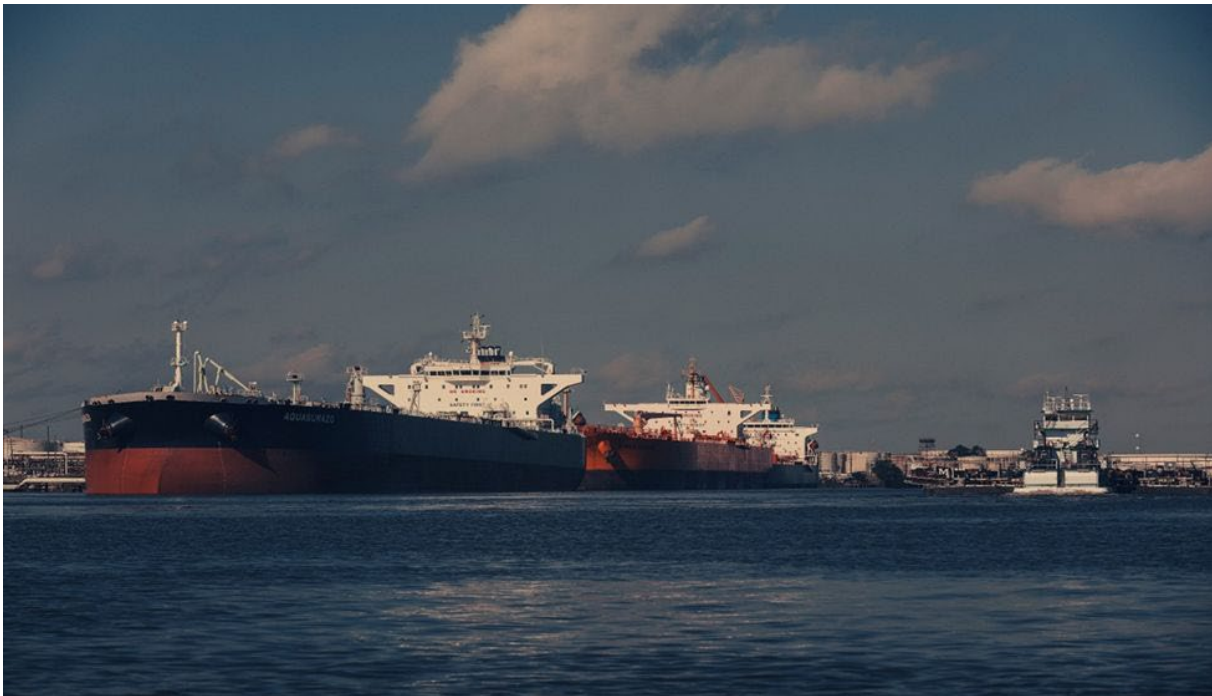




Sabine Neches Waterway Improvement Project Section 203 Feasibility Study

**Integrated Section 203 Feasibility Report
& Environmental Assessment**



February 2026

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Executive Summary

Construction of the federal project at the SNWW was most recently authorized in the Water Resources Reform and Development Act of 2014 (WRRDA 2014), in response to a Congressional resolution adopted on 5 June 1997 by the Senate Committee on Environment and Public Works, authorizing a study to determine the feasibility of modifying the federal navigation project previously authorized by the River and Harbor Act of 1962 (construction completed in 1968).

This draft Integrated Feasibility Report and Environmental Assessment (FR/EA) is carried out under the authority of Section 203 of the Water Resources Development Act (WRDA) of 1986, as amended (33 US Code 2231). The Sabine Neches Navigation District (SNND) is the cost-sharing non-federal interest of the existing federal navigation project and the non-federal interest performing this FR/EA. This FR/EA evaluates the feasibility of improvements to the federal navigation project at the Sabine Neches Waterway (SNWW) that will address the problems of channel congestion, navigation restrictions, and economic inefficiency.

The SNWW is located in Jefferson and Orange Counties in southeast Texas and in Cameron Parish Louisiana (Figure E-1). It includes the ports of Beaumont, Port Arthur, and Sabine Pass. The SNWW is the third largest waterway in the nation by tonnage, the largest military outload waterway in the nation, and the nation's largest exporter of Liquefied Natural Gas (LNG). The refining complex along its shores includes the largest refinery in the nation and supplies nearly four million barrels per day of gasoline, diesel, jet fuel, and home heating oil to markets in the mid-west as far north as Chicago and throughout the east coast. Commercial navigation along the waterway generates more than \$32 billion in trade surplus annually – the third largest trade surplus of any waterway in the nation.

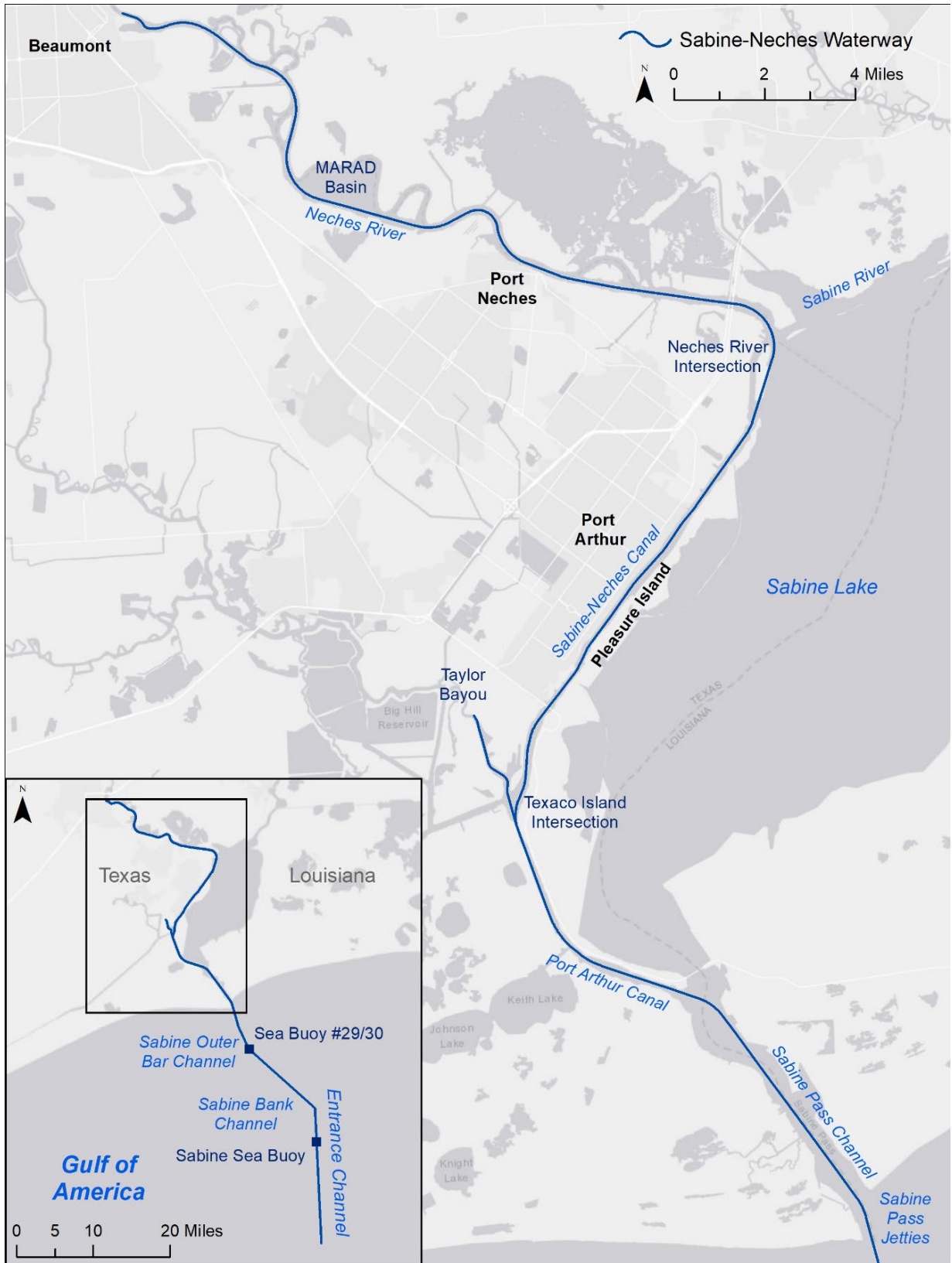
Existing Conditions

The SNWW is currently being deepened (Deepening Project) from -40 feet MLLW to -48 feet MLLW as authorized by the Water Resources Development Act of 2014. Deepening Project construction started in 2022, and the deepening component of the project is projected to be fully complete by 2028. The Deepening Project does not provide channel widening.

The SNWW is heavily trafficked, serving deep draft vessels engaged in international and domestic trade and is the third largest waterway in the nation by tonnage with 197 million tons transiting the waterway in 2023 (WCSC, 2025). The SNWW predominantly serves the energy and petrochemical industries that line the waterway from Sabine Pass to the Port of Beaumont. The SNWW is the largest foreign trade liquefied petroleum and natural gas waterway in the Nation and the second largest foreign trade crude oil waterway in the Nation (WCSC, 2025). Refiners along the waterway provide various fuel products to states in the mid-west and northeast via the Explorer Pipeline (660,000 barrels per day) terminating near Chicago, IL and the Colonial Pipeline (3,000,000 barrels per day) terminating outside of New York City in Linden, NJ.

Three of the nation's ten largest refineries (Motiva, ExxonMobil, and Valero), and the nation's largest crude oil terminal (Nederland Terminal) are located on the Waterway. In addition, the Port of Beaumont is the largest commercial military outload port in the Nation. The ready reserve fleet at the U.S. Maritime Administration (MARAD) basin on the Neches River is the largest in the Nation. Terminals on the Waterway have access to 57 percent of the nation's Strategic Petroleum Reserve.

Figure E-1
Sabine Neches Waterway



Future planned improvements identified by terminal operators include construction of new terminals, construction of additional docks at existing terminals, new pipeline connections to domestic production facilities, and increased storage facilities. Refiners at two facilities are also substantially increasing refining capacity.

The waterway also serves barge traffic along the Gulf Intracoastal Waterway (GIWW) that stretches from St. Marks, FL to Brownsville, TX and links Mississippi barge traffic with Texas Gulf coast terminals. Barge traffic along the portion of the GIWW that is co-located with the Sabine-Neches Canal operates 24 hours a day, 365 days per year. Based on data from the US Coast Guard Vessel Traffic System (VTS), in 2024 there were 48,000 inland tow transits on the SNWW, which is the equivalent of more than 5 barge tow transits per hour on this section of the SNWW. Additionally, there were 2,500 Articulated Tug Barge (ATB) transits that typically have an origin or destination on the Neches River where most of the SNWW terminals are located. The VTS indicates that there were more than 7,000 deep draft cargo vessel transits in 2024.

The SNWW is the focus of a substantial and sustained series of investments that increase waterway tonnage and the number of vessels transiting the waterway. From 2011 to 2021, \$53 billion in industry and terminal projects have been completed or are currently under construction. In addition, another \$30 billion in proposed investments have been identified.

Table E-1 shows total tonnage along the waterway by commodity group from 2019 through 2023 (the last year of WCSC data available at the time of this writing). The crude oil, liquified petroleum and natural gas, and petroleum products groups combined account for nearly 90 percent of all tonnage on the waterway in each year. This sub-total excludes chemicals that are largely used to support the refining industry. The largest historical growth is exhibited by Liquified Gases that has increased due to an export Liquified Natural Gas (LNG) facility coming on-line at Sabine Pass and due to increases in Propane and Butane (aka Liquified Petroleum Gas (LPG)) exports.

Table E-1
SNWW Cargo Tonnage 2019 – 2023 (thousands of short tons)

Cargo Type	2019	2020	2021	2022	2023
Chemicals & Chemical Products	15,544	14,276	14,944	15,405	15,757
Crude Petroleum	66,973	45,347	35,543	44,522	42,457
Liquified Gases	27,496	19,707	41,198	43,261	49,375
Petroleum Product	70,030	72,890	74,097	77,818	80,707
Raw Materials	7,672	8,683	4,834	4,225	4,035
Other	4,723	3,018	2,651	3,957	4,318
TOTAL	192,438	163,921	173,267	189,188	196,649
Foreign Trade	107,988	89,139	105,942	113,209	121,795
Domestic Trade	84,450	74,782	67,325	75,979	74,854
Foreign Trade %	56.1%	54.4%	61.1%	59.8%	61.9%

Source: WCSC

Table E-2 shows the number of trips by vessel operating draft category along the SNWW from 2019 through 2023 (WCSC, 2025). Note that a trip may be either inbound or outbound. A vessel call includes both the inbound and outbound trips. A twelve-foot operating draft was used to differentiate between deep draft and shallow draft vessels because the GIWW has a depth of -12 feet before and after it co-locates with the SNWW. Approximately 90 percent of traffic along the SNWW is shallow draft traffic, ranging from 53,000 to 67,000 trips per year. Deep draft vessel trips have ranged from 4,600 to 6,200 per year from 2019 through 2023. In 2023, there were an average of 167 trips along the Waterway per day (365 operating days per year) with 150 trips per day by shallow draft vessels and 17 trips per day by deep draft vessels.

