and manmade land use patterns and processes that have historically dominated the area. The river would continue to be used for recreation, but sedimentation and bank erosion could create safety hazards for boaters, impacting navigation and access to recreational areas.

4.4.3.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

Under these alternatives, recreational navigation and safety would have minimal temporary impacts. Recreational activities such as boating, kayaking, and fishing may be temporarily impacted during dredging and construction activities due to the dredge boat and construction equipment occupying the waterway. However, once the project is complete, recreational use of the area would return to normal. Day use areas and wildlife refuges would still be accessible and would not be impacted by the proposed alternatives. Overall recreational conditions would remain similar to current conditions.

4.4.4 Hazardous, Toxic, and Radioactive Waste

The USACE is obligated under ER 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all potential hazardous, toxic, and radioactive waste (HTRW) contamination within the vicinity of proposed actions during the feasibility phase. A Phase 1 Environmental Assessment for HTRW dated July 25, 2025, has been completed for the project (Section 2.7.4) and a full report of the results can be found in Appendix C. Based on the Phase 1 review, the probability of encountering HTRW concerns for this project would be considered low. Due to the low probability of encountering HTRW concerns, a site reconnaissance for the presence of HTRW for each of the proposed alternatives was not incorporated into this feasibility level assessment. A follow up HTRW Assessment shall be conducted during the PED phase of this project. If a recognized environmental condition is identified in relation to the project site, USACE would take the necessary measures to avoid the recognized environmental condition so that the probability of encountering or disturbing HTRW would continue to be low.

4.4.4.1 Future Conditions with No Action Alternative (FWOP)

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the JBJ Waterway.

4.4.4.2 Future Conditions with Alternatives 3, 3a, 3b, 3c, and 3ab

The records search using the EPA’s database identified three facilities maintaining an NPDES permit and four RCRA facilities withing a 1-mile buffer of the project areas. Care should be taken where activities may be performed near this pipeline. These identified

records are not believed to pose a risk to the work activity associated with the final array alternatives. The records search from the SONRIS database review identified 15 sites where previous or active oil and gas activity has taken place. These identified areas are not believed to affect the work activity associated with the final array alternatives. A site reconnaissance for the presence of HTRW for each of the proposed alternatives was not incorporated into this feasibility level assessment. A follow up HTRW Assessment shall be conducted during the PED phase of this project. A site reconnaissance will be conducted for the land disturbing features of the selected alternative.

Due to the results of the environmental records search and the nature of the proposed work on the Red River, it is believed that no HTRW concerns will be encountered on this project. A follow-up HTRW assessment should be conducted during the PED process for the selected alternative.

4.5 BUILT ENVIRONMENT

4.5.1 Navigation Conditions

4.5.1.1 Future Conditions with Alternative 1 (FWOP)

With the No Action Alternative, the waterway will continue to provide a 9-FT channel depth by 200-FT channel width. For planning purposes, the PDT assumed that emergency actions to repair in-channel structures would occur as a need to need basis, much like the emergency repairs discussed with the Joffrion and Westdale dikes.

There is an underlying risk that over the next 50 years, the in-channel structures will continue to degrade, especially if limited dike maintenance funding continues. Existing revetments will gradually erode from natural and human interferences, with progressively more stone launching away from the structures. Loss of cross-sectional area will gradually weaken the structures' ability to control flow within the channel. This degradation will also lead to bank erosion and instability that could alter channel alignment as sediment trapped behind structures and in riverbanks enters the main channel. Potential climate variability—droughts and extreme weather events—could have increasing impacts on the lifespan of structures, exacerbating losses of stone due to increased flow potential.

The need for construction and maintenance dredging will grow as the level of disrepair increases. Increased dredging requirements and overall channel degradation would decrease navigability of the waterway. Without a marked increase in maintenance funding, the system will remain constrained in both operational efficiency and reliability.

With Alternative 1, the No Action Alternative, the channel would continue to be authorized to 9-FT of depth and 200-FT of width for the length of the JBJ Waterway. However, if dike maintenance funding increases do not occur, revetments will continue to fall into disrepair and dredging requirements will increase as revetments fail over the next 50 years. This will lead to navigation disruptions and issues as annual in-channel dredging becomes more frequent and channel alignments are threatened. See Appendix A *Engineering* for a list of in-channel structure deficiencies.

4.5.1.2 **Future Conditions with Alternative 3**

With the construction dredging to 12-FT alternative, a small, temporary decrease in flow velocity is expected, as the cross-sectional area increases at dredged locations while discharge remains constant. Although pool levels will continue to be maintained by the lock and dam system, sediment deposition is still expected at known problem areas, necessitating ongoing annual dredging. This alternative would also retain the river training structures in their current condition; however, with the assumption that the Joffrion and Westdale Revetments will be rehabilitated prior to the beginning of this project, there are no other significant revetment failures anticipated that would impact navigation. Additionally, while deeper dredging can improve navigability, increased dredging operations may temporarily impede navigation, and changes in flow and sediment transport could lead to new or more frequent shoaling, increasing long-term maintenance demands. Overall, this alternative would allow barges with deeper draft to travel through the JBJ Waterway.

4.5.1.3 **Alternative 3a**

Alternative 3a involves improvements to existing dikes, primarily within the Gauntlet. This work would improve conditions of existing river training structure and alignment throughout the channel. By lengthening and raising the dikes, the cross-sectional area of the channel is reduced, concentrating flow in the main channel and increasing velocities in areas that are not currently maintaining the 12-FT draft under normal conditions. As a result, annual dredging requirements would decrease at these locations. However, dredging would still be needed approximately every two years, depending on river conditions. There is also a possibility that some areas identified in the HEC-RAS model as problem areas that do not have depth-maintaining structures could require dredging for the 12-FT channel. This is dependent on the river's response to the work performed; however, dredging at these locations is not anticipated and navigational routes around these areas are available. This alternative would enhance navigability, especially downstream of L&D 1, and would support larger drafts through the JBJ Waterway.

4.5.1.4 **Future Conditions with Alternative 3b**

New dike construction as part of this alternative would effectively push flow into the main channel to allow for a 12-FT draft. This would allow barges with heavier loads to travel through all areas that are not currently maintaining 12-FT. This alternative would also retain the river training structures in their current degraded condition; however, with the assumption that Joffrion and Westdale Revetments would be rehabilitated prior to the beginning of this project, no other significant revetment failures were anticipated to impact navigation. Since it was also assumed that these structures would not fail in the 50-year life of this project, the new dikes are expected to sufficiently increase in-channel velocities such that dredging is limited to once per 25 years with no anticipated dredging at other locations. With little navigational interference during dike construction and the reduced dredging

requirements, navigation through the channel would be improved under normal river conditions.

4.5.1.5 **Alternative 3c**

This alternative would provide all the benefits of Alternative 3a and most of the benefits of Alternative 3b. By improving existing dikes and constructing new dikes at high-priority areas, in-channel dredging requirements would be reduced to approximately once every 25 years. Areas not receiving new dikes are expected to have minimal impact on dredging needs, as they have been identified as generally maintaining a 12-FT depth under typical conditions. In these locations, improved sediment transport—enabled by dike repairs and greater flow velocities—would promote self-scouring and help maintain navigable depths under normal pool conditions. Overall, this alternative would offer improved control of channel alignment, enhance navigability, and reduce dredging-related disruptions to barge traffic.

4.5.1.6 **Alternative 3ab**

Alternative 3ab offers the most comprehensive approach, combining improvements to existing dikes with the construction of new dikes at all problem areas. This alternative provides the highest level of channel alignment control and maximizes the river's self-scouring capability. With improved dike conditions, the risk of structural failure that could impact dredging needs would be minimized. The combination of new and improved dikes would eliminate the need for dredging under normal river conditions. This plan would support deeper-draft barges and require minimal channel maintenance, leading to improved navigation throughout the waterway.

4.6 Mitigation, Monitoring, and Adaptive Management

Alternatives 3b, 3c, and 3ab would require mitigation for the clearing of trees and wetlands during tieback construction.

