J. Bennett Johnston Waterway 12-FT Channel

Appendix E - Economic and Social Considerations

August 2025

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SECTION 1
Introduction

1.1 PROJECT AREA

The J. Bennett Johnson (JBJ) Waterway project is located on the Red River in Louisiana, starting at the junction with the Mississippi and Old River Lock and Dam and extending 346 miles to Fulton, Arkansas. Commercial navigation on the river ceases at Shreveport, LA, river mile (RM) 228. There are five locks and dams between RM 0 to RM 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).

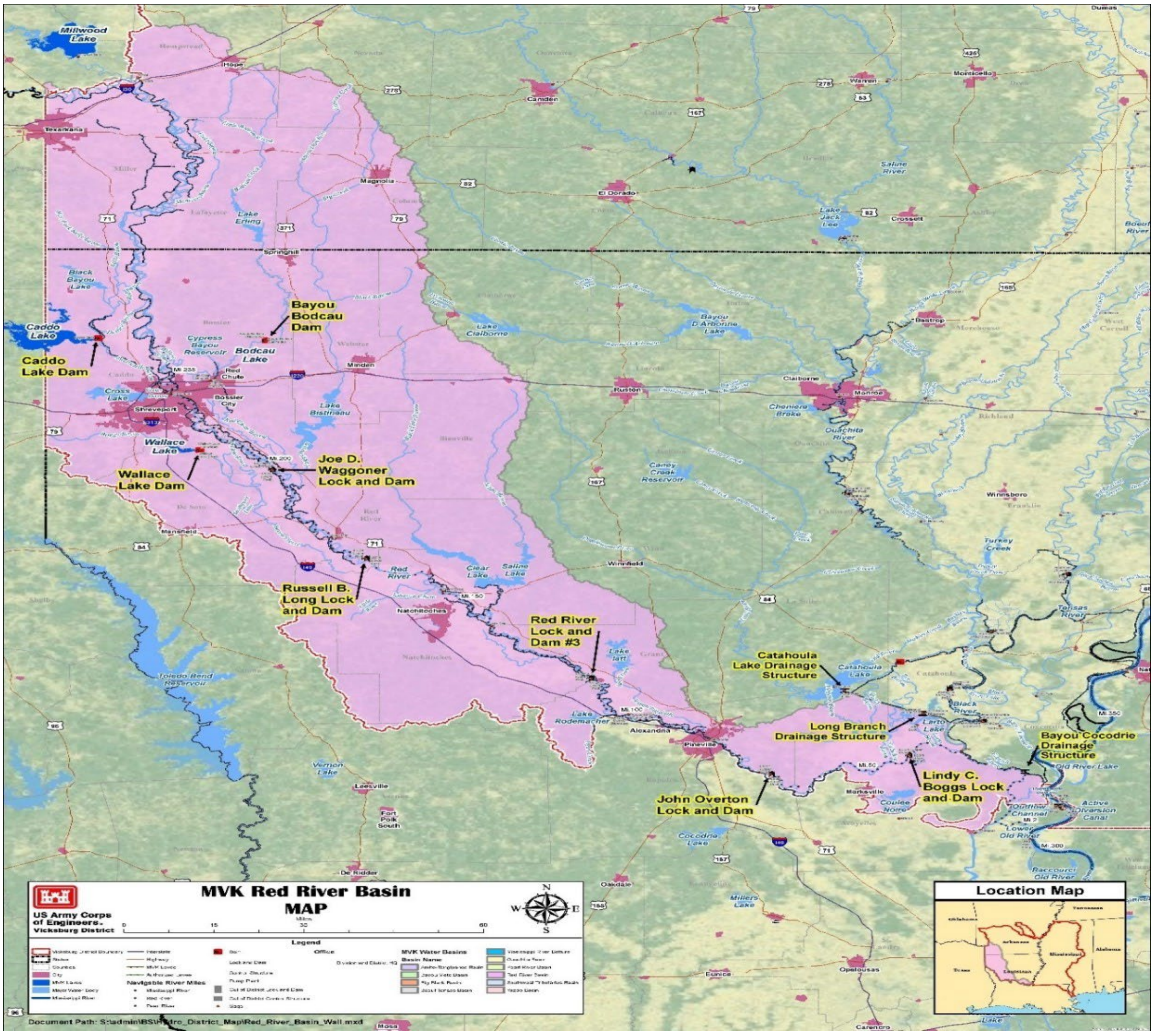

Figure 1. Red River Basin Watershed

The JBJ Waterway receives and ships tonnage throughout the Mississippi, Tennessee, Ohio and Gulf Intracoastal Waterway systems. It services the major population centers of Shreveport and Alexandria, Louisiana. Both the ports of Caddo-Bossier (near Shreveport) and Alexandria have intramodal rail and highway access.