Table E-2
Waterway Vessel Trips 2019 – 2023

Vessel Draft	2019	2020	2021	2022	2023
Less than or equal to 12 feet	67,495	56,115	48,696	53,401	54,765
More than 12 feet	5,867	4,642	5,107	5,894	6,225
Total Trips	73,362	60,757	53,803	59,295	60,990
Percent					
Less than or equal to 12 feet	92%	92%	91%	90%	90%
Percent					
More than 12 feet	8%	8%	9%	10%	10%

Source: WCSC

Based on SNWW navigation rules, Panamax vessels cannot meet other Panamax-size or larger vessels in the 400-foot-width channel reaches; in 2019, there were 4,300 transits by Panamax-size or larger vessels. In addition, navigation rules for the SNWW prevent Aframax and Suezmax vessels from transiting the 400-foot channel reaches at night; during 2019 there were delays for 1,200 vessels with daylight restricted transits.

Navigation safety concerns stem from the shared use by deep draft and shallow draft barge-tows in two 400-foot-wide reaches of the SNWW where the Gulf Intracoastal Water Way (GIWW) is collocated with the Sabine-Neches Canal. In addition, substantial tug, barge, and ATB traffic on the Neches River share the 400-foot-wide channel with deep draft vessels. Daylight only navigation restrictions in the Sabine-Neches Canal and Neches River are established by the Sabine Pilots Association for vessels with a beam greater than 125 feet. Barge-tow transits are unrestricted throughout the SNWW. Deep draft vessels with a beam greater than 125 feet are restricted to daylight transit because these large vessels have limited maneuverability in the 400-foot channel and because visual perceptions at night (even with auxiliary lighting) are insufficient for safe vessel and barge-tow meeting.

Navigation restrictions required for the 400-foot-wide channel cause substantial congestion and vessel delays. Vessels that are too large to meet in the narrow channel must wait for the channel to clear before entering from the sea or leaving from the dock. Vessels too large for nighttime transits must wait for daylight and a clear channel before entering from the sea or leaving from the dock. These navigation rules for the SNWW cause these delays, and also exacerbate weather

delays because the more time a vessel spends in the system the more exposed that vessel is to seasonal weather delays.

Plan Formulation

The problems identified for the Sabine Neches Waterway are:

- Restrictive navigation rules due to safety concerns for nighttime transits, and
- Inefficient movement of cargo.

Opportunities at the SNWW include:

- Improve navigational safety at nighttime on the SNWW,
- Improve cargo movement efficiency for the projected future commodity volume and the projected future fleet along the SNWW,
- Increase the carrying capacity of the SNWW by reducing navigation restrictions, and
- Provide environmental benefits by restoring habitat through the beneficial use of dredged material.

The goal of USACE involvement in deep draft navigation is to provide efficient and safe general navigation features while meeting the federal objective of increasing national economic development (NED) consistent with protecting the nation's environment. Given this goal, the following planning objectives were used in the formulation and evaluation of alternative plans:

1. Reduce delays and associated transportation costs for the projected commodities and SNWW fleet during the period of analysis (starting in the base year and extending for 50 years). This planning objective supports the Federal objective of maximizing economic development and supports the Council on Environmental Quality (CEQ) Guiding Principle of sustainable economic development.
2. Increase federal navigation channel efficiency for the projected SNWW fleet during the period of analysis. This planning objective supports the Federal objective of maximizing economic development and supports the CEQ Guiding Principle of sustainable economic development.
3. Improve navigation safety for vessels using the SNWW during the period of analysis. This planning objective supports the CEQ Guiding Principle of public safety.
4. Maximize beneficial use of dredged material during the period of analysis. This planning objective supports the Federal objective of protecting and restoring natural systems and supports the CEQ Guiding Principle of healthy and resilient ecosystems.

Plan formulation involves meeting study objectives without violating constraints. The study takes into account all applicable county, state, and federal laws, regulations, and environmental guidance. Specific study constraints include:

- Impacts to social, environmental, and cultural resources will be avoided or minimized to the extent practicable:
- Alternative plans will not impose net negative impacts on the effectiveness of federal projects in the study area, such as

- Sabine Neches Channel Improvement Project (48-foot deepening project including mitigation components)
- Sabine to Galveston Storm Damage Reduction Project,
- Alternative plans will not reduce navigational safety along the SNWW, and
- Hardened development, including floodwalls, terminals, docks, and other industrial development, situated adjacent to the navigation channel limit potential widening opportunities. Substantial impacts to these structures will be avoided.

The commodity forecast is identical for both with- and without-project conditions and is based on observed 2019 commodity tonnage and characteristics. Projected future commodity flow is based on two references:

- Terminal-specific improvements (provided under non-disclosure agreements) and associated increases in vessel traffic and commodity tonnage, if any, as described by terminal operators, and
- U.S. Energy Information Administration (EIA) Annual Energy Outlook 2021 (AEO) projections for imports and exports of crude petroleum and petroleum products.

Cargo not related to crude oil, petroleum products, LPG, or LNG were held at 2019 tonnages throughout the analysis. After an LNG terminal begins operations, tonnage estimates are held constant throughout the analysis and are not subject to EIA growth estimates. Note that the EIA growth rates are not always positive and that the EIA projects very little growth after 2025 (Table E-3). Note also that forecasts are held constant 20 years after the base year (2030) as standard practice in USACE navigation studies.

Table E-3
Sabine Neches Waterway Commodity Tonnages Used in Traffic Model
(thousands of metric tons)

Commodity	2025	2030	2035	2040	2045	2050
Crude Oil Imports	22,124	20,180	19,974	20,653	20,760	21,037
Crude Oil Exports	47,384	45,337	45,535	44,334	42,572	42,657
LNG (Export)	43,913	65,657	65,657	65,657	65,657	65,657
LPG (Export)	18,813	18,920	18,828	18,673	18,601	18,469
Product & Related Imports	2,559	1,978	2,112	2,483	2,617	2,731
Product & Related Export	39,904	40,808	39,149	37,935	36,991	35,955
Not Oil & Gas Related	4,268	4,266	4,266	4,266	4,266	4,266
Total	178,965	197,146	195,521	194,002	191,464	190,773

Table E-4 shows the number of vessel calls by vessel class for the baseline and each modeled year. Note that the vessel call list does not change after 2030 because planned improvements are projected to be completed by that time and there is very little change in commodity tonnages as presented in Tables E-3.

Table E-4
Vessel Calls by Vessel Class for Baseline and Modeled Years

	2019 Baseline	2025	2030	2035	2040	2045	2050
Aframax Tanker	549	595	595	595	595	595	595
Aframax Bulk	7	7	7	7	7	7	7
ATB	328	326	326	326	326	326	326
Handy Bulk	237	237	237	237	237	237	237
Handy Tanker	179	178	178	178	178	178	178
LNG	336	643	961	961	961	961	961
Long RORO	4	4	4	4	4	4	4
LPG	136	420	420	420	420	420	420
Panamax Tanker	806	1,008	1,008	1,008	1,008	1,008	1,008
Panamax Bulk	187	187	187	187	187	187	187
Pmax RoRo	36	36	36	36	36	36	36
Suezmax	99	245	245	245	245	245	245
TOTAL	2,904	3,886	4,204	4,204	4,204	4,204	4,204

The Sabine Neches Traffic Simulation Model (Traffic Model) was developed to evaluate the way different channel widths along select reaches would reduce SNWW congestion delays. For each analysis year, the Traffic Model simulates a full year of deep draft vessel traffic flow to evaluate the effects of various conditions on all vessels' time in the system, including time waiting to enter the channel and time waiting to leave the dock. Simulations for different analysis years reflect projected future traffic, tonnage, and terminal configurations for that year. The Traffic Model is approved by USACE for one-time use in the study.

The Traffic Model evaluates projections of traffic flow along the waterway at five-year intervals from 2025 to 2050 to determine impacts of future commodity and fleet distributions on projected future vessel traffic. Model output is used to evaluate traffic flow under alternative future channel width conditions to identify opportunities for potential traffic flow improvements.

Alternative plans are comprised of management measures. Management measures may be “a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives” (USACE 1996). Management measures may be either structural measures, which require construction, or they may be non-structural, such as operating procedures and policies. Management measures were identified through:

- Pilot’s workshop,
- Terminal operator’s workshop,
- SNND consultation,
- USCG VTS consultation,
- Pilot’s, barge operators, USCG COPT and VTS workshops,

- Previous USACE navigation feasibility studies of the SNWW (1982 and 2011), and
- Ship simulation studies (2003 and 2021).

Six non-structural management measures and 14 structural measures were identified for inclusion in plan formulation. The 14 structural measures included six widening measures, four alternative routes, two new or improved anchorages, and two deepening measures. Measures advanced for inclusion in the development of alternative plans were screened through a preliminary economic assessment of measures implemented individually (i.e., not in combination with other improvements). Measures included in the preliminary economic evaluation include widening channel reaches and increasing anchorage capacity. Channel widening allows additional vessel meeting opportunities that reduce vessel delays creating transportation cost reductions. Channel widening at the Sabine-Neches Canal and the Neches River Channel can eliminate the daylight restriction on navigation of large vessels through the Sabine-Neches Canal and the Neches River Channel.

Economic Evaluation of Alternatives

The economic evaluation of alternative plans was performed in three phases. Phase 1 identifies the net benefit maximizing plan that addresses the problem of daylight only transit restrictions. The net benefit maximizing plan identified in Phase 1 is Alternative 1. In the second phase, incremental widening is added to Alternative 1 to identify the widening plan that maximizes net benefits (Table E-5). In the third phase, incremental increases in Anchorage Basin No. 4 (AB4) vessel handling capacity are added to the net benefit widening plan to identify the NED Plan (Table E-6).

Construction costs used in the economic evaluation of alternative plans include final FY26 costs certified by the USACE Civil Works Cost Engineering and Agency Technical Review Mandatory Center of Expertise. Costs include Preconstruction Engineering and Design (PED), construction costs including beneficial use of dredged material, associated costs, construction management, contingency, and annualized maintenance costs as identified in the attached Engineering Appendix. Interest during construction is also included and has been calculated at the FY26 federal discount rate of 3.25 percent. Interest during construction is calculated monthly for each alternative including PED and construction. The base-year for all economic benefit calculations is 2030. For all economic evaluations of alternatives, model runs produce benefits in five-year increments from 2030 through 2050 and benefits are interpolated for the years between the model run years. Consistent with standard USACE practice, benefits are held constant after 2050.

Table E-5
AAEQ Net Benefits of Alternative Widening Plans
(FY26, \$ thousands)

	Alt1	Alt2	Alt3	Alt4	Alt5	Alt6
Construction Costs	310,827	887,301	634,559	457,084	182,319	890,128
Interest During Construction	16,012	63,765	41,390	28,306	5,986	79,889
Total Construction Cost	326,839	951,065	675,949	485,391	188,305	970,017
AAEQ Construction Cost	13,312	38,737	27,532	19,770	7,670	39,509
AAEQ Maintenance Cost	2,444	4,804	3,961	3,203	1,101	5,905
AAEQ Total Cost	15,756	43,541	31,493	22,973	8,771	45,414
AAEQ Benefits	49,144	49,602	51,223	51,134	21,972	57,928
AAEQ Net Benefits	33,388	6,060	19,730	28,161	13,201	12,513

The goal of Phase 3 of the economic evaluation of alternative plans is to evaluate the net benefits of adding incremental increases in AB4 vessel holding capacity to net benefit maximizing widening plan (Alternative 1). The increments of vessel holding capacity include increasing the AB4 capacity from one vessel (without-project condition) up to four vessels. Note that Alternative 1 includes the without-project condition capacity for a single vessel at AB4. Dredged material from the potential expansion of AB4 is unlikely to be used for wetland restoration because of the close proximity of an upland placement area to AB4, which would make beneficial use an unreasonably high cost of dredged material placement. The incremental time savings and net benefits of adding capacity at AB4 do not improve upon the benefits of Alt 1 (Table E-6).