To reduce impacts, excavated dirt would be placed back on top of the rocks used to construct the tiebacks. Covering the rocks would help create conditions that allow for natural succession to occur. Regrowth through natural succession would reduce the habitat clearing impacts from permanent to temporary and would likely reduce the amount of mitigation required to compensate for the loss of average annual habitat units. Additional habitat modeling would be required to determine by what amount the mitigation requirements would be reduced.

Alternatives 3 and 3a would not require mitigation. Impacts requiring mitigation are discussed in detail in Section 4.2.2 and Section 4.2.3.

SECTION 5
Plan Comparison and Selection

5.1 PLAN COMPARISON

Table 5-1 displays a comparison of the plans based on performance.

The final array of alternatives was evaluated and compared using benefit and cost economic analysis, development of conceptual designs, ROM quantities, and parametric cost estimates

5.1.1 System of Accounts

To facilitate the evaluation and display of effects of the alternative plans, ER 1105-2-103 calls for an evaluation of the four accounts established in the Planning and Guidance information. The four accounts are as follows:

a) The National Economic Development (NED) Account, which displays changes in the economic value of the National output of goods and services.

b) The Regional Economic Development (RED) Account, which displays changes in the distribution of regional economic activity, such as income and employment.

c) The Environmental Quality (EQ) Account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of ecosystem restoration plans.

d) The Other Social Effects (OSE) Account displays plan effects on social aspects such as community impacts, health and safety, displacement, and energy conservation.

The following sections describe the evaluation of the four accounts in further detail.

5.2 NATIONAL ECONOMIC DEVELOPMENT (NED) COSTS

Financial costs of the proposed project consist of the construction costs accrued during construction of the project and over its lifecycle. A detailed description of the cost engineering methods is included in Appendix B *Cost Engineering*; the economic analysis is further detailed in Appendix E *Economics and Social Considerations*.

USACE cost engineers prepared the cost estimates for each of the proposed final array alternatives for use in the economic analysis. Cost estimates were developed at a Class 4 level of effort utilizing largely parametric unit prices from sources such as historical Government and Commercial bid data, Architect-Engineer cost estimates available from design reports, RS Means Cost Data Books and other available historical cost data sources.

Dredging unit costs were estimated using historical production rates and 2025 Red River leased dredge contract's bid results. Stone costs were estimated using a quote from a stone supplier in Alexandria, Louisiana, along with labor and equipment costs for placement estimated in the MII (MCACES Second Generation) program.

The sum of these costs was used to determine Interest During Construction (IDC), which represents the economic cost of building a project.

Another financial cost is the annual cost accrued over the life of a project due to OMRR&R activities that represent an increase over the current OMRR&R costs to maintain the entrance channel. OMRR&R was excluded from the list of financial costs above because it is not included in the calculation of IDC. IDC considers only those costs incurred during construction.

IDC represents an economic cost of building a project that is considered in the selection of the recommended plan but does not factor in as a paid cost. IDC is the cost of the foregone opportunity to invest the money required to construct a project for another use. The hypothetical return on another investment, measured as IDC, is counted as an NED cost. As an economic cost rather than a financial cost, IDC is not considered in the determination of cost-sharing responsibilities.

IDC reflects that project construction costs are not incurred in one lump sum, but as a flow over the construction period. The IDC calculation methods are further described in *App*endix E *Economics*.

Table 5-1 shows the NED first costs for all alternatives; Table 5-3 shows total investment, IDC, average annual first costs, average annual OMRR&R, and total average annual costs for all alternatives. Values are at fiscal year 2025 price levels and amortized at the 2025 Federal discount rate of 3 percent.

Table 5-1. NED First Costs

Alternative	Item	Cost
3 Dredging to 12-FT	09-Construction	$19,625,000
	30-Preconstruction Engineering and Design (PED)	$3,600,000
	31-Supervision and Administration	$2,355,000
	Contingency	$5,971,000
	Mitigation	-
	30-Land, Easement, Right-Of-Way, Relocation, and Disposal (LERRD)	-
	Total First Cost	$31,551,000
3a Improvement of dikes to 12-FT	09-Construction	$32,829,000
	30-PED	$3,736,000
	31-Supervision and Administration	$3,939,000
	Contingency	$9,445,000
	Mitigation	-
	30-LERRD	$170,000 (administrative, not cost shared, included in PED cost)
	Total First Cost	$49,950,000

Alternative	Item	Cost
3b Construction of new dikes to 12-FT	09-Construction	$109,586,000
	30-PED	$4,000,000
	31-Supervision and Administration	$13,150,000
	Contingency	$29,508,000
	Mitigation	Required; 40.9 acres impacted
	30-LERRD	$1,644,000
	Total First Cost	$157,888,000
3c Construction of high-priority dikes and improvement of dikes to 12-FT	09-Construction	$73,715,000
	30-PED	$3,000,000
	31-Supervision and Administration	$8,846,000
	Contingency	$19,906,000
	Mitigation	Required; 10.9 acres impacted
	30-LERRD	$300,000
	Total First Cost	$105,767,000
3ab Construction of new dikes and improvement of dikes to 12-FT	09-Construction	$140,915,000
	30-PED	$5,600,000
	31-Supervision and Administration	$16,910,000
	Contingency	$38,083,000
	Mitigation	Required; 40.9 acres impacted
	30-LERRD	$1,644,000
	Total First Cost	$203,152,000

All estimates are rounded to the nearest thousandths place.

Table 5-2. Total Costs

Cost	3 Dredging to 12-FT	3a Improvement of dikes to 12-FT	3b Construction of new dikes to 12-FT	3c Construction of high-priority dikes and improvement of dikes to 12-FT	3ab Construction of new dikes and improvement of dikes to 12-FT
First Cost	$31,551,000	$49,950,000	$157,888,000	$105,767,000	$203,152,000
Interest During Construction	$529,000	$749,000	$12,326,000	$4,855,000	$19,226,000
Total Investment Cost	$32,080,000	$50,699,000	$170,214,000	$110,622,000	$222,378,000
Average Annual First Cost	$1,247,000	$1,970,000	$6,615,000	$4,299,000	$8,643,000
Average Annual Incremental OMRR&R	$2,475,000	$1,219,000	$46,000	$46,000	-
Total Average Annual Cost	$3,722,000	$3,189,000	$6,661,000	$4,345,000	$8,643,000

All estimates are rounded to the nearest thousand.

5.2.1 NED Benefits

The NED account displays changes in the economic value of the National output of goods and services. National benefits for Navigation Economic Analysis per ER 1105-2-103 are described further below:

“The primary economic benefit for navigation projects is created by reductions in transportation resources, known as transportation rate savings (42 USC 1962a-2). For navigation studies, these benefits can be further classified into the following six categories: cost reduction benefits for existing movements, shift of mode, shift in origin, shift in destination, induced movement, and non-standard. Deep draft navigation projects use transportation cost savings (based on vessel operating costs) and inland waterways projects use transportation rate savings.”

In this study, the PDT identified the potential for almost all benefit categories to be considered. Upon review of the applicability of benefit categories, it was determined that Cost Reduction benefit category would be primary driver of NED benefits. For more details regarding benefit categories, see Appendix E *Economic and Social Considerations*.

5.2.2 NED Benefit/Cost Analysis

Historical tonnage from 2018 to 2022 was used to model the Expected Scenario Forecast. The model uses the aforementioned years as a proxy for barge size, origin/destination/commodity movements, tow package orientation, tow boat size, vessel operating costs, etc. This model also identified any constraints in traffic movements on the JBJ Waterway. A constraint, within this model, can be defined as any scenario that inhibits achieving 12-FT channel benefits, despite there being sufficient depth for 12-FT barges in the river. For example, movements on the JBJ Waterway that occur on a barge with a maximum loaded draft of 9-FT would not benefit from deepening to 12-FT. Each individual barge movement is weighed against any system constraints to determine if it would benefit from a deepening to 12-FT. If the barge could benefit from the system being deepened, then the cost of transportation is reduced, achieving cost reduction benefits. The average annual benefits are based on these proxy model runs. Average annual benefits are similar across alternatives because each alternative was designed to deliver a 12-FT channel, aside from the No Action Alternative. A difference in NED benefits between alternatives is the annual O&M in-channel requirements as described in Section 3. For more details regarding this analysis, and the associated risk and uncertainty, see Appendix E *Economic and Social Considerations*.