1.2 RAIL ACCESS

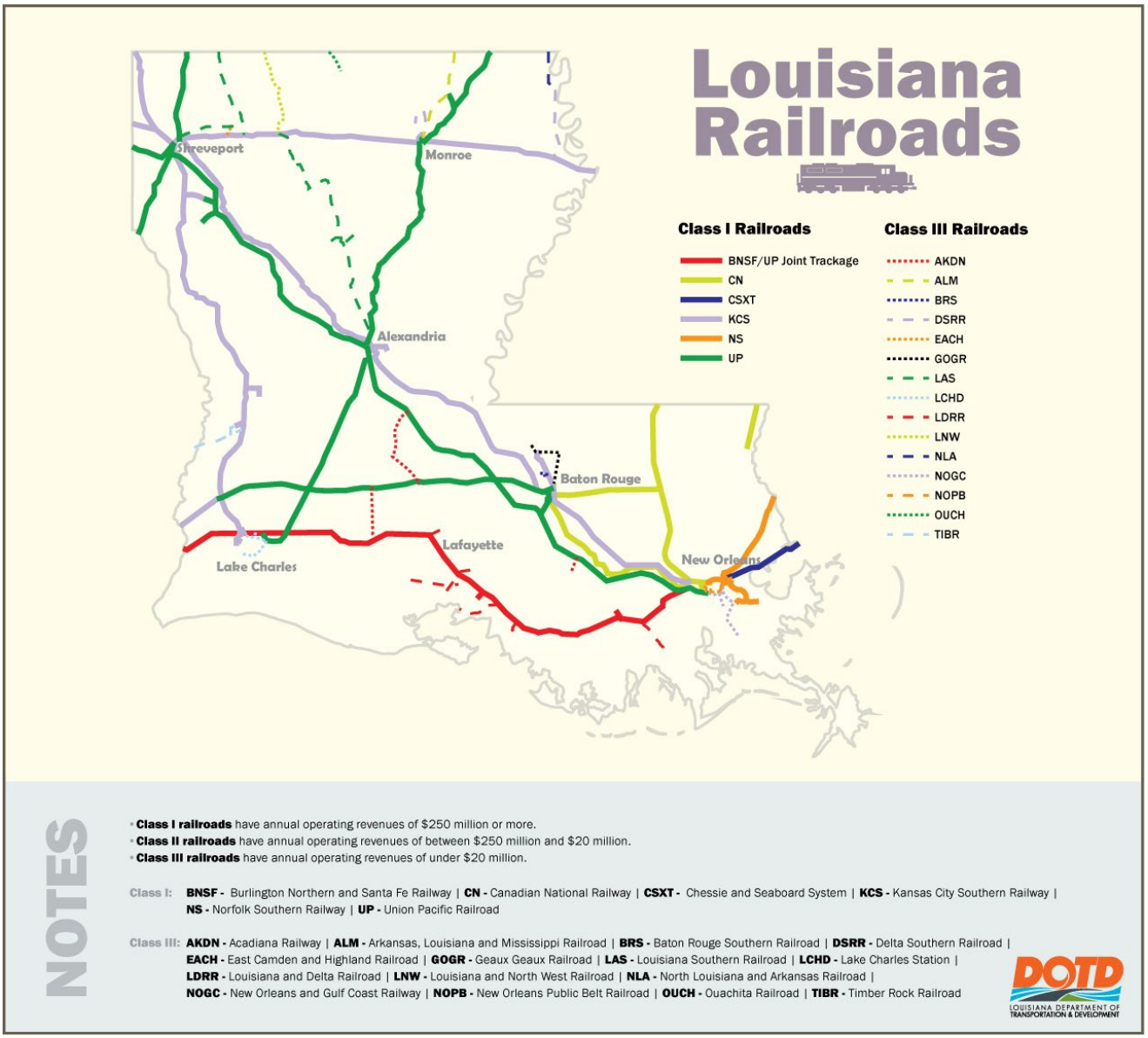

Figure 2. Louisiana Railroad Map

Union Pacific and Kansas City Southern lines stretch across upper and central Louisiana and provide national access to rail along the JBJ Waterway. The ports of Alexandria and Caddo-Bossier have rail terminals.

1.3 HIGHWAY ACCESS

Interstate 49 largely follows the JBJ Waterway on the western side. I-49 is a north–south interstate highway with multiple segments. The original portion is entirely within Louisiana with an additional signed portion extending from I-220 in Shreveport to the Arkansas state line.

Interstate 20 is a major east–west interstate highway in the southern U.S. I-20 runs 1,539 miles beginning at an interchange with I-10 in Reeves County, Texas, 40 miles east of Van Horn, Texas, and ending at an interchange with I-95 in Florence, South Carolina. The I-20 intersects the JBJ Waterway at Shreveport.

SECTION 2
Existing Conditions

The Project has formerly been referred to as the Mississippi River to Shreveport, Louisiana, reach of the Red River Waterway. The opening of the waterway to the Shreveport/Bossier City area in December 1994 was the culmination of more than 150 years of effort by local citizens to provide a safe, dependable navigation system for the Red River.

The project generates jobs, stimulates the development of port facilities, increases water related recreational opportunities, prevents further loss of valuable land and infrastructure along the river's banks and the navigation dams provide a potential source of hydropower.

The project consists of a 9-FT deep by 200-FT wide navigation channel that commences at the confluence of the Old and Red Rivers and proceeds upstream for 236 miles to the Shreveport/Bossier City area. Five navigation locks with usable dimensions of 84 feet wide by 705 feet long provide the necessary lift of approximately 141 feet. The locks can accommodate a standard six-barge tow, which are configured three long by two wide, and accompanying towboat in a single lockage.

The project also provides for realigning the banks of the Red River by means of dredging, cutoffs, and training works and stabilizing its banks by means of revetments, dikes, and other structural methods. Facilities to provide recreation and fish and wildlife management opportunities are also integral to the project.

2.1 HISTORICAL COMMERCIAL NAVIGATION TONNAGE

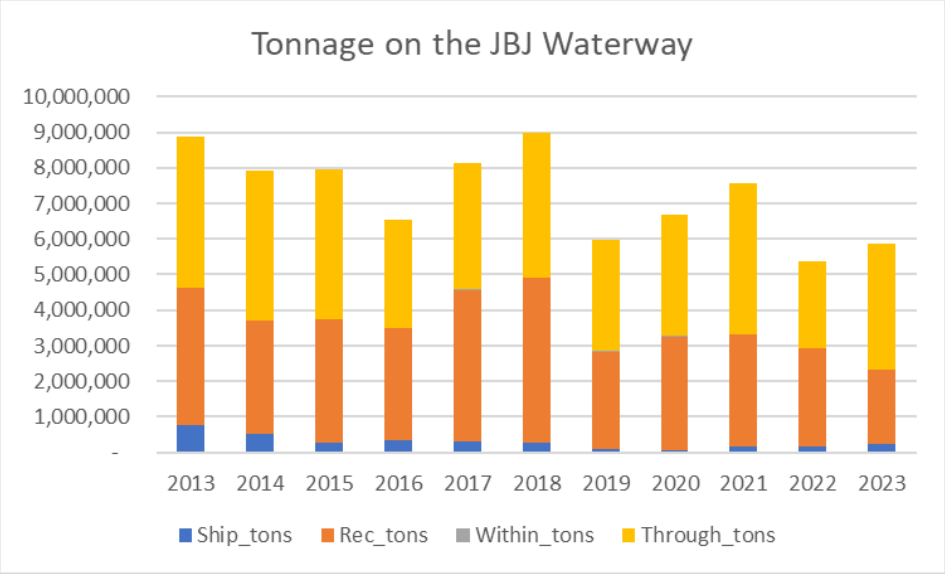

Figure 3. Waterborne Commerce Statistics Center Annual Recorded Tonnage on the JBJ Waterway 2013–2023

From 2013–2023, annual tonnage on the JBJ Waterway has ranged between 5 million and 9 million tons. About half the tonnage on the JBJ Waterway is through traffic, which moves onto the Atchafalaya or Black Rivers. Tonnage that is shipped or received on the JBJ Waterway passes through L&D 1. From 2013–2023, shipped or received tonnage on the JBJ has 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 Section 5 for more information.