Table E-6
Net Benefits: Alternative 1 with Increases in AB4 Vessel Capacity
(FY26 \$ thousands)

	Alt1 (1 Vessel)	Alt1+AB4-2 (2 Vessels)	Alt1+ AB4-3 (3 Vessels)	Alt1+ AB4-4 (4 Vessels)
Construction Costs (FY26)	310,827	350,654	386,760	421,803
Interest During Construction	16,012	19,989	23,951	28,210
Total Construction Cost	326,839	370,643	410,711	450,013
AAEQ Construction Cost	13,312	15,096	16,728	18,329
AAEQ Maintenance Cost	2,444	2,647	2,857	3,060
AAEQ Total Cost	15,756	17,744	19,585	21,389
AAEQ Benefits	49,144	49,122	34,743	33,822
AAEQ Net Benefits	33,388	31,378	15,158	12,433

The economic evaluation of alternative plans revealed that eliminating the daylight restriction in the Sabine-Neches Canal and the Neches River provided the greatest net NED benefit and that all subsequent incremental improvements did not increase net NED benefits, even if they increased total gross NED benefits. The economic analysis assumes that none of the alternatives increase total tonnage projected for the SNWW and that none of the alternatives cause a change in the composition of the fleet or the number of vessel calls projected for the SNWW.

Recommended Plan

The recommended plan/proposed action would widen the existing federal navigation channel by 100 feet along the left descending bank, over a combined length of approximately 19.4 miles. As shown in Figure E-2, the proposed widening would be within the:

- Sabine-Neches Canal (South) (magenta line in Figure E-2),
- Sabine-Neches Canal (North) (blue line in Figure E-2), and the
- Neches River Channel (yellow line in Figure E-2).

The recommended plan includes widening the following reaches from a nominal 400 to a nominal 500 feet.¹ Channel depth would remain -48 feet. No changes would be made to reaches not listed in Table E-7. The project would generate 11.2 million cubic yards (CY) of new work material and an annualized volume of 501,000 CY of maintenance material. All dredged material resulting from this project, including 50 years of maintenance dredging, will be accommodated by the existing dredged material management plan for the SNWW that includes 20 active upland placement areas. There are also opportunities to use up to 500,000 CY of new work material for

¹ Within the areas of proposed widening, some portions of the channel exceed the nominal width where there are bends in the channel.

beneficial use in wetland restoration; during PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

Figure E-2
Proposed Areas to Be Widened

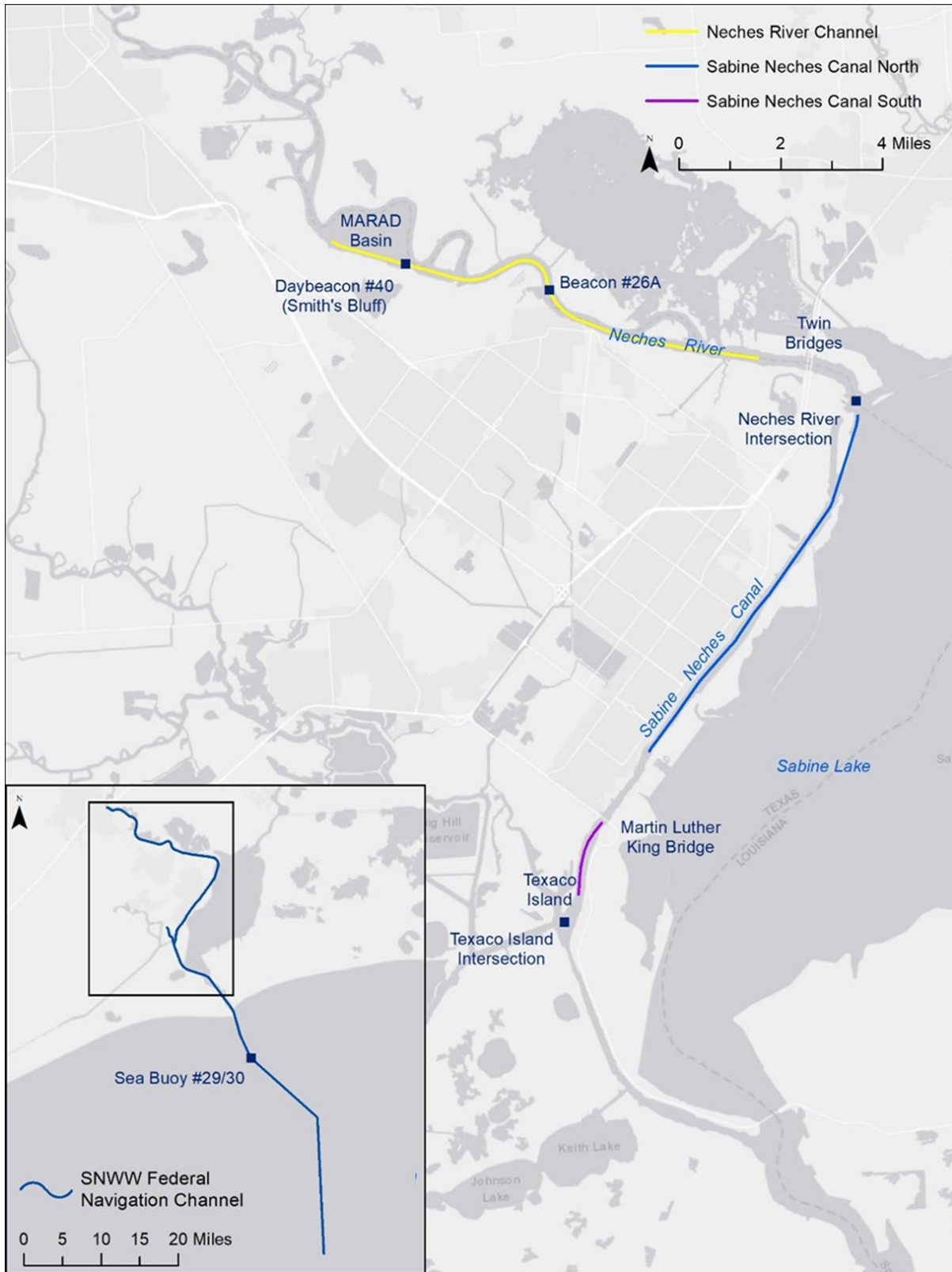


Table E-7
Sabine Neches Waterway Recommended Plan

Channel Reach	Reach	Bottom Width (Feet)	
		Without Project	With Project
Sabine-Neches Canal (South)	63+500 to 66+235	718 to 435	718 to 535
Sabine-Neches Canal (South)	66+235 to 72+700	435 to 400	535 to 500
Sabine-Neches Canal (North)	81+742 to 121+517	400 to 500	500 to 600
Neches River Channel	0+00 to 40+00	500	600
Neches River Channel	122+40 to 640+00	400	500

Table E-8 provides the cost sharing calculation for this project.

Table E-8
Project Cost Shares FY26 Costs

Cost Category	Total	Federal	Non-Federal
Construction Cost (Including Mob / Demob)	\$195,176,000	\$146,382,000	\$48,794,000
Enviro Mitigation & Monitor	\$0	\$0	\$0
Cultural Resource Preservation	\$103,000	\$77,000	\$26,000
Construction S&A	\$18,097,000	\$13,573,000	\$4,524,000
Preconstruction Eng. & Design (PED)	\$33,336,000	\$25,002,000	\$8,334,000
Contingency	\$50,743,000	\$38,057,000	\$12,686,000
Total Construction of GNF	\$297,455,000	\$223,091,000	\$74,364,000
Utility Relocation w/Contingency	\$13,104,000	\$0	\$13,104,000
Total Project First Costs	\$310,559,000	\$223,091,000	\$87,468,000
Associated Costs	\$0	\$0	\$0
Relocating Aids to Navigation	\$269,000	\$269,000	\$0
10% GNF Non-Federal less Relocation		-\$16,642,000	\$16,642,000
Total Cost	\$310,828,000	\$206,718,000	\$104,110,000

The estimated federal and non-federal shares of the project first cost are \$223,091,000 and \$87,468,000, respectively, as apportioned in accordance with the cost sharing provisions of Section 101 of WRDA 1986, as amended (33 U.S.C. 2211): the cost for dredging to a depth exceeding 20 feet (MLLW) and less than 55 feet (MLLW) will be shared at a rate of 75 percent by the Federal Government and 25 percent by the non-federal interest.

In addition to the non-federal interest's estimated share of the total first cost of constructing the project in the amount of \$87,468,000, pursuant to Section 101(a)(2) of WRDA 1986, as amended, the non-federal interest must pay an additional 10 percent of the costs of general navigation features of the project in cash over a period not to exceed 30 years, with interest. The value of the costs for lands, easements, rights-of-way and relocations provided by the non-federal interest under Section 101(a)(3) of WRDA 1986 as amended will be credited toward this payment. The costs for lands, easements, rights-of-way or relocations provided by the non-federal interest for this project total \$13,104,000 and 10 percent of the GNF cost is \$29,746,000, which results in a net 10 percent General Navigation Features (GNF) requirement of \$16,642,000.

Additional costs of operation and maintenance for recommended plan P, over and above the costs to operate and maintain the existing federal project, are estimated to be \$2,444,000 annually. In accordance with Section 101(b)(1) of WRDA 1986, as amended (33 U.S.C. 2211(b)(1)), the Federal Government will be responsible for an amount equal to 100 percent of the excess of the cost of operation and maintenance of the project over the cost of which would be incurred for operation and maintenance for project depths up to 55 feet. Therefore, the federal share of the incremental annual maintenance cost is estimated to be \$2,444,000.

There are no local service facility improvements or construction required for the realization of project benefits. The projected additional costs for aids to navigation, \$269,000, are a 100 percent federal responsibility.

Environmental Impacts

As detailed in Section 5, within the Sabine-Neches Canal, 1.3 miles of shoreline and a total of 10.9 acres of uplands (in the former golf course and along Placement Area 11) would be converted to open water. Within the Neches River Channel, 1.2 miles of shoreline and a total of 6.2 acres of uplands would be converted to open water. In sum, a total of 2.5 miles of shoreline and 17.2 acres of upland habitat would be converted to sub-tidal habitat. The vegetation along these shorelines and adjacent uplands have been altered by the placement and repeated placement of dredged material, manipulated into the abandoned golf course, overrun with invasive wild pigs, and managed for dredged material placement.

There are no wetlands in the affected habitat along the Sabine-Neches Canal. Within the area of landside excavation along the Neches River Channel, the area of upland disturbance includes a fringe of nine intermittent wetland habitat areas that sum to 2.9 acres within the footprint of active placement area maintenance. The effects to these habitat areas are excluded from the evaluation of the potential effects to wetlands, because the effects to wetland habitat within and adjacent to these placement areas have already been described, quantified, and accounted for in the 1975 EIS for maintenance dredging and dredged material management for the Sabine Neches Waterway (USACE, 1975). As such, no mitigation would be required for these effects to wetland habitat.

The potential long-term water quality effects due to the proposed channel geometry changes were modeled and predicted negligible changes in salinity, temperature, dissolved oxygen saturation concentrations, oxygen consumption, and residence time. Absent discernible changes to hydrodynamics, salinity, or water quality, there would be no predicted long-term adverse effects to aquatic wildlife. Throughout the areas for the proposed widening, there is no submerged aquatic vegetation and there are no corals or oysters.

NMFS' March 2024 Biological Opinion for the Deepening Project applies to all actions proposed under this Section 203 Navigation Improvement Project and no additional coordination with

NMFS was required. The USFWS concluded that, absent substantial changes to the project or changes to listed species, informal consultation is sufficient and complete. Because the proposed widening would occur in areas considered in attainment of the National Ambient Air Quality Standards, neither a General Conformity applicability analysis nor a conformity determination is required. Review of the regulated facilities and current USEPA and TCEQ database reviews for events (i.e., spills and releases) do not identify any recognized environmental conditions that would affect project alternatives and confirmed the minimal risk of encountering contaminated material, giving no cause for concern that dredging would mobilize contamination during construction. In 2023, the USACE executed a Programmatic Agreement that is applicable to this Section 203 project.

Mitigation

Measures to avoid and minimize environmental effects will be implemented during project construction. The recommended plan, including construction and maintenance, cause no impacts to significant environmental resources that would require replacing or providing substitute resources or environments. As such, the significance of adverse impacts to these resources has been evaluated and determined to not need separable compensatory mitigation features (USACE, 2019b). After the preceding actions are taken to avoid and minimize impacts to ecological resources, the proposed widening action would have negligible adverse impact on ecological resources and fish and wildlife resources such that there remain no unavoidable environmental effects to significant ecological resources by carrying out the recommended plan/proposed action.

Environmental Compliance

This FR/EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations. The USACE will follow provisions of all applicable laws, regulations, and policies related to the proposed actions, including those for which applicability, review, and enforcement are their responsibility.