Having identified the costs and benefits associated with all final array alternatives, identification of the TSP requires a comparison of the average annual net benefits resulting from each alternative. Table 5-3 contains the NED annual costs and benefits as well as the resulting net excess benefits and benefit-to-cost ratio (BCR) at fiscal year 2025 price levels and amortized at the 2025 Federal discount rate of 3 percent.

Using preliminary cost estimates, Alternative 3a has the greatest average annual net benefits at $2 million and a BCR of 1.6.

Table 5-3. BCRs

Cost	3 Dredging to 12-FT	3a Improvement of dikes to 12-FT	3b Construction of new dikes to 12-FT	3c Construction of high-priority dikes and improvement of dikes to 12-FT	3ab Construction of new dikes and improvement of dikes to 12-FT
First Cost	$31,551,000	$49,950,000	$157,888,000	$105,767,000	$203,152,000
Interest During Construction	$529,000	$749,000	$12,326,000	$4,855,000	$19,226,000
Total Investment Cost	$32,080,000	$50,699,000	$170,214,000	$110,622,000	$222,378,000
Average Annual First Cost	$1,247,000	$1,970,000	$6,615,000	$4,299,000	$8,643,000
Average Annual Incremental OMRR&R	$2,475,000	1,219,000	$46,000	$46,000	-
Total Average Annual Cost	$3,722,000	3,189,000	$6,661,000	$4,345,000	$8,643,000
Average Annual Benefits	$4,982,000	$5,189,000	$5,379,000	$5,379,000	$5,396,000
Net Excess Benefits	$1,260,000	$2,000,000	$(1,282,000)	$1,034,000	$(3,247,000)
BCR	**1.3**	**1.6**	**0.8**	**1.2**	**0.6**

5.3 REGIONAL ECONOMIC DEVELOPMENT (RED)

The USACE Institute for Water Resources, Louis Berger, and Michigan State University have developed a regional economic impact modeling tool, RECONS (Regional ECONomic System), that provides estimates of jobs and other economic measures such as labor income, value added, and sales that are supported by USACE programs, projects, and activities. This modeling tool automates calculations and generates estimates of jobs, labor income, value added, and sales through the use of IMPLAN®'s multipliers and ratios, customized impact areas for USACE project locations, and customized spending profiles for

USACE projects, business lines, and work activities. RECONS allows the USACE to evaluate the regional economic impact and contribution associated with USACE expenditures, activities, and infrastructure.

The RECONS run was based on the construction costs and the benefits that each alternative would provide to the region to implement the alternatives

For this project, the most significant amount of State and local benefits are accrued based on the anticipated amount of jobs generated from the project. This correlates directly with the expense of the project. All of the alternatives provide equal economic enhancement opportunities because they provide 12-FT draft throughout the year; however, Alternative 3a likely ranks highest from a regional aspect since it provides for opportunities for construction contracts and still continues dredging operations in the region. Appendix E, Economics further details the local, State, and National impacts of each alternative in the final array.

5.4 ENVIRONMENTAL QUALITY EVALUATION (EQ)

Alternative 3a would have the least severe environmental impacts since no new dikes would be constructed. Alternative 3 would have more severe impacts than Alternative 3a due to the proposed dredging activities.

Alternatives 3b, 3c, and 3ab would have the most severe environmental impacts due to the construction of new dikes and the clearing of forests and wetlands. These three alternatives would require mitigation.

Table 6 displays and compares environmental impacts between alternatives. For a full analysis of environmental impacts, see Appendix C *Environmental*.

Additionally, decreasing annual O&M dredging requirements serves as an EQ benefit because the water bottom will be disturbed less.

There is some environmental value in providing slack water areas between the dikes.

Table 5-3. Summary and Comparison of Environmental Impacts

Source	Alternative 3	Alternative 3a	Alternative 3b	Alternative 3c	Alternative 3ab
Wetland Impacts (Acres)	0	0	21.8	5.5	21.8
Wildlife Habitat Impacts (Acres)	0	0	19.1	4.8	19.1
Aquatic Impacts	Minor	Minimal	Minor	Minor	Minor
Threatened and Endangered Species	No Effect on Bats	No Effect on Bats	May Affect Bats: No Tree Clearing (1 May to 15 July) and (Dec 15- Feb 15)	May Affect Bats: No Tree Clearing (1 May to 15 July) and (Dec 15- Feb 15)	May Affect Bats: No Tree Clearing (1 May to 15 July) and (Dec 15- Feb 15)
Other Environmental Resources	Impacts to the other environmental resources considered were similar among alternatives.				
Ranking	**2**	**1**	**4**	**3**	**5**

5.5 OTHER SOCIAL EFFECTS (OSE) EVALUATION

There are limited differences in the benefits of OSE across the alternatives. All alternatives will lower emissions by reducing the number of trips necessary to move annual tonnage. This enhances regional air quality and improves health outcomes. Improving the system could shift operators from rail and truck to water, this would reduce accident risks on railroads and highways. Additionally, reducing waterway traffic by lowering the necessary number of barge trips could also reduce potential accidents on the waterways.

The improvements to the JBJ Waterway also ensure that recreational users of the system and the local communities have access to waterways. Enhancing the regional economy should help to bolster community cohesion.

5.6 COMPREHENSIVE BENEFITS: FOUR ACCOUNTS COMPARISON

Table 5-4 describes a comparison of the four accounts, NED, RED, EQ, and OSE.

Table 5-4 Four Accounts Comparison

Account	Metrics	Alternative 3	Alternative 3a	Alternative 3b	Alternative 3c	Alternative 3ab
NED	Net Excess Benefits	$1,260,000	$2,000,000	$(1,282,000)	$1,034,000	$(3,247,000)
	BCR	1.3	1.6	0.8	1.2	0.6
	Rank (Net Excess Benefits)	2	1	4	3	5
RED	Local and State Total Impact Value Added*	$31,500,000	$51,100,000	$162,800,000	$115,400,000	$213,900,000
	U.S. Total Impact Value Added	$72,800,000	$95,500,000	$304,100,000	$215,700,000	$399,600,000
	Jobs	384	550	1,752	1,243	2,302
	Rank	5	4	2	3	1
EQ	Wetland BLH Impacted	0	0	21.8	5.5	21.8
	Wildlife Habitat Impacts	0	0	19.1	4.8	19.1
	Total Impacted Acres	0	0	40.9	10.3	40.9
	Aquatic Impacts	Minor	Minimal	Minor	Minor	Minor
	Threatened and Endangered Species	No Effect on Bats	No Effect on Bats	May Affect Bats No Tree Clearing (1 May to 15 July)	May Affect Bats No Tree Clearing (1 May to 15 July)	May Affect Bats No Tree Clearing (1 May to 15 July)
	Other Environmental Resources	Impacts to the other environmental resources considered were similar among alternatives.				
	Rank	3	1	4	2	5
OSE	There are limited differences among the alternatives regarding OSE. All alternatives will lower emissions per ton of goods shipped. They will also potentially reduce accidents on the highways as induced movement goods potentially replace overland movements.					

* Local benefits do not differ from the State because the analysis was run for the entire system which spans across Louisiana.

The RED ranking in this table is based on RECONs model data, which determine regional benefits based on overall cost of the alternative. However, Alternative 3a likely ranks highest in providing regional economic enhancement opportunities since this alternative provides for opportunities for construction contracts and still continues dredging operations in the region.

5.6.1 Identification of the Total Benefits Plan, National Economic Development Plan, and Least Environmentally Damaging Practicable Alternative

Per 1105-2-103, the following plans must be identified during the comparison of alternatives: the NED plan, the Total Benefits Plan, and the least environmentally damaging practical alternative.

The NED plan is the alternative plan that reasonably maximizes net NED benefits consistent with protecting the Nation's environment.

Alternative 3a is the NED plan because it has the highest net benefits.

Alternative 3a is the least environmentally damaging practical alternative based on its comparative lack of wetland impacts, wildlife impacts, aquatic impacts, impacts on threatened and endangered species, HTRW concerns, and other categories described in Section 4.