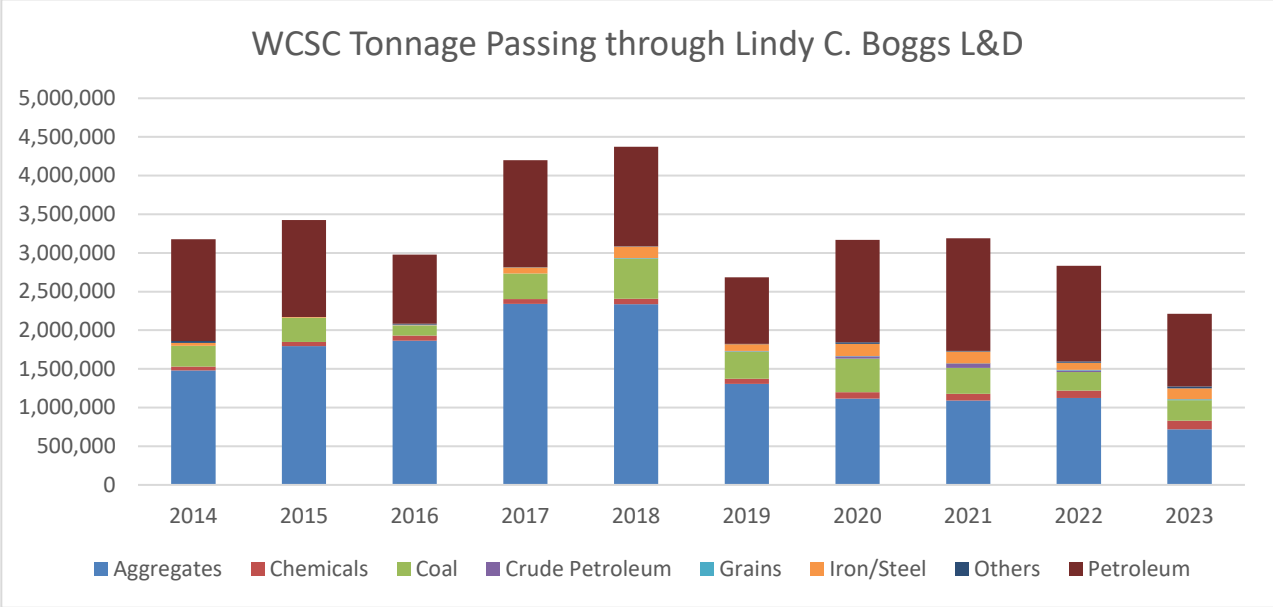

Figure 4. Waterborne Commerce Statistics Center Tonnage Passing Through L&D 1

Overall tonnage passing through L&D 1 has been fairly consistent over the past decade with the exclusion of 2017 and 2018, when there was an uptick in aggregate products. 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, in 2023.

Per discussion with aggregate shippers operating on the JBJ Waterway, 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 Waterway is coal, chemicals (fertilizer), and iron/steel products.

Although not contributing major tonnage, the military—the 101st out of Fort Campbell—executes a rotation one to three times per year at Ft. Johnson. They bring in 30–48 barges, which is 800–1,500 pieces of equipment. They load at Cumberland River Lock C. The move takes 1–3 days to make. 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.

A typical tow package is a 15-barge tow leaving Cumberland that then breaks to six-barge tows before entering the Red River, as is standard of many movements. The barges are flat tops.

2.2 MAJOR FACILITIES IN THE PROJECT AREA

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.

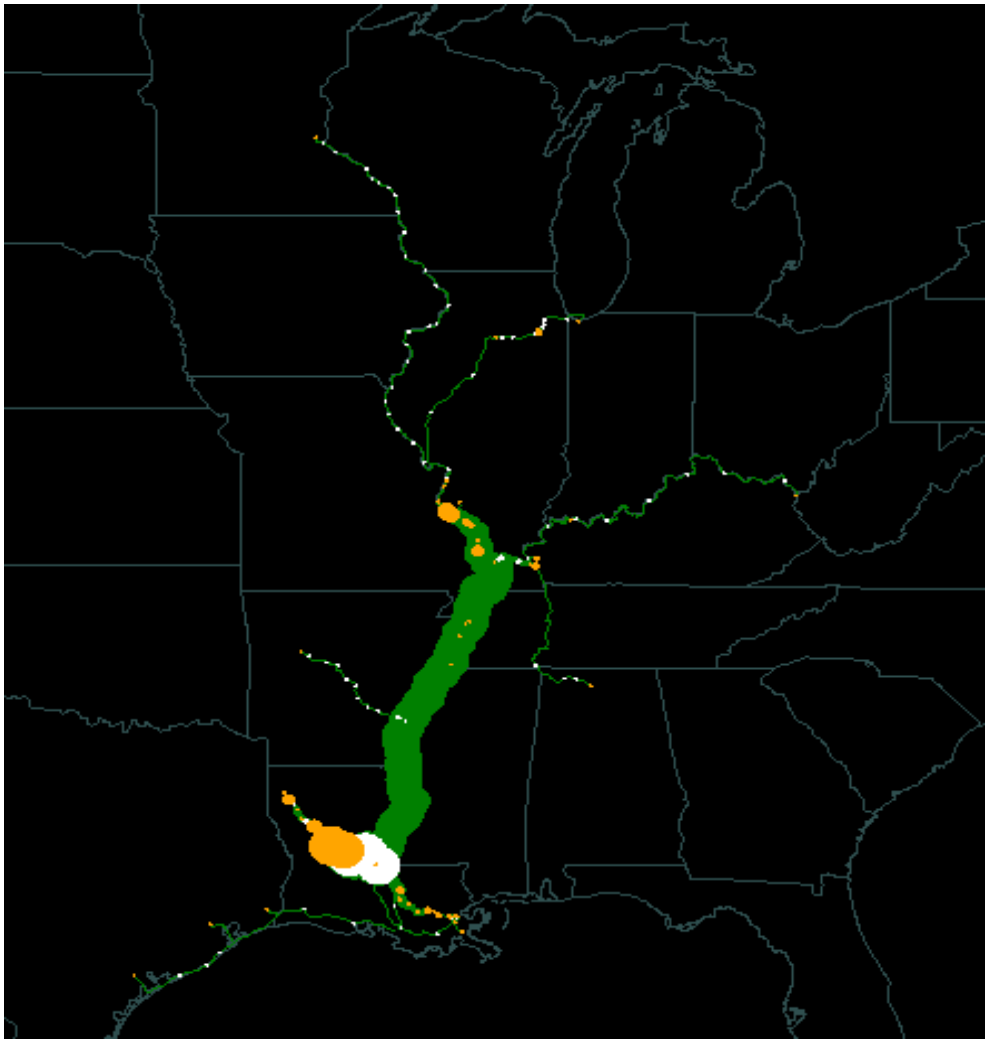

Figure 5. JBJ Waterway Tonnage Heat Map with Ports and Infrastructure

The system is broken up into pools beyond each of the five dams.

Table 1. Lock and Pool Names on the JBJ

Lock Name	Pool number
Lindy C. Boggs (L&D 1)	Pool 1
John H. Overton (L&D 2)	Pool 2
Lock 3 (L&D 3)	Pool 3
Russel B. Long (L&D 4)	Pool 4
Joe D. Waggoner (L&D 5)	Pool 5

Additionally, there is an area called the “Gauntlet” by industry and users; this area is located between Old River Lock and Dam and L&D 1. The Gauntlet has been identified as a critical area in need of stonework and dike enhancement.