Making the decision to implement the proposed channel widening measures and the subsequent construction would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations. Environmental compliance for the proposed action would be achieved upon final coordination of this FR/EA with appropriate agencies, organizations, and individuals. A draft Finding of No Significant Impact is Appendix O to this report.

Recommendation

The Sabine Neches Navigation District recommends that the Assistant Secretary of the Army (Civil Works) transmit a favorable assessment of this feasibility study to Congress. This feasibility report recommends that the existing project for deep draft navigation at the Sabine Neches Waterway, authorized by the Water Resources Reform and Development Act of 2014, be modified through the implementation of a federal project to widen selected reaches of the Federal channel, as described herein, at a first cost to the United States presently estimated at \$223,091,000; with an annual incremental operations and maintenance cost to the United States presently estimated at \$2,444,000.

The recommended plan is the plan that reasonably maximizes total net NED benefits (the NED Plan) and is the least environmentally damaging practicable alternative. The recommended plan is also the plan that reasonably maximizes total net benefits across all benefit categories including

monetized (NED) and non-monetized (ecosystem restoration) benefits. The recommended plan will provide \$33,387,000 in average annual equivalent net NED benefits and up to 500,000 CY of new work dredged material would be utilized to build marsh in the Bessie Heights East site (Figures 5-5 and 5-6), decreasing the BU feature construction duration and achieving the ecosystem benefits of the restored marsh habitat more quickly.

Public and Agency Participation

Environmental evaluation and coordination with appropriate federal and state agencies was initiated as early as practicable in the study process to fully integrate environmental considerations into the planning. In April 2024, a project summary read-ahead and written correspondence requesting coordination was sent to the resource agencies. On May 5, 2024 (during the 30-day period in which agencies were invited to provide comments), the SNND and USACE, Galveston District hosted a webinar to provide agencies with an overview of the proposed widening and an opportunity to ask questions about the project. Representatives were invited from the USEPA, NOAA Fisheries, USFWS, NRCS, THC/SHPO, TCEQ, GLO, TPWD, and the Texas Water Development Board.

The USFWS' Louisiana Ecological Services Office provided the USACE and SNND with a Planning Aid Letter (USFWS, 2024) in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 661 et seq.).

Informal consultations for affected protected species under the Endangered Species Act between USACE and USFWS have been initiated, and the USFWS has indicated that informal consultation will be sufficient. A request for Water Quality Certification has been initiated with the Texas Commission on Environmental Quality, and a Coastal Zone Management Act (CZMA) consistency determination has been initiated with Texas General Land Office (GLO).

In 2023, USACE Galveston District, in cooperation with the SNND and the respective Texas and Louisiana SHPOs executed a Programmatic Agreement (PA) that was signed in November 2023 (USACE, 2023). The PA outlines the process for addressing the potential effects on historic properties from ongoing construction activities for channel deepening, potential effects during operation and maintenance of the SNWW, and the potential effects from this proposed widening action under the Section 203 Authority. As part of the process of developing the PA, the USACE sent letters requesting comment on the PA to 12 regional Tribes from which no commentary was received. The PA was also reviewed by the Advisory Council on Historic Preservation (ACHP) pursuant to 36 CFR 800.2 (b) and the ACHP decided not to participate in the PA.

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1 Study Information

1.1 Introduction

This draft Integrated Feasibility Study and Environmental Assessment (FR/EA) evaluates the feasibility of improvements to the federal navigation project at the Sabine Neches Waterway (SNWW) that will address the problems of channel congestion, navigation restrictions, and economic inefficiency. The Sabine Neches Navigation District (SNND) is the cost-sharing non-federal interest for the existing federal navigation project and the non-federal interest performing this FR/EA.

The SNWW is located in Jefferson and Orange Counties in southeast Texas and in Cameron Parish Louisiana. It includes the ports of Beaumont, Port Arthur, and Sabine Pass. The SNWW is the third largest waterway in the nation by tonnage, the largest military outload waterway in the nation, and the nation's largest exporter of Liquefied Natural Gas (LNG). The refining complex along its shores includes the largest refinery in the nation and supplies nearly 4 million barrels per day of gasoline, diesel, jet fuel, and home heating oil to markets in the mid-west, as far north as Chicago and throughout the east coast. Commercial navigation along the waterway generates more than \$32 billion in trade surplus annually-- the third largest trade surplus of any waterway in the nation.

1.2 Study Authority

The Water Resources Development Act (WRDA) of 1986, as amended (33 US Code 2231), authorizes a non-federal interest to develop and submit a completed feasibility study to the Secretary of the Army for review to determine if the study, and the process under which the study was developed, comply with federal laws and regulations applicable to feasibility studies of water resources development projects. By completing the feasibility study in this fashion, the non-federal interest can evaluate and propose modifications to a federal navigation channel without needing project-specific Congressional authorization to initiate a new investigation.

The SNND has prepared this draft FR/EA for proposed navigation improvements to the Texas portion of the federal channel within the Sabine Neches Waterway. Construction of the federal project at the SNWW was most recently authorized in the Water Resources Reform and Development Act of 2014 (WRRDA 2014), in response to a Congressional resolution adopted on 5 June 1997 by the Senate Committee on Environment and Public Works, authorizing a study to determine the feasibility of modifying the federal navigation project previously authorized by the River and Harbor Act of 1962 (construction completed in 1968).

The federal navigation project authorized by WRDA 2014 is currently under construction and is scheduled for completion in 2030. The authorized project depth is -48 feet Mean Lower Low Water (MLLW), with no increases to channel width, of the project completed in 1968.

1.3 Federal Policies and Procedures

The National Environmental Policy Act of 1969 (NEPA), as amended, is a procedural statute intended to ensure that federal agencies consider the environmental impacts of their actions in the

decision-making process. The purpose and function of NEPA is satisfied if federal agencies have considered relevant environmental information, and the public has been informed regarding the decision-making process. NEPA does not mandate particular results or substantive outcomes but is to provide informed decision making and foster excellent action. The NEPA process is intended to help public officials make decisions that are based on the understanding of environmental consequences, and take actions that protect, restore and enhance the environment.

This FR/EA was carried out pursuant to NEPA, as amended, and the U.S. Army Corps of Engineers Agency Specific Procedures to Implement the Principles, Requirements, and Guidelines for Federal Investments in Water Resources (33 CFR§234). FR/EA implementation under these statutes follows federal guidance presented many guidance documents, most notably: ER 1105-2-100 *Planning Guidance Notebook* (2000), ER 1105-2-103 *Planning Policy for Conducting Civil Works Planning Studies* (2023), *Memorandum for Commanding General, U.S. Army Corps of Engineers Subject: Policy Directive – Comprehensive Documentation of Benefits in Decision Documents* (2021), *Memorandum for Commanding General, U.S. Army Corps of Engineers Subject: Incorporation of Nature-Based Solutions in Civil Works Projects* (2024), and *Department of Defense National Environmental Policy Act Implementing Procedures* (2025).

1.4 Purpose and Need for USACE Action*

Based on Sabine Pilots Association navigation rules for the SNWW, Panamax vessels cannot meet (i.e., pass) other Panamax-size or larger vessels in the interior channel reaches due to a restricted channel width. In 2019, the year that vessel traffic was analyzed in detail, there were more than 4,300 transits by Panamax-size vessels or larger. In addition, Aframax and Suezmax vessels are restricted to transiting the 400-foot channel reaches during daylight hours only, causing 1,200 daylight restricted transits in 2019.

The purpose and need for the Sabine Neches Waterway Improvement Project is driven by the imposed daylight-only transitioning restrictions and vessel meeting restrictions within the waterway. These restrictions result in 78-percent of vessel calls incurring some level of delay with an average delay length of more than 10 hours.

There has long been a concerted effort among SNWW users to reduce delays and maximize navigational opportunities along the waterway. Vessel scheduling, the use of “caravans,” and queuing rules are all a part of the choreography of getting vessels to and from their berths under the existing navigational rules. The effectiveness of these operational efforts is limited by the physical constraint of the channel and the size and number of vessels using the channel.

1.5 Objectives

The goal of USACE involvement in deep draft navigation is to provide efficient and safe general navigation features, while meeting the federal objective of increasing national economic development (NED) consistent with protecting the nation’s environment. The primary objective of this FR/EA is to evaluate alternatives that reduce delays and associated transportation costs for the projected commodities and SNWW fleet. The selected plan will reasonably maximize net benefits and provide dredged material for beneficial use in restoring local wetlands.

1.6 Overview of the Planning Process

Plan formulation was performed to develop and evaluate an array of alternatives that achieve the study objectives, comply with planning constraints, and maximize net benefits. Planning measures evaluated in the development of alternatives plans included non-structural and structural measures. Plan formulation was informed by detailed vessel operating data obtained from the Sabine Pilots Association, terminal operators, vessel operators, Automatic Identification System (AIS), Lloyd's List, and the US Coast Guard. These data were input into a traffic simulation model that was reviewed and approved for one-time use by USACE. Field surveys performed for this study include geotechnical and natural resources analyses.

The planning process used in this study follows the six-step process originally defined in the Principles and Guidelines (Water Resources Council, 1983):

1. Step 1 – Identify problems and opportunities
2. Step 2 – Inventory and forecast future conditions
3. Step 3 – Formulate alternative plans
4. Step 4 – Evaluate alternative plans
5. Step 5 – Compare alternative plans
6. Step 6 – Recommend a selected plan.

These steps are often performed iteratively as new information becomes available during the planning process requiring a reassessment of one or more planning steps. Uncertainties arise in each of the steps in the planning process. Some uncertainties can be resolved, and other uncertainties are managed, and the residual risks are accounted for during plan formulation. In navigation projects risk is inherent in commodity and fleet forecasts. Construction-related uncertainties are evaluated through a Cost and Schedule Risk Analysis that informs plan formulation and calculates the appropriate contingency value for cost estimates.

1.7 Location and Description of the Study Area

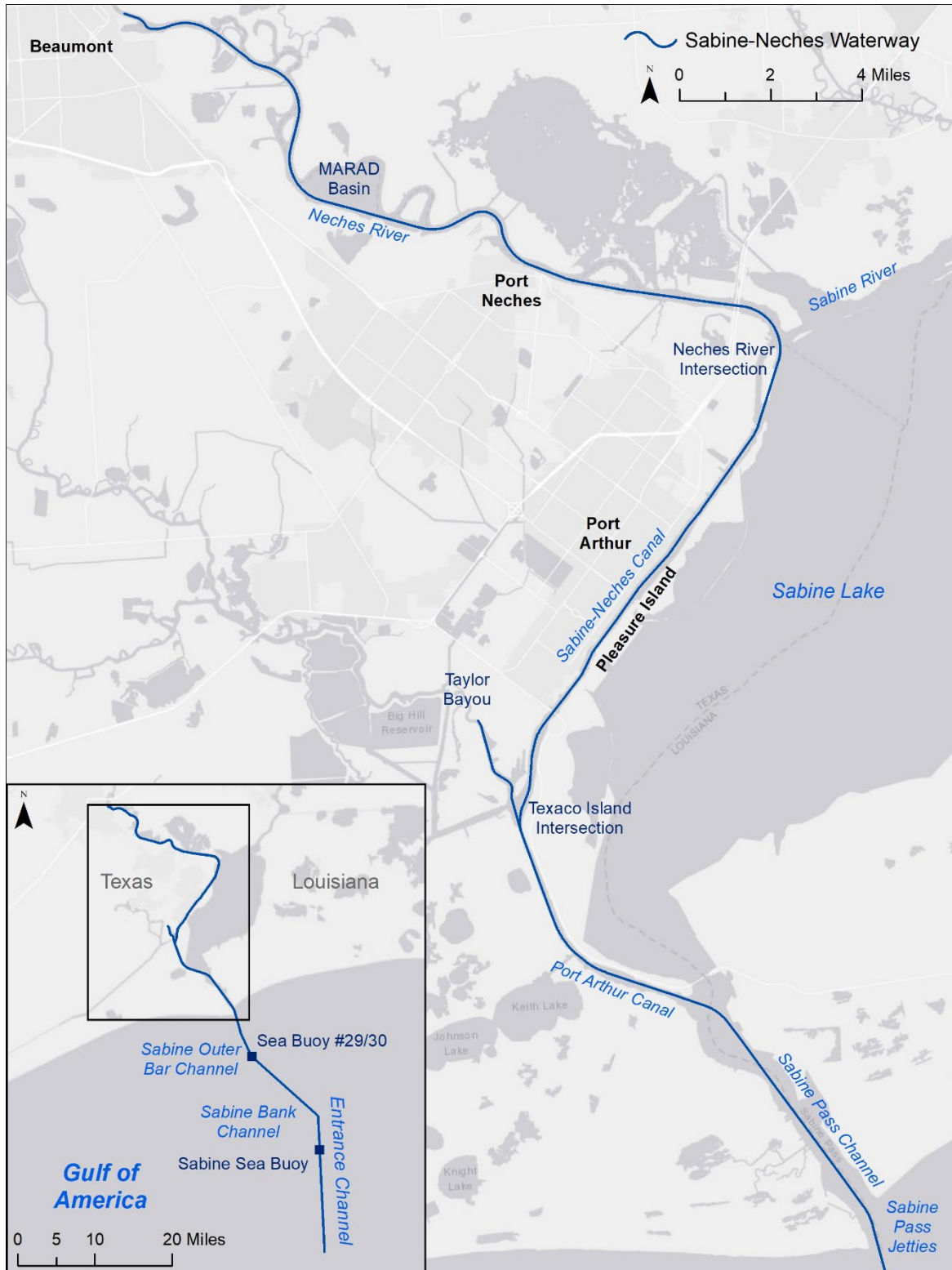
As depicted in Figure 1-1, the Sabine Neches Waterway (SNWW) is a constructed waterway that is located along the Louisiana-Texas State border providing deep draft navigation access to the Gulf of America for the Port of Beaumont on the Neches River, the Port of Orange on the Sabine River, and Port Arthur along the northern/western shoreline of Sabine Lake. The Sabine River and Neches River are among the largest rivers in southeastern Texas and flow into the north-eastern and north-western part of Sabine Lake, respectively. Sabine Lake is a large, shallow, estuarine lake that straddles the state boundary between Texas and Louisiana; the western shoreline is in Texas and the eastern shoreline is in Louisiana. The mouth of Lake Sabine is more than six miles inland from the Gulf of America and the SNWW flows into the Gulf of America approximately 75 miles northeast of Galveston, Texas. The Sabine-Neches Canal between the Neches River Intersection and the Texaco Island Intersection, as identified in Figure 1-1, is co-located with the Gulf Intracoastal Waterway that is the source of heavy barge-tow traffic along the SNWW.