The plan that reasonably maximizes net benefits across all four Planning and Guidance accounts in comparison to costs, is to be named the total net benefits plan.

When considering the public benefits relative to costs against the economic, environmental, and social effects of Alternative 3a, Alternative 3a is the Total Benefits Plan. There is a National security interest in supporting Fort Polk and the Barksdale Air Force Base. Other industries will also benefit from Alternative 3a.

5.7 PLAN SELECTION

Screening criteria applied to the final array of alternatives to select the TSP were based on the following:

- Four Accounts (NED, RED, EQ, and OSE)
- NED Excess Benefits
- NED BCR
- Objectives; Constraints

Based on the evaluation of the four accounts above, Alternative 3a, improvement of dikes, is the TSP.

Alternative 3a is ranked first for both NED benefits and is the least environmentally damaging practicable alternative.

New dike construction, as proposed in alternatives 3b, 3c, and 3ab, may impact other ecological resources such as wetlands in comparison to Alternative 3a, the TSP. Alternative 3, construction dredging, disturbs aquatic resources. Based on the comparison of impacts to ecological resources, Alternative 3a, the TSP, is considered the least environmentally damaging.

Alternative 3's construction dredging ranks very closely in NED benefits and is also less costly than Alternative 3a's improvement of dikes. However, one of the study objectives is to reduce annual O&M dredging to minimize navigation disruption and better achieve a self-scouring channel. Alternative 3 continues the trend of conducting annual O&M dredging along the JBJ Waterway, while Alternative 3a reduces O&M dredging from an annual basis to a biennial cycle, thus reducing the frequency of disruptions to traffic and disturbances of the water. Although the RECONS model results rank Alternative 3a fourth in comparison to the other alternatives for RED benefits, Alternative 3a likely ranks highest in RED benefits since it provides for opportunities for construction contracts and while dredging operations continue in the region. The RECONS model does not incorporate those factors when ranking.

There is little difference among the alternatives with regards to OSE.

SECTION 6
Tentatively Selected Plan

6.1 PLAN ACCOMPLISHMENTS

Alternative 3a, which consists of improvement of dikes, the deviation from EM 1110-2-1604, and draft restrictions during periods of extreme drought or low water, is the TSP. It is supported by the sponsors. The TSP would achieve the study's primary goal of increasing the navigation channel depth from 9-FT to an authorized 12-FT in the JBJ Waterway, thus achieving transportation cost efficiencies on the JBJ Waterway. It also supports National security by increasing reliability on the channel in service to Fort Polk and the Barksdale Air Force Base. The TSP meets all of the study's planning objectives.

6.2 PLAN COMPONENTS

The TSP is composed of 3 components:

1. Stonework improvements to the existing dikes in order to support 12-FT draft vessels.
2. Deviation from EM 1110-2-1604 to transit through the locks and dams during periods of low water.
3. Draft restrictions during periods of extreme drought or low water.

The main feature of this alternative is the stonework to bolster the existing dikes in 8 key dike field locations. Table 6-1 below lists the locations and estimated required tonnage. Assuming the 9-FT channel emergency repairs are complete, thus reducing the O&M in-channel dredging to a negligible amount, the maintenance between the 9-FT channel and the 12-FT channel would increase by 1,525,200 cubic yards of material between two years of dredging. However, this would be a 50 percent reduction in comparison to an O&M dredging-only plan, as described in Alternative 3. Currently, under the annual maintenance dredging for the 9-FT JBJ Waterway, a cutterhead is used to excavate material from the navigation channel and deposited in the swift current of the JBJ Waterway to carry and disperse the dredged material downstream. This method will continue under the TSP.

See the table below for a summary of anticipated stonework quantities in 8 key dike field locations.

After a high-water season, which typically occurs between the months of December and May, the navigation channel bed is expected to self-scour from the dike improvements described below. The stonework will be used to lengthen or heighten the existing dikes to support self-scour.

ERDC will construct a physical model and perform operational tests to ensure that 12-FT draft vessels can safely pass through L&D 2 at normal pool elevations. The results of the physical modeling will support the deviation (listed in the TSP components above) are anticipated to be incorporated into the report at a later date. The approved deviation will increase the amount of time that a 12-FT draft vessel can pass through L&D 2 from 42 to 90 percent of the time.

The draft restrictions will be managed by the Coast Guard and will continue to be utilized during periods of extreme drought or low water. The deviation would be used to inform the limits of draft restriction to allow for more use of the 12-FT channel during periods of extreme drought or low water compared to the FWOP conditions (e.g., 9-FT channel). There is a low risk that the physical modeling could result in a deviation request less than 12-FT. (e.g., 11-FT or 10-FT). If this occurs the main component of the TSP would be reviewed to determine if it needs to be adjusted (e.g., improvement of existing dikes to support a 11-FT or 10-FT channel).

The TSP is estimated to provide a 12-FT channel approximately 90 percent of the time, which will enable barges to carry more cargo per trip. This results in a transportation cost savings, which is a NED benefit.

The waterway also supports military operations by providing cost effective transportation of equipment and supplies to Fort Polk near Leesville, Louisiana, and Barksdale Air Force Base in Bossier City, Louisiana.

Table 6-1. Improvement to Dike Locations

Name	RM	L/R	Pool	Priority	B Stone (tons)
Lorran Lake Realignment	35	L	G	H	116,100
Lorran Dikes	36.5	L	G	H	28,800
Joffrion Dikes (M1)	37.3	R	G	H	10,700
Joffrion Revetment	38.2	R	G	H	51,500
Joffrion Dikes (M2)	38.2	L	G	H	8,800
Bringol Revetment (M1)	64	R	1	M	45,800
Westdale Revetment	192	L	4	H	39,500
East Point Revetment (M1)	194	R	4	M	59,900
Total Tons	-	-	-	-	**361,100**

See Figure 6-1 for a map of the proposed stonework. Notably, there are 4 locations from the above table shown within bubble 5: the Joffrion dikes, Joffrion revetment and Lorran Lake

realignment and Lorran dikes, which are all located between RMs 36 and 38. Each of the other bubbles shows only one location, which corresponds to the RM indicated in Table 6-1.