Figure 6. JBJ Project Area and L&D Facilities

Alexandria falls within Pool 2, which is between L&D 2 and Red River L&D 3. All tonnage that passes L&D 1 carries on through Pool 1 and L&D 2. Pool 2 accounts for 82 percent of all tonnage on the JBJ Waterway from 2013–2023.

Table 2. JBJ Waterway Tonnage by Pool

Calendar Year	Tonnage Entering Pool 2	Tonnage Entering Pool 3	Percentage in Pool 2
2013	4,101,038	673,804	84%
2014	3,172,697	642,970	80%
2015	3,426,964	398,233	88%
2016	2,943,401	373,304	87%
2017	4,198,639	1,159,718	72%
2018	4,372,763	1,161,695	73%
2019	2,686,150	436,662	84%
2020	3,169,029	322,868	90%
2021	3,187,435	457,092	86%
2022	2,833,899	386,437	86%
2023	2,212,822	485,096	78%
Total	**36,304,837**	**6,497,879**	**82%**

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 Red River – 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.

2.3 SOCIOECONOMIC

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.

2.3.1 Population

Louisiana ranks as the twenty-fifth largest State in the Union, respectively, 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 3.

Table 3. Populations of Parishes in Project Area[1]

Geography	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

2.3.2 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).

[1] Source: American Community Survey, Demographic Estimates, 2020 5-Year Estimates.

Table 4. Employment by Industry, 2024[2]

	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%

As shown in Table 5, 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.

[2] Source: Snapshot from census.gov. American Community Survey, Demographic Estimates, 2020 5-Year Estimates.

Table 5. Unemployment Rate, 2024[3]

Geography	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%

2.3.3 Median Household Income for Selected Counties

Median household incomes for the nine parishes in 2024 are shown in Table 6. The average median household income across the nine Louisiana parishes is $49,926, which is much lower than the state median of $60,023 and the national median of $64,994.

Table 6. Median Household Income, 2024[3]

Geography	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

[3] Source: American Community Survey, Economic Characteristics, 2020 5-Year Estimates.

2.3.4 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 7).

Table 7. Racial Composition, 2024[4]

	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%

2.3.5 Age Distribution

The age characteristics of the nine parishes are shown in Table 8.

Table 8. Age Characteristics[5]

	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%

[4] Source: Snapshot from census.gov. American Community Survey, Demographic Estimates, 2020 5-Year Estimates.
[5] Source: Snapshot from census.gov. American Community Survey, Demographic Estimates, 2020 5-Year Estimates.

2.3.6 Income and Poverty

Income and poverty data for the nine parishes for 2024 are summarized in Table 9. 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 9. Income and Poverty Data[6]

Geography	Median Household Income	Per Capita Income 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%

2.3.7 Education

The educational attainment levels for the parishes in 2024 are presented in Table 10. 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 10. Educational Attainment by Parish[7]

	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%

[6] Source: American Community Survey, Demographic Estimates, 2020 5-Year Estimates.
[7] Source: Screenshot from Census.gov. American Community Survey, Demographic Estimates, 2020 5-Year Estimates.

SECTION 3
Future Conditions

3.1 COMMODITY GROWTH FORECAST

An essential step when evaluating navigation improvements is to analyze the types and volumes of cargo moving through the port. Trends in cargo history can offer insights into a port's long-term trade forecast and the estimated cargo volume upon which future vessel trips are based. To minimize the impact of potential anomalies in trade volumes on long-term forecast, 5 years of data were employed to establish the baseline for the commodity forecast. Historical data from 2018 to 2022 (2022 was the latest year of available data, due to when the one-time use economic model was developed) were used to develop a baseline, allowing the forecast to capture the tonnage range of the system.

Interviews with port personnel, shippers, and operators on the JBJ Waterway system were held. They expressed the potential of new movements, such as jet fuel and increased steel tonnage, as well as induced movements of additional petroleum. While there was potential for induced demand and new movements from the project, these values did not vary considerably from that of the historical annual variance.

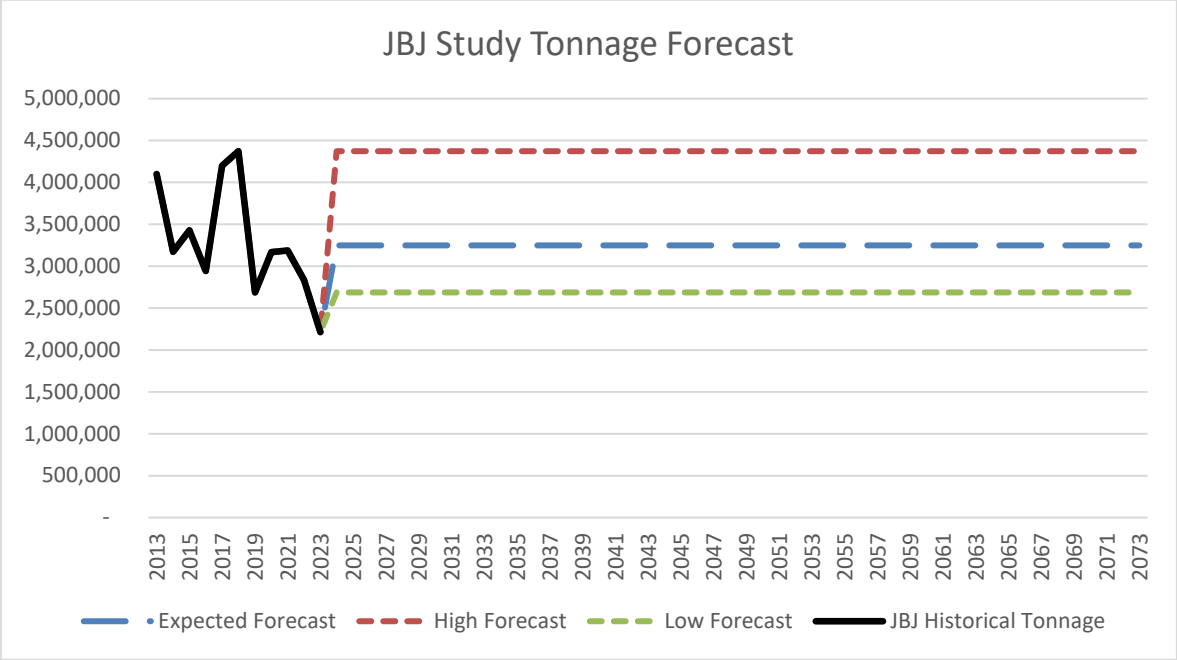

Figure 7. JBJ Study Tonnage Forecast and Historical Data

The expected forecast is the average tonnage from 2018 to 2022. This is almost the same value as the 11-year average tonnage, showing the consistency of the system

over time. 2023 tonnage was negatively impacted by a late start to the dredging season, which limited early season tonnage. Operators expressed that there has been a return to normal tonnage levels in 2024 and 2025.