As early as the mid-1800s, plans were being made to enlarge, deepen, and maintain shipping routes through Sabine Pass and Sabine Lake and up the Neches and Sabine Rivers (USACE, 1982). The first portion of the Sabine Neches Waterway was authorized by the U.S. Congress in the River and Harbors Act of 1875 and as such, the SNWW has been a working river for more than 150 years (USACE, 1982). The predecessor to the Sabine Neches Navigation District was formed in 1909 and has operated in Jefferson County, Texas for more than 100 years. In addition, areas adjacent to the Sabine Neches Waterway are home to the first large-scale oil extraction efforts in the nation. The Spindletop oil fields produced over 150 million barrels of oil from 1901 to 1985 (Lamar University, 2022) and today the waterway is flanked by many of the nation's largest refineries and oil terminals.

Due to its long history of commercial and military activity on the waterway, the adjacent land use is dominated by industrialization, urbanization, and land dedicated to placement of dredged material. Industry currently has more than 29 terminals arrayed along more than 30 miles of the Sabine Neches Waterway shorelines as this waterway has been, and continues to be, a working river within a highly modified environment (SNND, 2021). Because dredged materials have been placed adjacent to the navigation channels for more than 100 years, the physical characteristics of these soils in proximity to the navigation channels have evolved to their present condition by erosion, deposition, compaction, and subsidence, all of which are still active (USACE, 2011).

The SNWW is currently being deepened from -40 to -48 feet MLLW based on a Final Feasibility Report and Final Environmental Impact Statement (FFR/FEIS) completed in 2011 (USACE, 2011). When completed, the construction project will have dredged nearly 100 million CY of new-work and there is projected to be 650 million CY of maintenance material over the 50-year project life (USACE, 2011c).

Figure 1-1
Sabine Neches Waterway



1.8 Prior Reports and Projects

This analysis incorporates prior work performed for the federal channel at the SNWW and federal storm damage reduction projects at or near the SNWW. The work performed for these federal projects was used to inform this analysis by providing background information and current conditions along the SNWW. This is not a full list of all references used in the analysis (see the References section) but, these reports and projects identify federal projects pertinent to this analysis. These prior reports and projects include:

- HDR Engineering, Inc. (HDR). 2022. Design Documentation Report (DDR), Sabine Neches Waterway Channel Improvement Project – Sabine-Neches Canal and Neches River Channel. Prepared for the Sabine Neches Navigation District.
- U.S. Army Corps of Engineers (USACE). 1975. Environmental Statement, Maintenance Dredging Sabine Neches Waterway, Texas. Galveston District.
- U.S. Army Corps of Engineers (USACE). 2017. Sabine Pass to Galveston Bay, Texas, Coastal Storm Risk Management and Ecosystem Restoration, Final Integrated Feasibility Report – Environmental Impact Statement. Southwestern Division, Galveston District.
- U.S. Army Corps of Engineers (USACE). 2011. Final Feasibility Report for Sabine Neches Waterway Channel Improvement Project, Southeast Texas and Southwest Louisiana. Volume 1. Southwestern Division, Galveston District.
- U.S. Army Corps of Engineers (USACE). 2011a. Final Environmental Impact Statement for Sabine Neches Waterway Channel Improvement Project, Southeast Texas and Southwest Louisiana. Volumes II - IV. Southwestern Division, Galveston District.
- U.S. Army Corps of Engineers (USACE). 2020. Coastal Texas Protection and Restoration Feasibility Study (Coastal Texas Study), Draft Environmental Impact Statement. Galveston District.

1.9 Integrated Feasibility Report and Environmental Assessment (EA)

In June 2025, the Department of Defense (DOD) issued National Environmental Policy Act Implementing Procedures (USDoD, 2025). These implementing procedures establish the requirements under which DoD will typically fulfill its requirements under NEPA and are applicable to the Army Civil Works program executed by the U.S. Army Corps of Engineers (USDoD, 2025). The procedures state that “*if the proposed action is not likely to have reasonably foreseeable significant effects or the significance of the effects is unknown, [DoD] will develop an environmental assessment (EA)*” and “*For Army Civil Works projects, planning and/or engineering reports may be combined with or integrated into the EA*” (USDoD, 2025).

Construction of the proposed 100-foot channel widening represents a short-term localized construction project immediately adjacent to the recently deepened and routinely maintained federal navigation channel. Equipment used to widen the channel would be the same as that used for the ongoing deepening and routine maintenance dredging, and there is sufficient capacity

within existing confined upland placement areas to place all dredged material therein. Within the 19.4 miles of the channel to be widened, 16.8 miles (> 86 percent) would occur completely underwater resulting in no changes to the adjacent shoreline or land. Of the total of 17.2 acres of land that would be affected, 10.9 acres are from an abandoned golf course, and the remaining 6.2 acres are narrow strips of disturbed habitat between the Neches River Channel and the dikes of the adjacent confined upland placement areas along the lower Neches River. For all these reasons, this feasibility report is integrated with the content of the NEPA document, and the preparation of an environmental assessment is appropriate.

1.10 Public, Resource Agency, and Tribal Coordination

Environmental evaluation and coordination with appropriate federal and state agencies was initiated as early as practicable in the study process to fully integrate environmental considerations into the planning. In April 2024, resource agencies were sent a project summary read-ahead and written correspondence requesting “*initial input on the enclosed project summary within 30 calendar days of receipt of this letter so that your input may be considered during development of the draft FR/EA.*” The request for input was sent to National Oceanic and Atmospheric Administration (NOAA) Fisheries, the U.S. Department of Agriculture National Resources Conservation Service (NRCS), Texas Historical Commission (THC)/Texas State Historic Preservation Officer (SHPO), Texas Commission on Environmental Quality (TCEQ), Texas General Land Office (GLO), Texas Parks and Wildlife Department (TPWD), Texas Water Development Board, U.S. Environmental Protection Agency (USEPA) (Region 6), and the U.S. Fish and Wildlife Service (USFWS) (TX and LA Ecological Services Field Offices).

On May 5, 2024 (during the 30-day period in which agencies were invited to provide comment), the SNND and USACE Galveston District hosted a webinar to provide agencies with an overview of the proposed widening project, where agencies had an opportunity to ask questions. During the webinar, participants viewed a PowerPoint presentation describing the location of the proposed widening and details of completed and ongoing analyses. The USACE reaffirmed their request for written input from the respective agencies. No written comments on the scope or the approach to the evaluation of environmental effects were received.

Representatives were invited from the USEPA, NOAA Fisheries, USFWS, NRCS, THC/SHPO, TCEQ, GLO, TPWD, and the Texas Water Development Board. Individuals that participated in the webinar were Anthony Sogluizzo, NOAA-NMFS (SERO); Bradford Jones, THC Deputy SHPO; Brittney Lee, TPWD; Charrish Steven, NMFS; David Castellanos, USFWS; Gabe Gruta, USEPA Region 6; Jan Culbertson, USFWS; Kelley Kowal, TPWD; Kristen Naz, GLO; Paul Kaspar, USEPA Region 6; Peter Schaefer, TCEQ; and Scott Alford, USDA-NRCS.

Due to staffing limitations, the USFWS’ Louisiana Ecological Services Office (LESO) served as the lead point of contact for compliance with the Fish and Wildlife Coordination Act for the proposed widening. In that role, the LESO provided the USACE and SNND with a Planning Aid Letter (USFWS, 2024) in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 661 et seq.).

Informal consultations for affected protected species under the Endangered Species Act between USACE and USFWS have been initiated and the USFWS' has indicated that informal consultation will be sufficient. A request for Water Quality Certification has been initiated with the Texas Commission on Environmental Quality and a Coastal Zone Management Act (CZMA) consistency determination has been initiated with Texas General Land Office (GLO).

In 2023, USACE Galveston District, in cooperation with the SNND and the respective Texas and Louisiana SHPOs executed a Programmatic Agreement (PA) that was signed in November 2023 (USACE, 2023). Therein, in describing the Scope of the Undertaking, the PA asserts “*This PA shall be applicable to all construction activities related to the SNWW channel improvement project [the ongoing deepening], activities related to maintenance dredging, and additional navigation improvements to the SNWW, Texas and Louisiana, under the authority of Section 203 of WRDA, as amended by Section 101 of WRDA 2020*” (USACE, 2023). The PA outlines the process for addressing the potential effects on historic properties from ongoing construction activities for channel deepening, potential effects during operation and maintenance of the SNWW, and the potential effects from this proposed widening action under Section 203 Authority.

As part of the process for developing the PA, the USACE sent letters requesting comment on the PA to the Apache Tribe of Oklahoma, the Alabama-Coushatta Tribe of Texas, the Alabama-Quassarte Tribal Town, the Coushatta Tribe of Louisiana, the Caddo Tribe of Oklahoma, the Choctaw Nation, the Eastern Shawnee Tribe of Oklahoma, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Tonkawa Tribe of Indians of Oklahoma, the Tunica-Biloxi Tribe of Louisiana, and the Wichita and Affiliated Tribes from which no commentary was received. The PA was also reviewed by the Advisory Council on Historic Preservation (ACHP) pursuant to 36 CFR§800.2 (b) and the ACHP decided not to participate in the PA.

1.11 Review Process

The review process implemented for this study aligns with ER 1165-2-217 Civil Works Review Policy (02Sep24) which establishes a comprehensive accountable review process that produces a credible work product. A Review Plan was developed that identifies the review steps taken in the development of this FR/EA. The study team mimicked the USACE District Quality Control process by providing internal review of basic science and engineering through a detailed peer review, document control, computation and graphics checking. In addition, independent subject matter experts with extensive background performing USACE technical studies in hydrodynamic modeling and ship simulation modeling were utilized in the review process.

Independent Technical Review (ITR) was performed in two phases. In the first phase of ITR, USACE Southwestern Regional Planning and Environmental Center coordinated technical reviews of all the technical appendices to this FR/EA. All comments were documented in DrChecks, with all responses and revisions backchecked and closed out. This phase of the ITR also included Single Use Approval for the vessel traffic simulation model developed for this FR/EA, by the Director of the Deep Draft Navigation Planning Center of Expertise FR/EA. Estimated costs for the recommended plan were certified through a Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR, updated to FY26, included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies.

The second phase of ITR includes a review of the entire FR/EA by the USACE Galveston District prior to public release of the FR/EA and review by an external ITR team of qualified experts convened for this review task. This phase of the ITR is ongoing.

An Independent External Peer Review is not required for this FR/EA because it meets all the exclusion criteria identified in ER 1165-2-217:

- The project has an Environmental Assessment and a Finding of No Significant Impact, not an Environmental Impact Statement;
- The project is not controversial. The impetus for the project was a request by local industry for an analysis of traffic and delays along the SNWW;
- There are no impacts on known scarce or unique cultural, historic, or tribal resources;
- There are no substantial adverse impacts on fish and wildlife species and habitat; and
- There is negligible adverse impact on listed or endangered species or critical habitat.