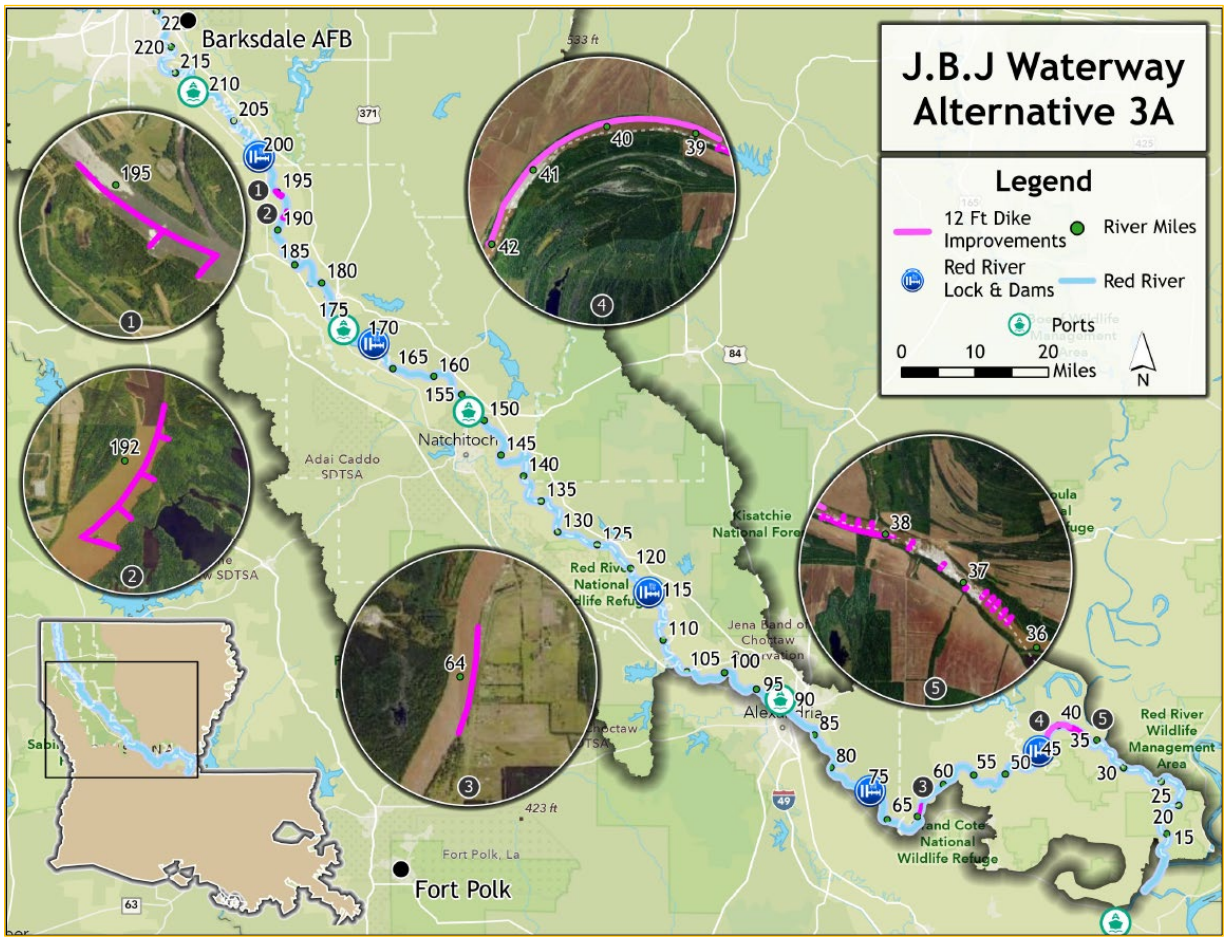

Figure 6-1. TSP Map

6.3 COST ESTIMATE

Table 6-1 displays the project first costs at the current fiscal year price level.

Cost estimates for the TSP were developed at a Class 4 level of effort.

For alternatives including construction dredging, dredging unit costs were developed using statistics from the 2024 Red River Dredging season, updated with 2025 Red River leased dredge contract's unit rates. A total of 1,119,999 cubic yards were dredged with an estimated total contract cost of $9,301,000 for fiscal year 2025 or approximately $8.30/cubic yard. This cost is all-inclusive: site prep, passing vessels, towing between sites, etc., are included. A cost of $9/cubic yard was used as a direct cost in MII for dredging.

A material and transport cost quote for “B” stone was obtained from Luhr Brothers. Transport quote was given for locations at RM 0, RM 89, and RM 222.5 on the Red River. Transport costs to each work site were interpolated from the provided quote. Labor and equipment costs for stone placement were estimated using MII.

Cost estimation methods are further described in Appendix B *Cost Engineering*. Table 6-2 below summarizes the TSP Project First Costs and LEERD cost estimate.

Table 6-2. Project First Costs (Fiscal Year 2025 Price Levels) for the TSP, Alternative 3a

3a Improvement of dikes to 12-FT	Construction	$32,829,138
	Preconstruction Engineering, and Design	$3,736,000
	Supervision and Administration	$3,939,497
	Contingency	$9,445,000
	Mitigation	-
	LERRD	$170,000 (administrative, not cost shared, included in PED cost)
	Total First Cost	$49,950,000

6.4 LANDS, EASEMENT, RIGHTS-OF-WAY, RELOCATIONS, AND DISPOSAL

Appendix D *Real Estate* contains the Real Estate Plan, which outlines the real estate needs for the TSP. The RRWC and LDOTD are the non-Federal sponsors. Current planning indicates that no new land acquisition (LERRD) will be required for the TSP's construction, operation, maintenance, or environmental mitigation. Required right-of-way for dike maintenance will either be below the Red River's Ordinary High Water Line (OHWL) and subject to navigation servitude, or within land already acquired by the RRWC for the existing JBJ Waterway navigation project. Access to project sites for construction will be via the Red River or existing RRWC owned LERRD. No utility relocations are anticipated at this time. Administrative costs in the amount of $170,000 will be required during the PED phase.

6.5 OPERATIONS, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION

The OMRR&R responsibilities of the Vicksburg District associated with the JBJ Waterway will not be impacted by the implementation of any of the proposed alternatives. All alternatives, including the no action plan, construction dredging, dike improvement, construction of new dikes, and combinations with the deviation from EM 1110-2-1604 and the draft restrictions, are designed to support the existing operational framework without altering the responsibilities for maintaining the waterway systems locks and dams. These measures focus primarily on enhancing navigation depth and efficiency without introducing new infrastructure or operational components that would require changes to established

general O&M practices. The continued maintenance and rehabilitation of locks, dams, and associated structures will proceed under current protocols regardless of the selected alternative.

The TSP alternative features a biennial cost of $1,275,000 in O&M dredging. It would increase the maintenance between the 9-FT channel and the 12-FT channel by 1,525,200 cubic yards of material between two years of dredging. However, this would be a 50 percent reduction in comparison to a O&M dredging only plan, as described in Alternative 3.

6.6 PROJECT RISKS

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various risks that could later impact construction schedule or costs. These risks were accounted for in cost and schedule contingency estimates and therefore were factored into the total cost of the TSP. None of the risks identified below are considered to be high risks.

6.6.1 Study Risks

The PDT identifies and manages the study risks and uncertainty during the feasibility phase of the study. The highest risks are related to funding and funding assumptions, such as the risk associated with the lack of funding for 9-FT channel OMRR&R. Approximately $17.5 million of O&M dike work would be required for the 9-FT channel and was assumed to be complete for the FWOP condition for this feasibility study based on planning guidance ER 1105-2-103. There may be a delay in the 12-FT project implementation if the outstanding 9-FT channel dike repairs are not addressed.

There are other river training structures for the 9-FT channel that have fallen outside of design grade standards. These deficiencies are not currently causing an increase in O&M dredging and do not currently threaten navigation for a 9-FT channel. Based on current hydraulic analysis and survey results, it was also assumed that these locations will not threaten 12-FT navigation currently. However, there is some risk that further degradation caused by weather or other events may occur, which would increase the OMRR&R needs for the 12-FT channel.

Other risks are related to planning assumptions regarding available benefits. As discussed in Section 2.8.3, the full approval of the deviation for the required depth over the miter gate sills is based on a 12-FT conditions. If the deviation is not approved, then the degree to which a 12-FT channel can be achieved throughout the year will be impacted, thus impacting benefits.

6.6.2 PED and Construction Schedule and Cost Risks

Risks were identified by the PDT for the PED phase. The most significant risks are listed below. The most significant risks are related to schedule and cost risk. Before implementation, WQCs are needed for the State of Louisiana, which requires additional

water quality sampling and lab work. The schedule for this data collection and lab analysis could delay implementation.

Additionally, cost risk centers around the amount of dredged material needed to remove to achieve a 12-FT channel. Surveys and modeling are expected to be conducted during PED. However, high-water events between PED activities and construction could cause changes in the expected dredged material needed to remove. Another uncontrolled area of risk is related to high-water events, fuel rates, inflation, and access to material and labor, which all could affect the cost and the schedule.

Overall, the plan is expected to improve navigation reliability and reduce maintenance requirements in the channel. The hydraulic efficiency gained through structural modifications will be balanced with various monitoring efforts, such as yearly inspections and studies conducted by the ERDC for various purposes throughout the system. Continued coordination between engineering, environmental, and navigation stakeholders will be essential to ensuring the system functions as intended and to optimize benefits.

6.7 COST SHARING

Table 6-3 describes the cost sharing apportionment between Federal and non-Federal sources.

Table 6-3. Cost Sharing

Item	Federal Cost (General Fund)	Federal (Inland Waterways User Board (IWUB))	Non-Federal Cost	Total Cost
Feasibility Cost-Sharing Agreement (50/50 Federal/non-Federal)*	$1,500,000	-	$1,500,000	$3,000,000
PED (75/25 Gen fund/IWUB)*	$3,399,598	$1,133,199	-	$4,532,797
Construction Management and Construction (75/25 Gen Fund/IWUB)	$33,935,342	$11,311,781	-	$45,247,122
LERRD	$127,500	$42,500	$0	$170,000
Total	**$38,962,439**	**12,487,480**	**$1,500,000**	**$52,949,919**

Fiscal year 2025 price levels, 3 percent interest; 50-year period of analysis beginning in the year 2030.