SECTION 4
Alternatives

Alternatives that were carried forward for economic evaluation were as follows:

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

4.1.1 Alternative 1: No Action

Under the Future Without-Project (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 carrying capacity per trip, and barges would continue to lightload.

KEY NOTE: The No Action Alternative requires $17.5 million in Operation and Maintenance (O&M) stonework to minimally bring the project back to the existing condition baseline. The project dikes have not received the necessary O&M funding and have degraded.

The FWOP condition would not see any O&M funds for stonework, but from a plan formulation perspective, the analysis was not based on that determination. Guidance requires the plan formulation team to assume the project is operating at its authorized design, even though it is not. The existing project dikes would need to be brought back to authorized dimensions in critical locations to allow for the study alternatives to be applicable without requesting construction funding for O&M work.

As a result, the No Action Alternative—the FWOP plan—and all action alternatives have an O&M maintenance charge of $17.5 million factored into average annual costing. This cost nets out across all alternatives in the analysis. It is a risk of the project that the current condition requires O&M stonework that has not been historically funded.

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

This alternative features deviation, draft restrictions, and construction dredging in 18 locations. The total amount of excavated material for the initial construction dredging from 9-FT feet to 12-FT would be 1,525,200 cubic yards.

It is estimated that approximately 28 days of O&M dredging on a yearly basis will be required. The O&M dredging requirement is on an annual basis and is estimated at $2,475,000. There would be minor aquatic impacts and no impacts to wetland or terrestrial resources. No mitigation would be required. All work would be within the original project footprint for the 9-FT channel designs. The excavated material will be in channel placement.

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

This alternative features the deviation, draft restrictions and improvements to the existing dikes in order 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.

It was estimated that approximately 28 days of O&M dredging within 2 years would be required. The O&M dredging cost requirement was estimated to be $2,475,000 on a biennial basis. O&M dredging was reduced by 50 percent in comparison with the FWOP condition. There would be minimal aquatic impacts and no impacts to wetland or terrestrial resources. No mitigation is required. All work would be within the original project footprint for the 9-FT channel designs.

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

This alternative features 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.

It was estimated that approximately 28 days of O&M dredging within 25 years would be required. The O&M dredging cost requirement was estimated to be $1,275,000, applied throughout the 25-year period. O&M dredging would be reduced by 90 percent in comparison with the FWOP. There would be minor aquatic impacts, an expected 21.8 acres of wetlands impacted, and an expected 19.1 acres of wildlife habitat impacted. Mitigation based off of these impacts would be required.

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

This alternative features the deviation, draft restrictions improvement to dikes as described in Alternative 3a and the construction of new dikes in seven high-priority locations. (High-priority locations are those that cause severe depth restraints in the channel that also impact the navigability of the 9-FT channel. For more details, see

Appendix A *Engineering*). The total amount of stonework was estimated to be 834,600 tons.

It was estimated that approximately 28 days of O&M dredging within 25 years will be required. The O&M dredging cost requirement was estimated to be $1,275,000, applied throughout the 25 year period. O&M dredging would be reduced by 90 percent in comparison with the FWOP. There would be minor aquatic impacts, an anticipated 5.5 wetland acres impacted, and an anticipated 4.8 acres of wildlife habitat impacted. Mitigation will be required based on these impacts.

4.1.6 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.

It is estimated that O&M dredging will be reduced 100 percent. 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 based off of these impacts.

SECTION 5
Analysis Approach

The study's National Economic Development (NED) analysis took the following approach.

5.1 GUIDANCE

The first step in any study process is to identify the proper guidance and then try to structure the analysis approach in a way that allows an evaluation based on the necessary criteria.

Guidance for deepening studies comes from Engineer Regulation (ER) 1105-2-103 section 3-2.c.(1) NED Benefits. The base economic benefit of a navigation project is the reduction in the value of resources required to transport commodities.

Navigation benefits can be categorized as follows:

5.1.1 Cost Reduction Benefits

3-2.c.(1)(a) Cost reduction benefits for commodities for the same origin and destination and the same mode of transit thus increasing the efficiency of current users. This reduction represents a NED gain because resources will be released for productive use elsewhere in the economy.

Examples for inland navigation are reductions in costs incurred from trip delays (e.g., reduction in lock congestions), reduction in costs associated with the use of larger or longer tows, and reduction in costs due to more efficient use of barges. Examples for deep draft navigation are reductions in costs associated with the use of larger vessels, with more efficient use of existing vessels, with more efficient use of larger vessels, with reductions in transit time, with lower cargo handling and tug assistance costs, and with reduced interest and storage costs.

For this study, the cost reduction benefits category is the primary benefit driver. Benefits are generated by barges being able to carry more tonnage or larger, more efficient barges being able to enter the JBJ Waterway due to the greater draft clearance and more efficient operation.

5.1.2 Shift of Mode Benefits

3-2.c.(1)(b) Shift of mode benefits for commodities for the same origin and destination providing efficiency in waterway or harbor traversed. In this case, benefits are the difference in costs of mode transport between the without-project condition (when rails, trucks or different waterways or ports are used) and the with-project condition (improved locks, waterways or channels). The economic benefit to the national economy is the savings in resources from not having to use a more costly mode or point of transport.

5.1.3 Shift of Origin and Destination Benefits

3-2.c.(1)(c) Shift in origin and destinations that would provide benefits by either reducing the cost of transport, if a new origin is used or by increasing net revenue of the producer, if a change in destination is realized. This benefit cannot exceed the reduction in transportation costs achieved by the project.

5.1.4 New Movement Benefits

3-2.c.(1)(d) New movement benefits are claimed when there are additional movements in a commodity or there are new commodities transported due to decreased transportation costs. The new movement benefit is defined as the increase in producer and consumer surplus; thus, the estimate is limited to increases in production and consumption due to lower transportation costs.

Increases in shipments resulting from a shift in origin or destination are not included in the new movement benefits. This benefit cannot exceed the reduction in transportation costs achieved by the project.

5.1.5 Induced Movement Benefits

3-2.c.(1)(e) Induced movement benefits are the value of a delivered commodity less production and transportation costs when a commodity or additional quantities of a commodity are produced and consumed due to lower transportation costs. The benefit, in this case, is measured as the difference between the cost of transportation with the project and the maximum cost the shipper would be willing to pay.

5.1.6 Benefit Categories Utilized

In this study, the potential for almost all benefit categories to be considered was identified. However, after a more in-depth analysis, it was determined that the cost reduction benefit category would be the primary driver of NED benefits.

Other benefit categories were utilized by forecasting higher tonnage scenarios due to operators taking advantage of the enhanced system. This tonnage would reflect a user shifting from rail to water or inducing more tonnage as they make the same number of trips.