1.12 Report Organization

This FR/EA serves as the USACE planning-level document supporting the recommended navigation improvements and as the required federal environmental compliance document. This FR/EA provides information that meets environmental laws including NEPA, the Clean Water Act (CWA), Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSA), Fish and Wildlife Coordination Act, Clean Air Act (CAA), Coastal Zone Management Act (CZMA), National Historic Preservation Act (NHPA), and other applicable federal laws. The draft FR/EA facilitates agency and public review and comment.

The Main Report of the FR/EA provides the study authority, the purpose and scope of the FR/EA, a concise discussion of prior reports and existing water projects, a detailed discussion of plan formulation, a summary discussion of project benefits and impacts, a detailed description of the recommended plan, plan implementation and responsibilities, a detailed alternative plan impact assessment and summary of environmental compliance, and a summary of public and agency review comments. Detailed reports on engineering, project costs and benefits, , field studies, and real estate are incorporated by reference in the main report and included as a series of appendices and sub-appendices.

The Main Report includes the following sections:

- Section 1: Introduction
- Section 2: Historical and Existing Conditions
- Section 3: Future Without Project Conditions Overview
- Section 4: Plan Formulation
- Section 5: Recommended Plan/Proposed Action*
- Section 6: Scope of the Environmental Assessment

- Section 7: Affected Area and Environmental Effects*
- Section 8: Mitigation Planning and Best Management Practices
- Section 9: Environmental Compliance*
- Section 10: Public and Agency Participation and Comments
- Section 11: Recommendations
- Section 12: Finding of No Significant Impact*
- Section 13: References
- Section 14: Glossary of Terms
- Section 15: List of Acronyms

Appendices to the Main Report:

Appendix A: Engineering

Attachment 1 - Ship Simulation Screening Report

Attachment 2 - Drawings

Attachment 3 - Tidal Circulation Modeling Report

Attachment 4 - Storm Surge Modeling Report

Attachment 5 - Vessel Effects Modeling Report

Attachment 6 - Water Quality Modeling Report

Attachment 7 - HTRW Report

Attachment 8 - Cost Report

Appendix B: Economics

Appendix C: Traffic Simulation Model Report

Appendix D: Real Estate Plan

Appendix E: USFWS Correspondence and draft Biological Assessment

Appendix F: USFWS Planning Aid Letter

Appendix G: Essential Fish Habitat Assessment

Appendix H: Vegetation Habitat Assessment Survey

Appendix I: Clean Water Act Section 404(b)(1) Evaluation

Appendix J: Clean Water Act Section 401 State Water Quality Certification

Appendix K: Coastal Zone Management Plan Consistency Determination

Appendix L: Section 106 Programmatic Agreement

Appendix M: Review Plan, Comments & Responses, and Certifications

Appendix N: Agency Correspondence

Appendix O: Draft Finding of No Significant Impact (FONSI)

2 Historical and Existing Conditions

Historical and existing conditions set the baseline for forecasts of without-project and with-project conditions that are used in plan formulation and the assessment of environmental effects. Historical and existing conditions were developed from data and analyses used in the 2011 CIP FEIS updated and/or verified for inclusion in this FR/EA.

Detailed design, and the ongoing construction planning for the deepening project have been applied to the development of historical and existing conditions where appropriate. Evaluations specific to developing historical and existing conditions include compiling, and assessing bathymetric, geophysical, and topographic survey data; aerial photography; and navigation charts that serve as the basis for evaluating channel alignment and geometry.

Field data gathered for this study included drawdown and return current data for calibration and validation of the hydrodynamic and water quality modeling and water quality field measurements of salinity, temperature, pH, and dissolved oxygen (DO). Geotechnical data were also collected for this project to support design assumptions. Habitat characterization of potentially affected shorelines and upland terrestrial habitat was augmented by project-specific field surveys.

2.1 General Physical Setting

The project area is in the Coastal Plain physiographic province of Texas containing marine sediments (USACE, 2010b). The area is characterized by a diversity of features that are a result of the natural transition between marine and freshwater environments and substantial anthropogenic alterations to the landscape (USACE, 2011). The project area is low-lying flat land that has evolved to its present conditions by erosion, deposition, compaction, and subsidence, all of which are still active.

The SNWW is a Y-shaped commercial waterway comprised of interlocking natural river channels and manmade canals (USFWS, 2010). The navigable portion of the Neches River is often referred to as the lower Neches River because it is separated from upper freshwater reaches of the river by a saltwater barrier upstream of the marine terminals at Beaumont. The SNWW presently extends from the Gulf of America, through the Sabine Jetties, 63.8 miles northward across the western edge of Sabine Lake and up the Neches River to Beaumont, Texas; at 100 square miles in area the system is the fifth largest estuary in Texas (USFWS, 2010). Astronomical tides are generally small in the Gulf with an average amplitude of approximately one foot (USACE, 2011).

Along the SNWW, lands and habitats have been manipulated for the benefit of commercial and military navigation, evidenced by the extent of industrialization, urbanization, and adjacent land dedicated to placement of dredged material. The land use along the right descending bank on the lower Neches River and the Sabine-Neches Canal is substantially developed for industrial and municipal use and includes flood risk reduction features (i.e., levees and pump stations).

The left descending banks of the Neches River and Sabine-Neches Canal have been used for dredged material placement for more than 100 years. The left descending bank of the Sabine-Neches Canal was once the open waters of Sabine Lake and was made dry land by the dredging

of the Sabine-Neches Canal and the placing the dredged materials onto Sabine Lake to create the present-day Pleasure Island (USACE, 1982).

Within just the past 50 years, more than 250 million CY of maintenance material has been dredged from the interior channels of the SNWW and placed in adjacent upland placement areas (PAs) (USACE, 2021). The upland PAs are confined with earthen containment dikes. Dredging effluent is discharged from the PAs via controlled spillways to outfall canals and drainage ditches. As shown in Figure 2-1, there are more than 11,500 acres (within the dikes) of upland PAs that are maintained and operated for dredge material placement along the entire SNWW. These existing upland PAs are all adjacent to the navigation channel and are proximate to areas for the proposed widening.

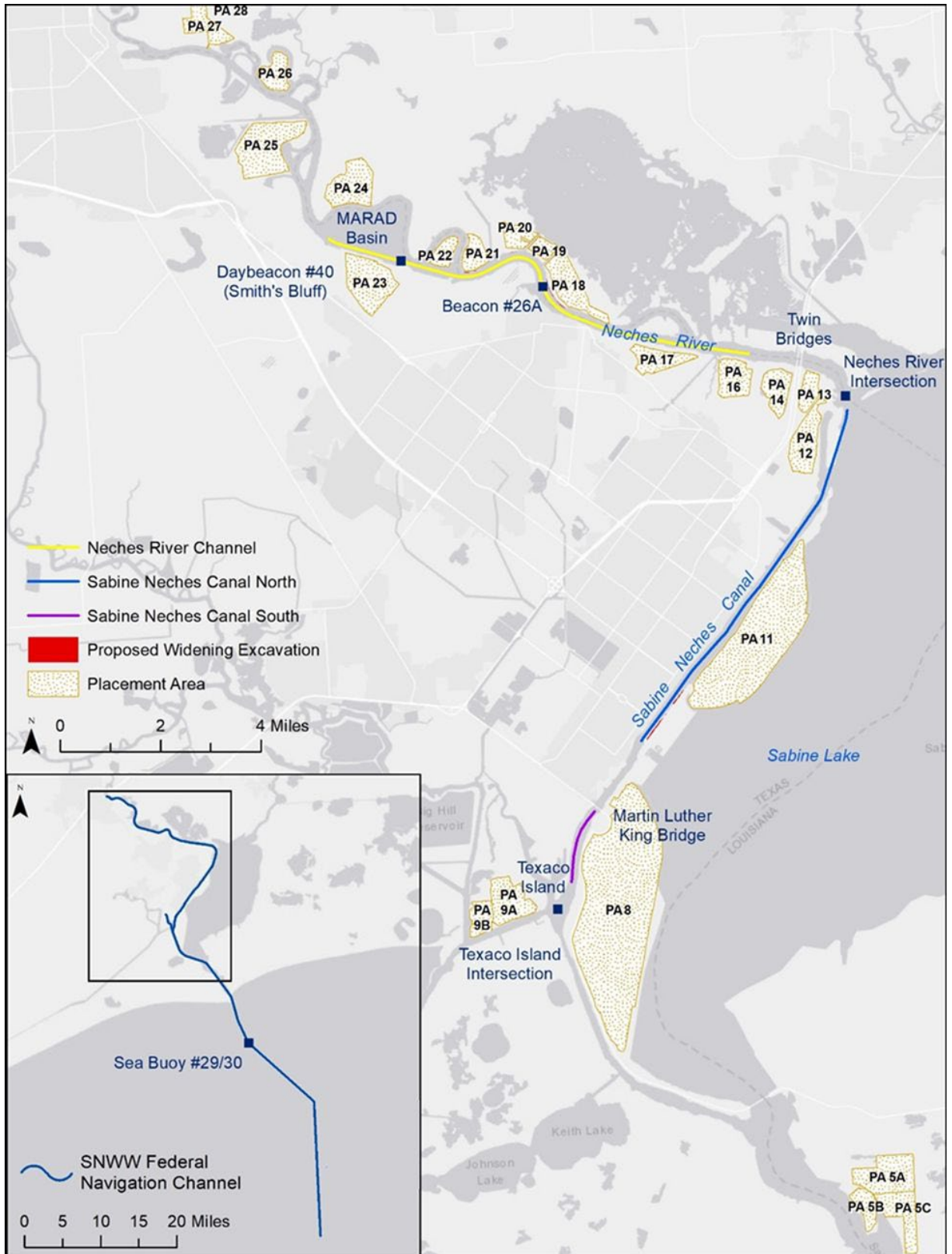
The SNWW is currently being deepened (Deepening Project) from -40 to -48 feet as authorized by the Water Resources Development Act of 2014. Note that all depths presented in this document are mean lower low water (MLLW). Deepening Project construction started in 2022, and the deepening component of the project is projected to be fully complete by 2028. Long-term beneficial use placement of maintenance dredged material from the Deepening Project is projected to continue throughout the life of the Deepening Project.

Table 2-1 provides the SNWW's authorized and fully constructed channel dimensions resulting from the Deepening Project. Note that the federal channel will be extended 13.2 miles farther into the Gulf to achieve the required -50-foot depth. The Deepening Project does not provide channel widening; however, the Sabine Bank Channel will be reduced from 800 feet to 700 feet as a part of the Deepening Project.

**Table 2-1
Post-Deepening Project Waterway Dimensions**

Channel Reach	Depth (feet MLLW)	Width (feet)	Length (Miles)
Sabine Bank Channel Extension	50	700	13.2
Sabine Bank Channel	50	700 - 800	14.7
Sabine Pass Outer Bar Channel	50	800	3.4
Sabine Pass Jetty Channel	48	800-500	4.0
Sabine Pass Channel	48	500-1,133	5.6
Port Arthur Canal (incl. Taylors Bayou)	48	500-1,788	6.2
Sabine-Neches Canal	48	400-1,060	11.3
Neches River Channel	48	400	18.6

Figure 2-1
Sabine Neches Navigation District Dredged Material Placement Areas



2.2 Commercial Navigation

The SNWW is heavily trafficked, serving deep draft vessels engaged in international and domestic trade and is the third largest waterway in the nation by tonnage with 197 million tons transiting the waterway in 2023 (WCSC, 2025). The SNWW predominantly serves the energy and petrochemical industries that line the waterway from Sabine Pass to the Port of Beaumont (Figure 2-2). The SNWW is the largest foreign trade liquified petroleum and natural gas waterway in the Nation and the second largest foreign trade crude oil waterway in the Nation (WCSC, 2025). Refiners along the waterway provide various fuel products to states in the mid-west and northeast via the Explorer Pipeline (660,000 barrels per day) terminating near Chicago, IL and the Colonial Pipeline (3,000,000 barrels per day) terminating outside of New York City in Linden, NJ.