*Additional funding has been requested to fund the physical model required for the deviation as described in the draft report. This physical modeling will be conducted prior to implementation.

6.8 DESIGN AND CONSTRUCTION

A planning assumption for this study was that benefits would be realized in the year 2030 for all alternatives. Economic data is currently based on this assumption, which was necessary to ensure equal comparison across the base year. However, for the implementation of the TSP, 365 days were later added into the construction schedule to account for weather and unforeseen events. Based on this addition, construction would not complete until year 2031 and benefits would not begin until 2031. Following the successful submission of this DIFR-EA and its acceptance, the PDT estimates the following timeline:

- 1 year, 6 months for PED. PED would include 1 year required for water quality analysis and certification, which must be completed prior to construction.
- 2 years for construction comprising of stonework improvements to existing dikes in approximately 8 dike field locations.
- After a high-water season, which typically occurs between the months of December to May, the navigation channel bed is expected to self-scour from the dike improvements.

6.9 ENVIRONMENTAL COMMITMENTS

Section 401 of the CWA requires projects that result in a discharge of fill material into waters of the U.S. to obtain a WQC or waiver from a certifying authority. LDEQ serves as the certifying authority for activities within the boundaries of the State of Louisiana. A WQC is used to determine whether an activity, as described in the Federal license or permit, will comply with applicable provisions of Sections 301, 302, 303, 306, and 307 of the CWA.

All the proposed alternatives would require a WQC. USACE is currently coordinating with LDEQ to complete the WQC process. During coordination, LDEQ will be provided with the necessary information to complete the WQC process for the TSP including the amount of fill to be placed in the river and possible impacts as described in this DIFR-EA. USACE will ensure the WQC is issued prior to the initiation of construction.

In addition, a Section 404(b)(1) evaluation was performed to analyze the impacts of placing fill material into the river (Appendix C *Environmental* Section 6). The analysis determined the proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines. For more information regarding the status of the WQC issuance, please contact the Vicksburg District's RPEDS department.

6.10 PROJECT-SPECIFIC CONSIDERATIONS

There are approximately $17.5 million worth of dike repairs needed in the Joffrion (RM 37.5) and Westdale (RM 191) areas. These repairs will need to be performed through OMRR&R funds to begin the work to achieve a 12-FT channel. The normal budget process will be followed to request the $17.5 million for 9-FT channel repairs.

6.11 ENVIRONMENTAL OPERATING PRINCIPLES

The USACE Environmental Operating Principles (EOPs) were developed to ensure that USACE missions include totally integrated sustainable environmental practices. The EOPs, introduced in 2022, provided corporate direction to ensure the workforce recognizes USACE's role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the Nation.

The re-energized Environmental Operating Principles include the following:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all USACE activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet USACE's responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

The concepts embedded in the original EOPs remain vital to the success of USACE and its missions.

In this study, the PDT considered the USACE EOPs throughout the planning process. For example, beneficial use of dredged material was seriously considered a measure in an effort to enhance environmental sustainability. The PDT ensured NEPA compliance and collaborated with USFWS, and other environmental and cultural resources partners. The PDT investigated potential HTRW concerns. The PDT considered environmental risks when conducting risk assessments such as the Abbreviated Risk Analysis.

The PDT made every effort to ensure the proposed project is economically sustainable.

The PDT leveraged scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.

6.12 VIEWS OF THE NON-FEDERAL SPONSOR

The non-Federal sponsor has expressed the need for reliable 12-FT navigation channel on the JBJ Waterway. They have been fully involved in the study development. The features of the TSP, as well as the other alternatives reviewed in the final array, were discussed in detail with the non-Federal sponsor. They have expressed their support of the TSP, which achieves a 12-FT channel via dike improvements, a deviation from depth requirements at L&D 2, and draft restrictions

SECTION 7
Environmental Compliance

7.1 ENVIRONMENTAL COMPLIANCE TABLE

Table 7-1 provides a list of all relevant environmental laws, regulations, and EOs and includes a brief statement summarizing how the project will comply with the requirements. Additionally, the status of all Federal permits, licenses, and other authorizations that must be obtained in implementing the project as well as any issues preventing full compliance with laws, regulations, and EOs are noted.

Table 7-1. Environmental Compliance

Federal Statutes and Compliance Requirements	Compliance Status*
Archaeological and Historic Preservation Act of 1974, as amended*:* Compliance requires USACE to undertake recovery, protection, and preservation of significant cultural resources whenever its activities may cause irreparable loss or destruction of such resources.	NA
Archaeological Resources Protection Act of 1979, as amended: Compliance requires that a contractor, State or Federal agency obtain a Federal permit under the act from the appropriate Federal land manager for all archaeological work occurring within Federal and Indian lands in the U.S. for the removal and subsequent disposition of archaeological collections from that land.	NA
Clean Air Act of 1970, as amended: Compliance requires coordination with the U.S. Environmental Protection Agency and analysis of potential impacts on air quality.	FC
Clean Water Act of 1972, as amended: Compliance requires preparation of Section 404(b)(1) Evaluation and submission of such to Congress with the report or procurement of State WQC. See Appendix 2 for the 404(b)(1) evaluation. Full compliance will be received on a site-by-site basis, as State WQC will be coordinated during detailed designs.	PC[3]
Endangered Species Act of 1973, as amended: Compliance requires coordination with the USFWS to determine if any endangered or threatened species or their critical habitat would be impacted by the project. USACE is requesting concurrence with their not likely to adversely affect determination with review of this report. Additional time-sensitive, tiered Section 7 Consultations will be coordinated during detailed designs and implementation of measures.	FC
Federal Water Project Recreation Act of 1965, as amended: Compliance requires review by the Department of the Interior. Washington level review of the draft report would bring the project into full compliance.	FC

Federal Statutes and Compliance Requirements	Compliance Status*
Fish and Wildlife Coordination Act of 1934, as amended: Compliance requires coordination with the USFWS and the State wildlife agencies. These agencies were part of the interagency team utilized during plan formulation. The USFWS concurrence letter is included in the Appendix.	FC
National Historic Preservation Act of 1966, as amended: Compliance requires USACE to consider the impacts of project on any property included in or eligible for inclusion in the National Register of Historic Places. A Historic Properties Determination has been prepared and circulated for concurrence review in consultation with federally recognized tribes and the Louisiana SHPO in accordance with 36CRF800.14(B)(1)(ii).	FC
National Environmental Policy Act of 1969, as amended: Compliance requires preparation of this EA, consideration of public comments, and preparation and public review of the final EA. Signing of the Finding of No Significant Impact, or completion of an Environmental Impact Statement, if warranted, would bring this project into full compliance.	PC[1]
Rivers and Harbors Act of 1899, as amended: No requirements for USACE projects authorized by Congress.	FC
Farmland Protection Policy Act of 1981, as amended: Compliance requires coordination with the Natural Resources Conservation Service to determine if any designated prime or unique farmlands are affected by the project. Full compliance will be received on a site-by-site basis with associated coordination during detailed designs.	FC
Wild and Scenic River Act of 1968, as amended: Compliance requires coordination with Department of the Interior to determine if any designated or potential wild, scenic, or recreational rivers are affected by the project. Coordination has been accomplished and there are no such rivers in the project area.	FC
Executive Order 11988, Floodplain Management: Compliance requires an assessment and evaluation together with the other general implementation procedures to be incorporated into the EA.	FC
Executive Order 11990, Protection of Wetlands: Compliance requires results of analysis and findings related to wetlands be incorporated into EA.	FC
Executive Order 13112, Invasive Species: Compliance requires assessment of potential for the project to introduce invasive species to the project area.	FC
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments: Compliance requires the Agency to conduct coordination and consultation with Federally recognized Tribes to determine if Tribal Rights, Tribal lands, or protected tribal resources, would be significantly adversely affected by a proposed action. It is implemented though the USACE Tribal Consultation Policy, 1 Nov 2012.	FC
State Water Quality Standards	PC[2]
State Air Quality Standards	FC

*PC: Partial Compliance

*FC: Full Compliance

*NA: Not Applicable

[1] Full compliance after submission for public comments and signing of FONSI

[2] Full compliance upon receiving WQC

7.2 COORDINATION AND PUBLIC REVIEW

7.2.1 Scoping

NEPA entails USACE performing scoping as an early and open process to identify concerns from the public, organizations, and agencies. In October 2024, public NEPA scoping letters requesting participation and comments were sent to interested parties, agencies, and tribes. Agency letters and coordination can be found in Appendix C *Environmental* Section 1.