Discussion with industry did not indicate a likely shift of origin or destination benefits. The Caddo-Bossier Port did indicate a potential from new movements, related to petroleum, but that was not related to the study directly and had other factors impacting the potential start of shipments.

5.2 NED ECONOMIC ANALYSIS APPROACH

A one-time use model based in Excel was developed for this study. The model uses historical waterborne data from 2018–2022 as proxies for tonnage forecasts, barge size, origin/destination/commodity movements, tow package orientation, tow boat size, vessel operating costs, etc.

Each movement of commercial goods that originates, terminates, or passes through the JBJ Waterway is subject to a wide range of constraints as to how much tonnage can be loaded on the barge. These include depth at origination and termination harbor, the authorized depth of the channels the barge travels through, the conditions of the systems (hydraulically and infrastructurally), the available vessels, the operator decisions, and the commodity being carried.

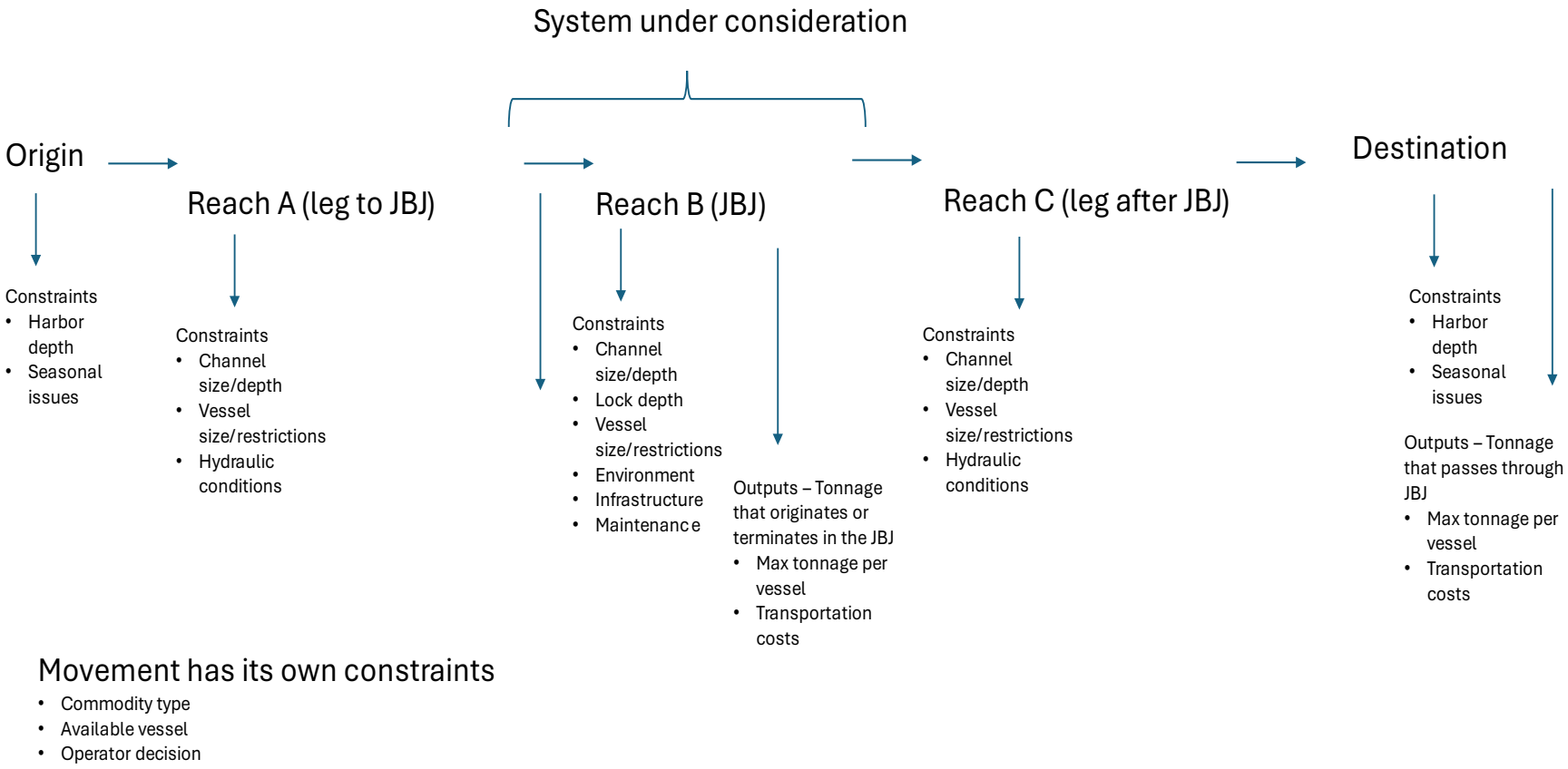

Figure 8. Vessel Constraint Model Concept

The economic model developed looks at five years of historical commercial navigation movements that passed through or originate/terminate in the JBJ Waterway, 2018–2022. It identifies the constraint in each movement as laid out in the concept figure. Sometimes a movement may occur on a barge with a maximum loaded draft of 9-FT. This movement would receive no benefit from the deepening of the JBJ Waterway. Some movements originate or terminate in a harbor for maximum drafts of 9-FT. Deepening the JBJ Waterway would not benefit that movement, since it would still be constrained by the 9-FT harbor.

If the movement of a barge with 12-FT draft capacity originates on a system that supports a 12-FT draft, and its movement is constrained by only the 9-FT portion of the JBJ Waterway, then in this case, the deepening of the JBJ Waterway channel would provide potential benefits.

In the concept figure, there is a Reach C and Destination, although, in reality, all tonnage moving on the JBJ Waterway beyond L&D 1 either originates or terminates on the JBJ Waterway. This is an important characteristic as there is no through tonnage that is impacted by the study. Waterborne commerce statistics does note through tonnage on the JBJ Waterway, but that tonnage exits the system on the Atchafalaya and Black Rivers. The Atchafalaya River already operates at 12-FT, and the portion on the JBJ Waterway that is currently able to sustain a 12-FT draft is only between the Old River Lock and Dam and the Atchafalaya River. The Black River has an authorized depth of 9-FT and would not receive any benefit from deepening of the JBJ Waterway due to its own limitation.

The model uses historical movements from 2018 to 2022 to represent future activity. 2018 tonnage represents the High Scenario Forecast and 2022 represents the Low Scenario Forecast. The average of all five years is used for the Expected Scenario Forecast. Each individual barge movement is weighed against the system constraints to determine if it would benefit from a deepening to 10-FT, 11-FT, and 12-FT. If the barge could benefit from the system being deepened, then the cost is reduced by the load factor reduction percentage. Essentially, the model says if it took one trip to make this movement at a certain cost, then with deepening, it would take some value that is less than one trip to make the same movement, reducing the transportation costs by that factor.