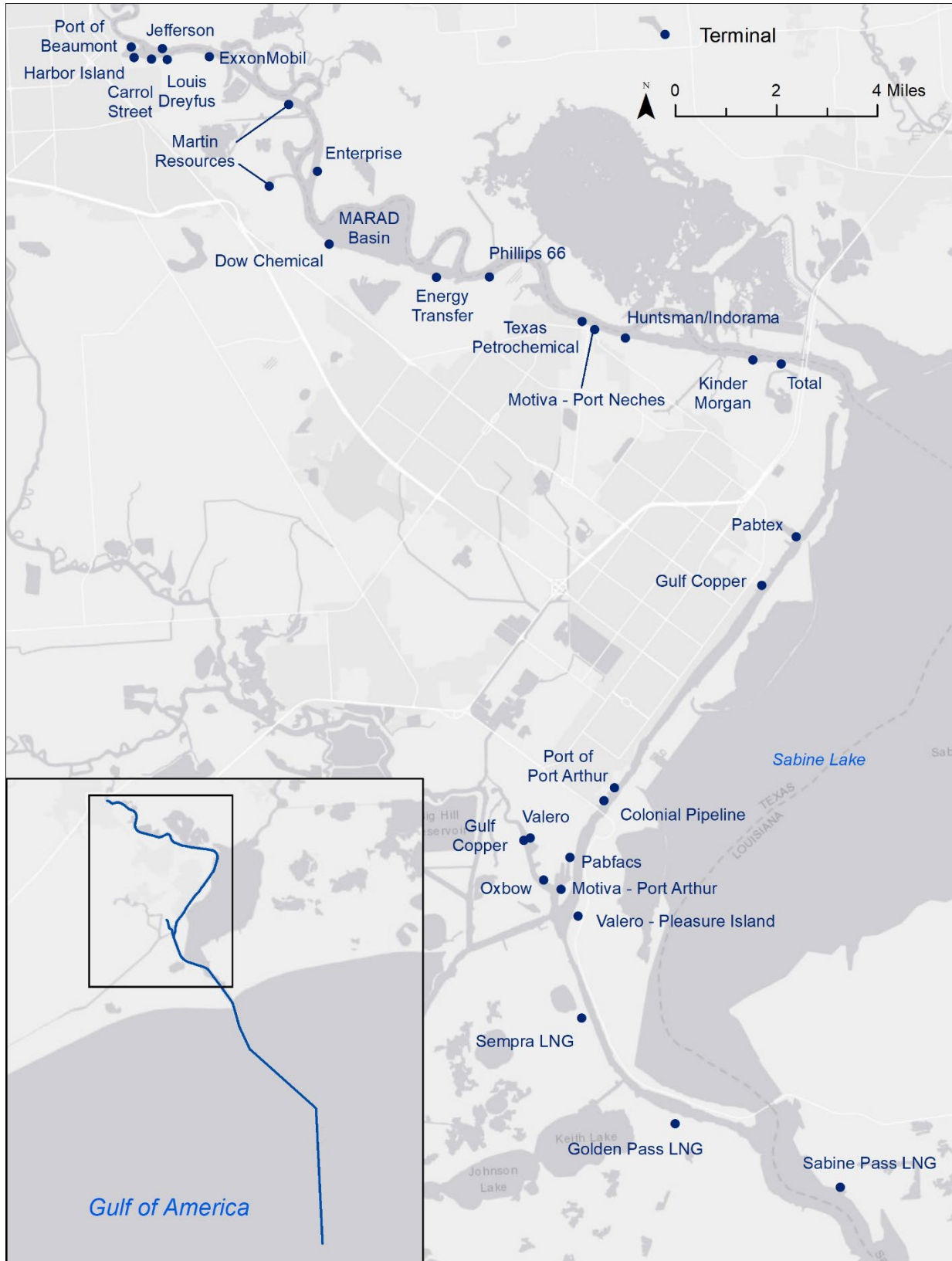
Three of the nation's ten largest refineries (Motiva, ExxonMobil, and Valero), and the nation's largest crude oil terminal (Nederland Terminal) are located on the Waterway. In addition, the Port of Beaumont is the largest commercial military outload port in the Nation. The ready reserve fleet at the U.S. Maritime Administration (MARAD) basin on the Neches River is the largest in the nation. Terminals on the Waterway have access to 57 percent of the nation's Strategic Petroleum Reserve.

Future planned improvements identified by terminal operators include construction of new terminals, construction of additional docks at existing terminals, new pipeline connections to domestic production facilities, and increased storage facilities. Refiners at two facilities are also substantially increasing refining capacity. Notable planned improvements include:

- The Golden Pass LNG Terminal on the Port Arthur Ship Channel is under construction and scheduled to start operations in late 2025. The facility will produce 16 million tons of LNG annually for export with a permit request to increase capacity to 18 million tons annually;
- Phase I of the Port Arthur LNG Terminal is under construction and is projected to begin exporting LNG in 2027. Phase II of the Port Arthur LNG project would produce an additional 13.5 million tons of LNG annually for export by 2030;
- Three crude oil terminals along the SNWW have been issued permits to construct five new docks, each capable of handling Suezmax tankers;
- Two crude oil terminals are adding new pipeline services to increase their crude oil export capacities, and two terminals are adding storage capacity to support increased exports; and
- The Valero refinery at Port Arthur is currently increasing capacity by more than 30,000 barrels per day with the construction of its green diesel production facility.

The waterway also serves barge traffic along the Gulf Intracoastal Waterway (GIWW) that stretches from St. Marks, FL to Brownsville, TX and links Mississippi barge traffic with Texas Gulf coast terminals. Barge traffic along the portion of the GIWW that is co-located with the Sabine-Neches Canal operates 24 hours a day, 365 days per year. Based on data from the US Coast Guard Vessel Traffic System (VTS), in 2024 there were 48,000 inland tow transits on the SNWW, which is the equivalent of more than 5 barge tow transits per hour on this section of the waterway.

Figure 2-2
Sabine Neches Waterway Deep Draft Terminal Locations



SNWW. Additionally, there were 2,500 Articulated Tug Barge (ATB) transits that typically have an origin or destination on the Neches River where most of the SNWW terminals are located. The VTS indicates that there were more than 7,000 deep draft cargo vessel transits in 2024.

2.2.1 Cargo Tonnage

The SNWW is the focus of a substantial and sustained series of investments that increase waterway tonnage and the number of vessels transiting the waterway. From 2011 to 2021, \$53 billion in industry and terminal projects have been completed or are currently under construction. In addition, another \$30 billion in proposed investments have been identified.

Table 2-2 shows total tonnage along the waterway by commodity group from 2019 through 2023 (the last year of WCSC data available at the time of this writing). The crude oil, liquified petroleum and natural gas, and petroleum products groups combined account for nearly 90 percent of all tonnage on the waterway in each year. This sub-total excludes chemicals that are largely used to support the refining industry. The largest historical growth is exhibited by Liquified Gases that has increased due to an export Liquified Natural Gas (LNG) facility coming on-line at Sabine Pass and due to increases in Propane and Butane (aka Liquified Petroleum Gas (LPG)) exports.

Table 2-2
SNWW Cargo Tonnage 2019 – 2023 (thousands of short tons)

Cargo Type	2019	2020	2021	2022	2023
Chemicals & Chemical Products	15,544	14,276	14,944	15,405	15,757
Crude Petroleum	66,973	45,347	35,543	44,522	42,457
Liquified Gases	27,496	19,707	41,198	43,261	49,375
Petroleum Product	70,030	72,890	74,097	77,818	80,707
Raw Materials	7,672	8,683	4,834	4,225	4,035
Other	4,723	3,018	2,651	3,957	4,318
TOTAL	192,438	163,921	173,267	189,188	196,649
Foreign Trade	107,988	89,139	105,942	113,209	121,795
Domestic Trade	84,450	74,782	67,325	75,979	74,854
Foreign Trade %	56.1%	54.4%	61.1%	59.8%	61.9%

Source: WCSC

2.2.2 Vessel Fleet and Traffic

The existing fleet calling at SNWW terminals is comprised of a deep draft fleet engaged in foreign trade and domestic coastwise trade, and a shallow draft fleet that consists mainly of barge tows that use the GIWW to enter and exit the SNWW. Barge tow configurations range from a single

barge 195 feet long by 35 feet wide to a four-barge configuration (two barges wide) 1,069 feet long by 108 feet wide. Much of the barge traffic along the portion of the GIWW shared with the SNWW is through-traffic.

Table 2-3 shows the number of trips by vessel operating draft category along the SNWW from 2019 through 2023 (WCSC, 2025). Note that a trip may be either inbound or outbound. A vessel call includes both the inbound and outbound trips. A twelve-foot operating draft was used to differentiate between deep draft and shallow draft vessels because the GIWW has a depth of -12 feet before and after it co-locates with the SNWW. Approximately 90 percent of traffic along the SNWW is shallow draft traffic, ranging from 53,000 to 67,000 trips per year. Deep draft vessel trips range from 4,600 to 6,200 per year from 2019 through 2023. In 2023, there were an average of 167 trips along the Waterway per day (365 operating days per year) with 167 trips per day by shallow draft vessels and 17 trips per day by deep draft vessels.

**Table 2-3
Waterway Vessel Trips 2019 – 2023**

Vessel Draft	2019	2020	2021	2022	2023
Less than or equal to 12 feet	67,495	56,115	48,696	53,401	54,765
More than 12 feet	5,867	4,642	5,107	5,894	6,225
Total Trips	73,362	60,757	53,803	59,295	60,990
Percent Less than or equal to 12 feet	92%	92%	91%	90%	90%
Percent More than 12 feet	8%	8%	9%	10%	10%

Source: WCSC

Deep draft vessels that used the Waterway in 2019 were the basis for categorizing individual vessels into vessel classes based on vessel dimensions and commonly used vessel categories. Deadweight tonnage, length overall, and beam for each deep draft vessel observed using the Waterway in 2019 was obtained from Lloyd’s List Intelligence. The average dimensions for each vessel class are shown in Table 2-4.

**Table 2-4
Waterway Vessel Class Average Dimensions 2019**

Vessel Class	Deadweight Tons	Length Overall (ft)	Beam (ft)
Aframax Tanker	109,202	804	140
Aframax Bulk	50,034	635	119
Articulated Tug Barge	21,175	477	74
Handy Bulk	28,082	551	86
Handy Tanker	19,572	473	76
LNG	89,183	955	149
Long RORO	43,872	888	106
LPG	50,180	717	114
Panamax Tanker	50,162	612	106
Panamax Bulk	55,712	648	105
Panamax RoRo	21,037	653	106
Suezmax Tanker	157,223	900	158

Table 2-5 shows additional detail for deep draft vessels that used the SNWW in 2019. The data indicate that 69 percent (4,010) of vessel transits through the SNWW were to terminals on the Neches River or Sabine-Neches Canal reaches. Vessels destined for or departing from terminals on the Neches River or Sabine-Neches Canal must pass through the Sabine-Neches Canal that is co-located with the GIWW. The combination of more than 4,000 deep draft vessel trips and 62,000 shallow draft vessel trips through the same 400-foot-wide navigation channel provides for frequent meeting situations between deep draft and shallow draft vessels in this reach.

**Table 2-5
Vessel Class Trips by Terminal Location 2019**

Vessel Class	Terminal Locations				Total
	Neches River Channel	Sabine-Neches Canal	Sabine Pass	Taylor Bayou	
Aframax Tanker	954	0	0	144	1,098
Aframax Bulk	14	0	0	0	14
Articulated Tug Barge	314	34	0	308	656
Handy Bulk	236	112	0	126	474
Handy Tanker	254	6	0	98	358
LNG	0	0	672	0	672
Long RORO	6	2	0	0	8
LPG	272	0	0	0	272
Panamax Tanker	1,018	238	0	356	1,612
Panamax Bulk	120	176	0	78	374
Panamax RoRo	66	6	0	0	72
Suezmax Tanker	182	0	0	16	198
Total	3,436	574	672	1,126	5,808

2.2.3 Navigation Channel Congestion

As previously stated, the SNWW is currently being deepened from -40 feet to -48 feet, but the ongoing Deepening Project does not widen the channel and current navigation restrictions will remain in effect after the channel is deepened. During the ongoing deepening, the channel will remain 400 feet wide in the Sabine-Neches Canal and the Neches River reaches. Detailed vessel operating data for 2019 was obtained from the Sabine Pilots Association, terminal operators, vessel operators, and the US Coast Guard to understand the nature of SNWW congestion and to develop a model to evaluate alternative improvement measures in order to reduce channel congestion. Based on navigation rules for the Waterway, Panamax vessels cannot meet other Panamax-size or larger vessels in the 400-foot-width channel reaches; in 2019, there were 4,300 transits by Panamax-size or larger vessels. In addition, navigation rules for the Waterway, implemented by Sabine Pilots Association, prevent Aframax and Suezmax vessels from transiting the 400-foot channel reaches at night; during 2019 there were delays for 1,200 vessels with daylight restricted transits.

Navigation restrictions required for the 400-foot-wide channel cause substantial congestion and vessel delays (see a detailed description of pilotage rules in Appendix B, Economics). Vessels that are too large to meet in the narrow channel must wait for the channel to clear before entering from the sea or leaving from the dock. Vessels too large for nighttime transits must wait for daylight and a clear channel before entering from the sea or leaving from the dock. These implemented navigation rules from the Waterway cause these delays, and also exacerbate weather

delays because the more time a vessel spends in the system the more exposed that vessel is to seasonal weather delays.