The problems, objectives, opportunities, and constraints were determined based on feedback from the NFS and existing JBJ Waterway industry. The Sponsor, as well as other agencies listed below were invited to the planning charrette:

- U.S. Fish and Wildlife Services (USFWS)
- Louisiana Department of Environmental Quality (LDEQ)
- Environmental Protection Agency (EPA)
- Office of the Secretary of State of Louisiana
- Louisiana Department of Wildlife and Fisheries (LDWF)
- Red River Waterway Commission (RRWC)
- Red River Valley Association (RRVA) (dispersed further by them)
- Louisiana Department of Transportation and Development (LDOTD)

7.2.2 Agency Coordination

Cooperating agency letters were sent to USFWS, LDEQ, LDWF, and the EPA. USFWS and LDWF agreed to be coordinating agencies. A WQC is currently being coordinated with LDEQ.

7.2.3 Tribal Consultation

Formal Section 106 consultation was initiated with Federally-recognized Tribes during the 2024 Mississippi Department of Archives and History (MS SHPO) Tribal Summit on 22 October 2024, and follow-up email correspondence to 12 Tribal parties (Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Muscogee [Creek] Nation, Quapaw Nation, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana) as well as the Louisiana SHPO on 5 November 2024, pursuant to 36 Code of Federal Regulations § 800.3(c). Written receipt confirming the intent to participate as a consulting party to this undertaking was received from the Louisiana SHPO on 18 November, the Choctaw Nation of Oklahoma on 7 December, and the Alabama Coushatta Tribe of Texas on 9 December 2024. Virtual meetings were held 24 April, 23 July, and 27 August 2025, to further discuss this undertaking with Tribal consulting parties. All consulting parties were provided additional

email correspondence of the TSP selection, cultural analysis, and USACE Section 106 undertaking determination of **No Adverse Effects to Historic Properties/No Further Work Required** for the proposed project on 13 August 2025 for review and comment. Additional correspondence was provided to all consulting parties on 13 September 2025 further clarifying the scope and nature of the project. Section 106 concurrence was received from the LA SHPO on 18 September and the Quapaw Nation on 7 October 2025.

In compliance with USACE's 2023 Tribal Consultation Policy and EO 13175, the above engagements have provided Tribal parties a means to express and share Tribal concerns regarding the potential for the project to affect/impact Tribal resources. Consulting Tribes have expressed their primary concerns for the project include the potential to encounter cultural and sacred sites, such as village locations, and Trail of Tears Removal Routes. More specifically, the Choctaw, who were forcibly removed from their lands in the Deep South (Mississippi, Louisiana, Alabama, and Arkansas), used the Mississippi River and then ascended the Red River on steamboats before joining the Ouachita River during relocation to Oklahoma. Similarly, the Quapaw were initially forced to the Red River in northwestern Louisiana and then, after a period of settlement, were forced to relocate to Oklahoma (Anderson and Sassaman 2012). Tribal parties have expressed concern about potential impacts to the waterway and prefer dredging be limited to areas previously subjected to dredging activities to areas to maintain the 9-FT channel and associated compliance-related cultural investigation as well as avoidance of landside impacts.

7.2.4 Public Review

Notification of this Draft Environmental Assessment, an unsigned Finding of No Significant Impact (FONSI), and a Section 404 Analysis Public Notice will be sent to interested officials, agencies, organizations, and individuals for a 30-day public comment and review period before a signed FONSI is received. Additionally, an electronic copy will be available on USACE's Vicksburg District's website during the public review period at https://www.mvk.usace.army.mil/Missions/Programs-and-Project-Management/Regional-Planning-Environment-Division-South/.

- To assure compliance with NEPA, the NHPA, the Endangered Species Act, and other applicable environmental laws and regulations, coordination with these agencies will continue as required throughout the PED and construction phases of the proposed project.

7.2.4.1 List of Statement Recipients

Appendix C *Environmental* contains a list of the agencies, organizations, and persons that will receive copies of the draft report for review from USACE.

7.2.4.2 Public Comments Received and Responses

To be updated following public review period.

SECTION 8
District Engineer Recommendation

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a National Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsors, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

The TSP for this study includes the following:

> Nonstructural: Draft restrictions will be enacted by the Coast Guard during periods of extreme drought or low water.
>
> Nonstructural: Deviation from EM 1110-2-1604 in order for 12-FT draft vessels to transit through the locks at less depth than the required, 1.5x the draft of the vessel.
>
> Structural: Stonework improvements to the existing dikes will be performed to maintain a 12-FT navigation channel with minimal dredging required.

The TSP addresses the study objectives while reasonably maximizing National benefits in the interest of transportation cost savings. The TSP is the Total Benefits Plan and the NED plan. The plan recommends 361,100 tons of stonework to improve existing dikes in approximately eight dike field locations. Draft restrictions will also be implemented during periods of extreme drought or low water. A deviation from the depth requirements of the miter gate sill of L&D 2 is also being pursued.

Based on a 3 percent discount rate and a 50-year period of analysis, the equivalent average annual benefits and costs are estimated at $5,189,000 and $3,183,000 respectively. The project is estimated to provide annual net benefits of $2 million and a BCR of 1.6.

This report has been prepared in accordance with all applicable laws, policies, and regulations. In addition, the requirements of the NEPA and all applicable environmental laws and regulations have been complied with throughout the course of this study and in the preparation of the TSP.

SECTION 9
List of Preparers

9.1 LIST OF PREPARERS

Table 9-1 provides a list of individuals involved in preparation of the document and significant supporting information.

Table 9-1. List of Preparers

Title/Topic	Preparer
Project Manager	Barry Moore
Project Manager	Katy Breaux
Environmental Manager	Taylor Piefke
Technical Lead	Tyler Hassell
River Engineering	Carsen Cuevas
Structural	Richard Jacobson
Structural	Ivan Esquilin-Diaz
Geotechnical	Kie Simerall
Operations	Leah Deyoung
Installation and Resilience	Claire Kendall
Plan Formulation	Travis Creel
Plan Formulation	David Day
Plan Formulation	Grace Bodron
Economics	Nathan Pfisterer
Socioeconomics	Taylor Piefke
Geographic Information System	Bill Sisneros
Geographic Information System	Noah Sticha
Threatened and Endangered Species Coordination	Taylor Piefke
Water Quality, 404 (b)(1)	Brian Johnson
Cultural Resources, Tribal Consultation	John Underwood
Infrastructure Installation and Resilience	Claire Kendall
Recreation	Shaun Hebert
Real Estate	Eric Sessums

Title/Topic	Preparer
Real Estate	Richard Miller
Air Quality, HTRW	Brian Johnson
Air Quality, HTRW	Ryan Horton
District Quality Control	Brandon Davis
Hydrology & Hydraulics	James Elliott

SECTION 10
References and Resources

Project References:

Anderson, David G., and Kenneth E. Sassaman, 2012, *Recent Developments in Southeastern Archaeology: From Colonization to Complexity.* Society for American Archaeology Press, Washington D.C.

Gulf South Research Institute, 1975, *Red River Waterway, Louisiana, Texas, Arkansas, and Oklahoma, Mississippi River to Shreveport, Louisiana, & Shreveport, Louisiana, to Daingerfield, Texas, Design Memorandum No. 15, Environmental Analysis. Vol. V: Archeology, History, and Culture*. Prepared for the U.S. Army Corps of Engineers, New Orleans District. Gulf South Research Institute. Baton Rouge, Louisiana.