Variables of note:[8]

- Dry cargo barges were estimated to run in six-pack, 3x2, barge configurations utilizing 2,400-horsepower tow boats.
- Liquid cargo (petroleum) was estimated to run in a 2x1 barge configuration utilizing 3,000-horsepower tow boats.

[8] Based on operator input.

5.3 RISKS AND UNCERTAINTY WITH THE NED ECONOMIC APPROACH

By using historical data to provide proxies for barge size, origin/destination, commodity mix, etc., the analysis potentially undervalued the positive effects of deepening as users shift vessel preferences and economic incentives. Operators may begin to utilize larger barges more frequently as they take advantage of the greater draft. This would bolster economic benefits. Users may continue to make the same amount of trips, inducing additional tonnage as they fully load their vessels. This is particularly the case for aggregate users. Aggregate users take advantage of lower waterborne costs to offset land trucking costs. As they bring tonnage into the port, they then have a profitable radius from which they can truck goods out into the hinterland. As the waterborne cost decreases, the range for landside trucking increases, enlarging their market and increasing demand.

This approach also potentially overstates forecasted tonnage, as there has been a moderate downward trend in tonnage over the past decade. This downward shift is likely offset by positive economic factors and incentives that the Alternatives would provide.

The approach largely ignores individual factors such as business risks. There is a chance that coal tonnage could decline if the power plant closes operations over the project life. The approach also excludes potential new tonnage that could come online such as jet fuel, methanol, and other refined petroleum product projects that may be heading to both the Central Louisiana Regional Port and Caddo-Bossier Port.

The uncertainties around all of these factors were deemed acceptable to the best available approach of using historical data as a proxy for future results.

SECTION 6
NED Benefits and Costs

6.1 NED BENEFITS

Each alternative, excluding Alternative 1 (the No Action Alternative), was designed to deliver a 12-FT channel year-round. It was assumed that all other waterways operated at their designed and authorized depths. This led annual average benefits to be similar across all alternatives and led to an alternative selection that closely resembles a least costly alternative plan.

The difference in NED benefits among action alternatives is the timing that it takes to perform in-channel dredging. In-channel dredging is estimated to take 28 days per dredging cycle.

Alternative	Dredging Cycle Requirement
3	Annually: 28 out of every 365 days
3a	Every other year: 28 out of every 730 days
3b	Every 25 years: 28 out of every 9,125 days
3c	Every 25 years: 28 out of every 9,125 days
3ab	Not necessary during project period

Benefits for the years under consideration ranged from $3.7 million to $9.7 million for Alternative 3ab, assuming a fully accessible 12-FT channel throughout the year.

Average annual benefits (AAB) are based on the proxy run years as discussed in Section 5: 2018 tonnage and movements represented the High Scenario Forecast, 2022 tonnage and movements represented the Low Scenario Forecast, and the average of 2018–2022 represented the Expected Scenario Forecast. Since tonnage and variables are held constant for each scenario, the AAB do not change based on discount rates.

Table 11. AAB by Alternative Modeled Year

	Alternative				
Model Year	**3**	**3a**	**3b**	**3c**	**3ab**
2018 - High Forecast	$ 8,937,000	$ 9,308,000	$ 9,649,000	$ 9,649,000	$ 9,679,000
2019	$ 4,463,000	$ 4,649,000	$ 4,819,000	$ 4,819,000	$ 4,834,000
2020	$ 3,406,000	$ 3,548,000	$ 3,678,000	$ 3,678,000	$ 3,689,000
2021	$ 4,089,000	$ 4,259,000	$ 4,415,000	$ 4,415,000	$ 4,429,000
2022 - Low Forecast	$ 4,016,000	$ 4,183,000	$ 4,337,000	$ 4,337,000	$ 4,350,000
Expected - Forecast	$ 4,982,200	$ 5,189,400	$ 5,379,600	$ 5,379,600	$ 5,396,200

Notably, the 2020 proxy year results, which had 3.2 million annual tons, generated a lower AAB than the 2022 proxy year results, which had 2.8 million tons. This is due to the combination of constraints impacting the 2020 movements versus the 2022 constraints.

6.2 NED COSTS

Project first costs, interest during construction, and total investment cost are shown in the following table.

Table 12. Investment Cost of Each Alternative

Alternative	3	3a	3b	3c	3ab
Investment Cost					
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

See Appendix B *Cost Engineering* for more information on project first costs.

Interest during construction reflects the opportunity cost of funds if they were not allocated towards the alternative prior to it accruing benefits. It was assumed that each alternative will not provide any benefit until it is fully completed. This is likely a conservative assumption, as improvements of dikes working upstream from Old River towards Shreveport would provide deeper channel access as they are made, allowing benefits to start accruing.

It was also assumed that $20 million to $30 million in stonework could be completed each year. This would mean that Alternative 3a would require 2 years to be completed while Alternative 3ab would require 7-8 years.

Average annual O&M reflects the cost of in-channel dredging that is required for each alternative: it was assumed to be $2.475 million per dredging cycle. See Section 6.1 for alternative dredging cycles.

Table 13. Average Annual Costs for Alternatives

Alternative	3	3a	3b	3c	3ab
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

6.3 PRELIMINARY NET BENEFITS AND BENEFIT-TO-COST RATIO (BCR)

Having identified the costs and benefits associated with all study alternatives, identification of the tentatively selected plan (TSP) requires a comparison of the average annual net benefits resulting from each alternative. Table 14 contains the NED annual costs and benefits as well as the resulting average annual net benefits and BCRs at fiscal year 2025 price levels and amortized at the 2025 Federal discount rate of 3.0 percent.

Table 14. Preliminary Average Annual Costs and Benefits

Alternative	3	3a	3b	3c	3ab
Investment Cost					
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 Cost					
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
Benefits					
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**

A range of benefits was developed to capture the uncertainty around tonnage levels, constraints, vessel mix, commodity mix, seasonality, etc. These scenarios are discussed in Section 3 and Section 5.

Table 15. High, Low, and 2020 Scenario Net Benefits

Alternative	3	3a	3b	3c	3ab
High Scenario AAB	$ 8,937,000	$ 9,308,000	$ 9,649,000	$ 9,649,000	$ 9,679,000
Net Excess Benefits	$ 5,215,000	$ 6,119,000	$ 2,988,000	$ 5,304,000	$ 1,036,000
BCR	**2.4**	**2.9**	**1.4**	**2.2**	**1.1**
Low Scenario AAB	$ 4,016,000	$ 4,183,000	$ 4,337,000	$ 4,337,000	$ 4,350,000
Net Excess Benefits	$ 294,000	$ 994,000	$ (2,324,000)	$ (8,000)	$ (4,293,000)
BCR	**1.1**	**1.3**	**0.7**	**1.0**	**0.5**
2020 Proxy Year Scenario AAB	$ 3,406,000	$ 3,548,000	$ 3,678,000	$ 3,678,000	$ 3,689,000
Net Excess Benefits	$ (316,000)	$ 359,000	$ (2,983,000)	$ (667,000)	$ (4,954,000)
BCR	**0.9**	**1.1**	**0.6**	**0.8**	**0.4**

6.4 RECOMMENDED TENTATIVELY SELECTED PLAN

Alternative 3a—Draft Restrictions; Deviation; Dredging to 12-FT—is the recommended plan, with average annual net benefits of $2 million and a BCR of 1.6 to 1. Based on the scenarios measured, the net excess benefits range from $365,000–$6,119,000 with BCRs ranging from 1.1–2.9.