Hunter, Donald G., 1990, *A Cultural Resources Survey, Howard Realignment and Williams Downstream Revetment, Red River Waterway, Louisiana*. Prepared for the U.S. Army Corps of Engineers, Vicksburg District. Coastal Environmental Inc. Baton Rouge, Louisiana.

Pearson, Charles E., Tom Wells, and Beverly Watkins, 1999, *Steamboats on Red River: A History of Waterborne Commerce and An Assessment of Steamboat Losses Along the Red River, Louisiana and Arkansas.* Prepared for the U.S. Army Corps of Engineers, Vicksburg District. Coastal Environmental Inc. Baton Rouge, Louisiana.

Pearson, Charles E. and Tom Wells, 2000, *Cultural Resources Survey in Support of Master Plan, Red River Waterway, Pools 3, 4, and 5, Louisiana.* Prepared for the U.S. Army Corps of Engineers, Vicksburg District. Coastal Environmental Inc. Baton Rouge, Louisiana.

Mueller, James W., and Judith A. Newkirk, 1981, *A Cultural Resources Survey of the Red River Waterway from Shreveport, Louisiana, to the Mississippi River.* Prepared for the U.S. Army Corps of Engineers, New Orleans District. Commonwealth Associates, Inc. Jackson, Michigan.

New Orleans District, Corps of Engineers, 1982, Appendix I - Cultural Resources. In General Evaluation Report and Environmental Impact Statement *Draft Supplement No. 2. Red River Waterway, Louisiana, Texas, Arkansas, and Oklahoma, Mississippi River to Shreveport, Louisiana*. Prepared by the U.S. Army Corps of Engineers, New Orleans District.

Saltus, Allen R., Jr., 1980, *Exploratory Magnetic Survey of a Portion of the Red River Waterway (Simmesport Area to Shreveport, Louisiana).* Prepared for the U.S. Army Corps of Engineers, New Orleans District. Gulf South Research Institute. Baton Rouge, Louisiana.

U.S. Army Corps of Engineers, 2023, *Planning Guidance Notebook*, Engineer Regulation 1105-2-103, Department of the Army, Washington D.C., 07 November 2023.

U.S. Army Corps of Engineers, 2006, *Hydraulic Design of Navigation Locks*, *Engineer Manual* 1110-2-1604, Department of the Army, Washington D.C., 01 May 2006.

U.S. Army Corps of Engineers (USACE). (2022). *Red River Basin Master Water Control Manual*. Tulsa, Little Rock, Fort Worth, and Vicksburg Districts.

Weinstein, Richard A., Wayne P. Glander, Sherwood M. Gagliano, Susan Fulgham, Charles E. Pearson and Kathleen G. McCloskey, 1979, Cultural Resources Survey of Five Proposed Construction Projects Along the Lower Red River, Louisiana. Prepared for the U.S. Army Corps of Engineers, New Orleans District. Coastal Environments, Inc. Baton Rouge, Louisiana.

U.S. Army Corps of Engineers (USACE). (1999). *Red River Channel Improvement Data Report FY 1999*. Vicksburg District.

U.S. Army Corps of Engineers. (1993). Engineering and Design Cost Engineering Policy and General Requirements, Engineer Regulation 1110-1-1300. Department of the Army, Washington D.C., 26 March 1993.

U.S. Army Corps of Engineers. (1999). *Engineering and Design for Civil Works Projects, Engineer Regulation 1110-2-1150*. Department of the Army, Washington D.C., 31 August 1999.

U.S. Army Corps of Engineers. (2016). *Civil Works Cost Engineering, Engineer Regulation 1110-2-1302*. Department of the Army, Washington D.C., 30 June 2016.

U.S. Army Corps of Engineers. (2020). *Construction Equipment Ownership and Operating Expense Schedule, Region III, Engineer Pamphlet 1110-1-8*. Department of the Army, Washington D.C., 12 August 2021.

U.S. Army Corps of Engineers. (2016). *Civil Works Construction Cost Index System (CWCCIS), Engineer Manual 1110-2-1304*. Department of the Army, Washington D.C., 30 September 2019.

Pinkard, C. F., Jr., and Stewart, J. L. 2001. “The management of sediment on the J. Bennett Johnston Waterway,” Proceedings of the Seventh Interagency Sedimentation Conference, 2, March 25-29, Reno, Nevada, XI-9–XI-16.

Websites:

U.S. Environmental Protection Agency. (2024). Superfund. Retrieved from https://www.epa.gov/superfund/search-superfund-sites-where-you-live

U.S. Environmental Protection Agency. (2025). EnviroMapper. Retrieved from https://enviro.epa.gov/envirofacts/enviromapper/search

U.S. Environmental Protection Agency. (2025). UST Finder. Retrieved from https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=c220c67462e14763a8e0c4df75550278

Louisiana Department of Energy and Natural Resources. (2025). SONRIS Interactive Maps. Retrieved from https://sonris-gis.dnr.la.gov/gis/agsweb/IE/JSViewer/index.html?TemplateID=181

Google. (2024). *Google Earth*. Retrieved from http://www.google.com/earth/index.html

SECTION 11
List of Abbreviations

AEP	**Annual Exceedance Probability**
BCR	**Benefit-to-Cost Ratio**
BLH	**Bottomland Hardwood**
CHL	**Coastal and Hydraulics Laboratory**
CSR	**Cultural Resources Survey**
CWA	**Clean Water Act**
DIFR-EA	**Draft Integrated Feasibility Report and Environmental Assessment**
DOD	**U.S. Department of Defense**
EM	**Engineer Manual**
EO	**Executive Order**
EOP	**Environmental Operating Principles**
EP	**Engineer Pamphlet**
EPA	**U.S. Environmental Protection Agency**
ER	**Engineer Regulation**
ERDC	**U.S. Army Engineer Research and Development Center**
EQ	**Environmental Quality**
FONSI	**Finding of No Significant Impact**
FWCA	**Fish and Wildlife Coordination Act**
FWOP	**Future Without-Project**
HEC-DSS	**Hydrologic Engineering Center Data Storage System**
HTRW	**Hazardous, Toxic, and Radioactive Waste**
IPaC	**Information, Planning, and Conservation**
IWTF	**Inlan Waterways Trust Fund**
IWUB	**Inland Waterways User Board**

JBJ	**J. Bennett Johnston**
LA	**State of Louisiana**
LDOTD	**Louisiana Department of Transportation and Development**
LA SHPO	**Louisiana Office of Cultural Development, Division of Archaeology's**
LDEQ	**Louisiana Department of Environmental Quality**
LDWF	**Louisiana Department of Wildlife and Fisheries**
LERRD	**Lands, Easements, Rights-of-Way, Relocations, and Dredged or Excavated Material Disposal**
LWRP	**Low Water Reference Plane**
L&WCF	**Land and Water Conservation Fund**
NAAQS	**National Ambient Air Quality Standards**
NED	**National Economic Development**
NEPA	**National Environmental Policy Act**
NFS	**Non-Federal Sponsor**
NHPA	**National Historic Preservation Act**
NMFS	**National Marine Fisheries Service**
NPDES	**National Pollutant Discharge Elimination System**
NRCS	**Natural Resource Conservation Service**
NRHP	**National Register of Historic Places**
NWI	**National Wetlands Inventory**
NWR	**National Wildlife Refuge**
OMRR&R	**Operations, Maintenance, Repair, Replacement and Rehabilitation**
OSE	**Other Social Effects**
P&G	**Planning and Guidance**
PDT	**Project Delivery Team**
PED	**Preconstruction Engineering and Design**
RCRA	**Resource Conservation and Recovery Act**
RECs	**Recognized Environmental Conditions**
RED	**Regional Economic Development**
RRWC	**Red River Waterway Commission**

SHPO	**State Historic Preservation Office**
SONRIS	**Strategic Online Natural Resources Information System**
SSP	**Sponsor Supported Plan**
TSP	**Tentatively Selected Plan**
USACE	**U.S. Army Corps of Engineers**
USFWS	**U.S. Fish and Wildlife Service**
WMA	**Wildlife Management Area**
WRDA	**Water Resources Development Act**
WQC	**Water Quality Certification**