6.5 RISK & UNCERTAINTY AND SENSITIVITY ANALYSIS

Undiscussed risks and uncertainties include the following:

- The continued need to dredge at lock sills annually will continue to negatively impact commercial navigation operations. It is unclear if the increased sediment scour from the action alternatives will lead to faster and more severe accumulation at lock sills.
- The need to rehab existing dikes to existing project condition before moving forward is estimated to cost $17.5 million, which would need to be funded by O&M.
- If the project costs are undervalued or take longer to become completed, then the average annual costs would be understated and the net benefits would be overstated.

Alternative	3	3a	3b	3c	3ab
First costs 25% increase (AAC)	$ 4,033,750	$ 3,681,500	$ 8,314,750	$ 5,419,750	$ 10,803,750
First costs 25% increase (NEB)	$ 948,250	$ 1,507,500	$ (2,935,750)	$ (40,750)	$ (5,407,750)
BCR	**1.2**	**1.4**	**0.6**	**1.0**	**0.5**

- If the proposed action alternatives do not adequately provide a 12-FT channel with 100 percent efficiency, this would lead to overstated net benefits.

Alternative	3	3a	3b	3c	3ab
Channel at 12ft 75% (AAB)	$ 3,437,580	$ 3,580,410	$ 3,711,510	$ 3,711,510	$ 3,723,240
Channel at 12ft 75% (NEB)	$ (284,420)	$ 391,410	$ (2,949,490)	$ (633,490)	$ (4,919,760)
BCR	**0.9**	**1.1**	**0.6**	**0.9**	**0.4**

- The need for O&M stonework throughout the project life for each alternative was determined to be unnecessary given the longevity and effectiveness of the existing project structures. If the alternative dikes were to need O&M repairs during the project life, the average annual costs would be understated, leading to overstated net benefits.

Alternative	3	3a	3b	3c	3ab
O&M increase 25% (AAB)	$ 4,340,750	$ 3,493,750	$ 6,672,500	$ 4,356,500	$ 8,643,000
O&M increase 25% (NEB)	$ 641,250	$ 1,695,250	$ (1,293,500)	$ 1,022,500	$ (3,247,000)
BCR	**1.1**	**1.5**	**0.8**	**1.2**	**0.6**

SECTION 8
Comprehensive Benefits Analysis

8.1 REGIONAL ECONOMIC DEVELOPMENT ANALYSIS

The U.S. Army Corps of Engineers (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 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 to implement each alternative and the benefits that each alternative would provide to the region.

Alternative	3	3a	3b	3c	3ab
RED					
Local & State*	$31.5M	$51.1M	$162.8M	$115.4M	$213.9M
National	$72.8M	$95.5M	$304.1M	$215.7M	$399.6M
Jobs**	384	550	1,752	1,243	2,302
Ranking	5	4	2	3	1

* local benefits do not differ from the state because the analysis was run for the entire system which spans across LA

** All jobs are presented in Full-Time Equivalence

Notably, the more expensive the project is, the greater the local regional benefits.

Additionally, the local region will benefit from reduced transportation costs, which could drive businesses to expand or induce more demand in the local economy. Since the JBJ Waterway is an existing project and this study future conditions does not significantly change from historical tonnage levels, RECONS would have a difficult time distinguishing enhanced regional activity beyond the benefit already provided by the system. The table below provides the existing Regional Economic Development impact of the system, which would be further enhanced by any alternative that improved the outcomes of the JBJ Waterway.

Table 16. JBJ Waterway RECONS Analysis

JBJ Regional Economic Output based on 2018 - 2022 Average Tonnage and the Generic Study Area

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$79,712,728	189.7	$0	$0
Secondary Impact		$108,337,502	416.2	$0	$0
Total Impact	$79,712,728	$188,050,230	605.8	$0	$0
State					
Direct Impact		$79,712,728	189.7	$0	$0
Secondary Impact		$108,337,502	416.2	$0	$0
Total Impact	$79,712,728	$188,050,230	605.8	$0	$0
US					
Direct Impact		$79,712,728	206.5	$20,431,015	$29,112,021
Secondary Impact		$158,325,822	662.2	$50,883,106	$82,513,707
Total Impact	$79,712,728	$238,038,549	868.8	$71,314,121	$111,625,728

** Jobs are presented in full-time equivalence (FTE)*

8.2 ENVIRONMENTAL QUALITY

Given that the vast majority of the action alternatives were developed within the existing JBJ Waterway footprint, environmental quality impacts are expected to be small. Potential deepening and scouring of the channel could stir up trapped contaminants, suspending them in the water column and passing them down the system. Reduced commercial navigation trips due to more tons per trip could lead to less potential impact of barges and tows on wildlife and vegetation in the aquatic ecosystem. Alternatives that create new dikes could potentially impact vegetation.

As a result, Alternative 3a, the TSP, is likely to have the least environmental quality impact as it stays within the footprint of existing dikes and limits channel dredging, while at the same time enhancing the system to reduce barge trips.

8.3 OTHER SOCIAL EFFECTS

Alternatives would lower emissions by reducing the number of trips necessary to move annual tonnage. This would enhance regional air quality and improve 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 would ensure that recreational users of the system and the local communities have access to waterways. This is a lower socioeconomic region, and enhancing the waterway should help to maintain community cohesion.

SECTION 9
Economic Conclusion

This analysis took an conservative approach by limiting tonnage to recent averages, not accounting for potential positive incentives such as induced tonnage, new movements, and more efficient barges to maximize the additional depth, and not accounting for accruing benefits during construction. Even with these assumptions, the TSP still generated $2 million in annual net excess benefits. Additionally, stress test scenarios of uncertainty in the analysis showed a healthy BCR over 1.1.

The TSP is relatively inexpensive by infrastructure standards: $50 million. The project has little environmental impact. It will help to stabilize a system that has been underinvested in with O&M funds and lower necessary annual O&M costs in the future by reducing the need for annual in-channel dredging. Additionally, the JBJ Waterway has a national defense aspect, as it regularly moves military equipment for training exercises. The deepening would improve the economic viability of waterborne jet fuel shipments to Barksdale Air Force Base, saving taxpayer dollars. Given the strong net benefits, national defense implications, positive Regional Economic Development aspects, and limited environmental impacts, it is recommended to approve Alternative 3a.