There has long been a concerted effort among SNWW users to reduce delays and maximize navigational efficiency along the waterway. Vessel scheduling, the use of “caravans,” and queuing rules are all a part of the choreography of getting vessels to and from their berths as efficiently as possible. The effectiveness of these operational efforts is limited by the physical constraint of a 400-foot-wide channel, the size of vessels using the channel, and the number of these vessels.

3 Future Without Project Conditions Overview

3.1 Ongoing Channel Deepening

Deepening the channels of the SNWW is under construction, but not yet completed. The construction associated with the ongoing channel deepening have implications for the expected FWOP condition; therefore, these assumptions inform the Proposed Action design, cost estimate, and the environmental effects analysis. When any navigation channel is deepened, the adjacent channel side slopes are also dredged at a shallower angle from their current positions. This dredging outside the geometry of the navigation channel prevents large quantities of adjacent sediment from sloughing into the newly deepened navigation channel. The engineering evaluation of the dredging outside the geometry of the navigation channel is referred to as a “side slope stability analysis.”

The ongoing channel deepening will require dredging of the adjacent side slopes in areas where widening is being proposed. Detailed side slope stability analyses developed for the ongoing deepening² shows that channel side slopes of 2:1 (2 horizontal to 1 vertical) will meet the minimum factor of safety along the Sabine-Neches Canal and Neches River Channel segments (HDR, 2024). As such, where the navigation channel is being deepened to -52 feet³ MLLW, and assuming a planar side slope of 2H:1V, the adjacent side slope would be dredged laterally for approximately 104 feet (52 feet x 2 = 104 feet). The extent of the side slopes associated with the completed channel deepening is the FWOP condition against which the widening alternatives are evaluated.

Under the FWOP, there are locations along Pleasure Island where the channel deepening will result in changes to the left descending bank shoreline and land (HDR, 2024). Historically, a variety of non-engineered shoreline protection materials (e.g., rubble/concrete debris) were placed along Pleasure Island within the Sabine-Neches Canal. These materials must be removed under the FWOP because deepening the adjacent channel and side slope stability dredging requires moving the Pleasure Island shoreline landward.

Table 3-1 presents the extent of changes to the existing condition under the FWOP condition within the areas evaluated in detail for the proposed widening.⁴ The assumed area of Pleasure Island that will become open water when the deepening project is completed (4.5 acres), and the length of Pleasure Island shoreline (0.7 mi) that would be moved inland during construction of the deepening project. During construction of the deepened channel, an estimated 4,470 linear feet of existing, non-continuous, shoreline protection materials will be removed; the volume of non-engineered shoreline protection materials to be removed is assumed to be 10 CY per linear foot generating 44,700 CY of debris when deepening is completed. Physically removing these materials during construction of the deepening project is assumed to be accomplished from the water using a barge-based crane, with materials being either recycled or trucked to an appropriate landfill for disposal.

² Design Documentation Report (DDR), Sabine Neches Waterway Channel Improvement Project (HDR, 2022)

³ Deepening in this area has a -48 feet project depth, with additional two feet of underkeel clearance and an additional two feet of advance maintenance dredging that sum to -52 feet.

⁴ Because the deepening construction has not been completed, the deepening construction assumptions are used herein to establish the FWOP condition.

There are no predicted changes to the shoreline or adjacent lands on the Neches River due to the completion of the ongoing deepening project.

**Table 3-1
Future Without-Project Deepening Side Slope Projections**

SNWW Reach to be Deepened	Side Slope Area of Disturbance (AC)	Adjacent Land Mass Loss (AC)⁵	Affected Shoreline Length (MI)⁶
Future Without-Project			
Sabine-Neches Canal (South)	14.2	0.0	0.0
Sabine-Neches Canal (North)	79.2	4.5	0.7
Neches River Channel	66.6	0.0	0.0
TOTAL	160.0	4.5	0.7

The channel deepening is projected to result in approximately 650 million CY of maintenance material, generated over the 50-year period of analysis, to maintain the SNWW after deepening is completed (USACE, 2011). Variability in sediment accumulation in the SNWW means that the ongoing maintenance dredging program does not have annual maintenance in each reach. The 2011 channel deepening FEIS projected annual totals of accumulation within the Sabine-Neches Canal and the Neches River Channel, as shown in Table 3-2. Assuming 25,000 CY per day for maintenance dredging production, the maintenance dredging for these two reaches (after channel deepening) would take approximately 130 days per year.

⁵Under the FWOP condition approximately seven acres of Pleasure Island will be removed because the side slopes for the deeper channel will extend onto land. Of the seven acres of Pleasure Island to be removed under the FWOP, 4.5 acres would be coincident with the proposed widening alternatives. Therefore, the area of disturbance for the proposed action and Alternative 2 presume the 4.5 acres of Pleasure Island will have already been removed.

⁶Under the FWOP condition, a total of 1.13 miles of Pleasure Island shoreline will be moved landward because the side slopes for the deeper channel will extend onto land. The length of shoreline disturbance from widening presumes the Pleasure Island shoreline and lands will have already been affected by the ongoing channel deepening (i.e., FWOP).

**Table 3-2
FWOP - Estimated Annualized Maintenance Dredging Volumes and Durations**

Alternative and Area	Annual Dredge Volume (CY/YR)	Annual Days Maintenance Dredging (Days)⁷
Future Without Project⁸		
Sabine-Neches Canal	1,464,900	59
Neches River Channel	1,794,496	72
TOTAL	3,259,396	130

3.2 Navigation Efficiency

In 2024, more than 58,500 vessels transited the Sabine Neches Waterway and more than 5,000 of those transits were deep draft vessels (SNND, 2024). This level of traffic is projected to increase slightly in the future. Under the No Action/Future Without Project condition, the proposed widening would not be constructed and would not provide additional navigational efficiencies for vessels transiting into, within, and out of, the SNWW.

3.3 Air Quality

Over the 50-year period of analysis, the continuing problem of vessel congestion would accumulate to approximately 1,370,000 hours of vessel delays at dock and 795,000 hours of vessel delays at sea (SNND, 2024). Based on existing and projected future vessel operations, hours of delay equate to hours of auxiliary power operation as each hour of vessel delay represents an hour of auxiliary engine operations over the 50-year period of analysis.

3.4 Shoreline Effects

Within the Sabine-Neches Canal, construction of the ongoing deepening under the No Action/Future Without Project condition would also remove approximately 4,470 linear feet of non-engineered shoreline protection materials, generate approximately 44,700 CY of debris, require the relocation of 0.7 miles of shoreline, and would convert approximately 4.5 acres of the abandoned golf course into sub-tidal (i.e., submerged) habitat.

Within the Neches River, construction of the ongoing deepening under the No Action/Future Without Project condition would not result in effects to the shoreline or adjacent lands.

3.5 Maintenance Dredging

Under the No Action/Future Without Project condition, SNWW deepening and the routine maintenance dredging will cumulatively generate 98 MCY of new-work dredged material and 650

⁷Annual Days Maintenance Dredging estimated by dividing CY by the assumed 25,000 CY/DY production.

⁸Source: 50-Year Maintenance Quantities for the Recommended Plan from 2011 Final Feasibility Report, Main Report, Table VI-1, Page VI-2, divided by 50 for annual (CY/YR) quantities.

MCY of maintenance material (USACE, 2011). This material is in addition to the more than 250 million CY of maintenance material that has been dredged from the interior channels of the SNWW and placed in adjacent upland placement areas over the past 50 years (USACE, 2021).

The existing array of placement areas has sufficient capacity for both the new-work material and maintenance material projected to be dredged over the 50-year period of analysis (SNND, 2024).

3.6 Dredged Material Management

Under the No Action/Future Without Project condition, the more than 11,500 acres of lands along the SNWW dedicated to dredge material management (including the areas within and surrounding Placement Areas 8, 11, 18, 19, 20, 21, and 22) would continue to be used as previously described and assessed in the USACE 1975 EIS (USACE, 1975). Over the 50-year period of analysis, the dredged material placement areas would continue to receive dredged material, have episodic raising of containment dikes to increase storage capacity, and require routine maintenance and in-kind replacement of support features within and surrounding the placement areas (e.g., access road construction and maintenance, vegetation control, levee lifts and maintenance, weir maintenance).

3.7 Beneficial Use of Dredged Material

Under the No Action/Future Without Project condition, completion of the deepening component of the ongoing construction project is projected for 2028. Completion of the beneficial use component of the project would be 2056 based on projected use of new work material and maintenance material generated over seven four-year maintenance dredging cycles.

Under the No Action/Future Without Project condition, Beneficial Use (BU) of dredged material would proceed as described in the 2011 FEIS for channel deepening (USACE, 2011). The Neches River BU Feature (including all three components, Rose City East, Bessie Heights East, and Old River Cove) would result in the construction of a total of 2,853 acres of emergent marsh (USACE, 2011) and over the 50-year period of analysis, 1,896 acres of restored marsh habitat would be built the Bessie Heights East BU component of the Neches River BU features.

In addition, under the No Action/Future Without Project condition, the widening construction would not occur and would not make up to 500,000 CY of dredged material available to advance construction of the Bessie Heights East beneficial use site.

4 Plan Formulation

Plan formulation is the process of building alternative plans that meet the planning objectives of the study and avoid the planning constraints. Planning objectives are developed from the problems and opportunities identified for the study area during the period of analysis (2030 – 2080). The planning objectives support Federal objectives and CEQ Guiding Principles, as described below. Planning constraints are restrictions that limit the actions contained within an alternative plan and are used for preliminary screening.

The following alternative plans will be identified in this analysis to ensure a complete evaluation of trade-offs among the alternatives:

- The “no action” alternative,
- A plan that reasonably maximizes total net NED benefits (the NED plan),
- A plan that reasonably maximizes total net benefits across all benefit categories including monetized and non-monetized benefits,
- A plan that reasonably maximizes net benefits including monetized and nonmonetized benefits consistent with the study purpose only, and
- The least environmentally damaging practicable alternative.

Note that the same alternative may be identified to meet more than one of the plans listed above.

Alternative plans are evaluated for performance with respect to the four formulation and evaluation criteria (completeness, effectiveness, efficiency, and acceptability) and for performance with respect to the planning objectives. The study specific quantitative metrics used to evaluate alternative plan performance include NED costs and NED benefits for the NED account and cubic yards of beneficial use dredged material and acres of wetlands restored for the EQ account. Qualitative metrics for the RED account include temporary increases in construction related employment, revenues, wages and induced spending. Qualitative metrics for the OSE account include improved navigation safety. Uncertainty in the assessment of performance of alternatives is addressed through the NED cost contingency developed through the Cost and Schedule Risk Analysis and through the use of a “no growth” commodity and fleet forecast scenario that affects NED benefits.

The detailed analysis of vessel traffic on the SNWW that informs plan formulation is based on 2018 and 2019 data, much of it proprietary, provided by vessel operators, terminals, USCG, and the SPA. Continuance of the problems and opportunities identified using 2018 and 2019 data into current existing conditions is confirmed in the Economics Appendix that was updated in 2025. Similarly, the appropriateness of projected future without and with-project conditions based on analyses performed with 2018 and 2019 data is also confirmed in the updated Economics Appendix.

4.1 Problems

The problems identified for the Sabine Neches Waterway are:

- Restrictive navigation rules due to safety concerns for nighttime transits, and
- Inefficient movement of cargo.

Navigation safety concerns stem from the shared use by deep draft and shallow draft barge-tows in two 400-foot-wide reaches of the SNWW where the Gulf Intracoastal Water Way (GIWW) is collocated with the Sabine-Neches Canal. In addition, substantial tug, barge, and ATB traffic on the Neches River share the 400-foot-wide channel with deep draft vessels. Daylight only navigation restrictions in the Sabine-Neches Canal and Neches River are established by the SPA for vessels with a beam greater than 125 feet. Barge-tow transits are unrestricted throughout the SNWW. Deep draft vessels with a beam greater than 125 feet are restricted to daylight transit because these large vessels have limited maneuverability in the 400-foot channel and because visual perceptions at night (even with auxiliary lighting) are insufficient for safe vessel and barge-tow meeting.

The effect of this restriction is that Aframax and Suezmax vessels transiting to or from terminals on the Neches River are restricted to travel only during daylight. In 2018, there were 1,138 daylight restricted transits. Similarly in 2019, there were 1,136 daylight restricted transits. Daylight only navigation restrictions concentrate the movements of Aframax and Suezmax vessels to only daylight hours causing delays for those vessels. These delays directly impact the efficient movement of cargo along the SNWW.

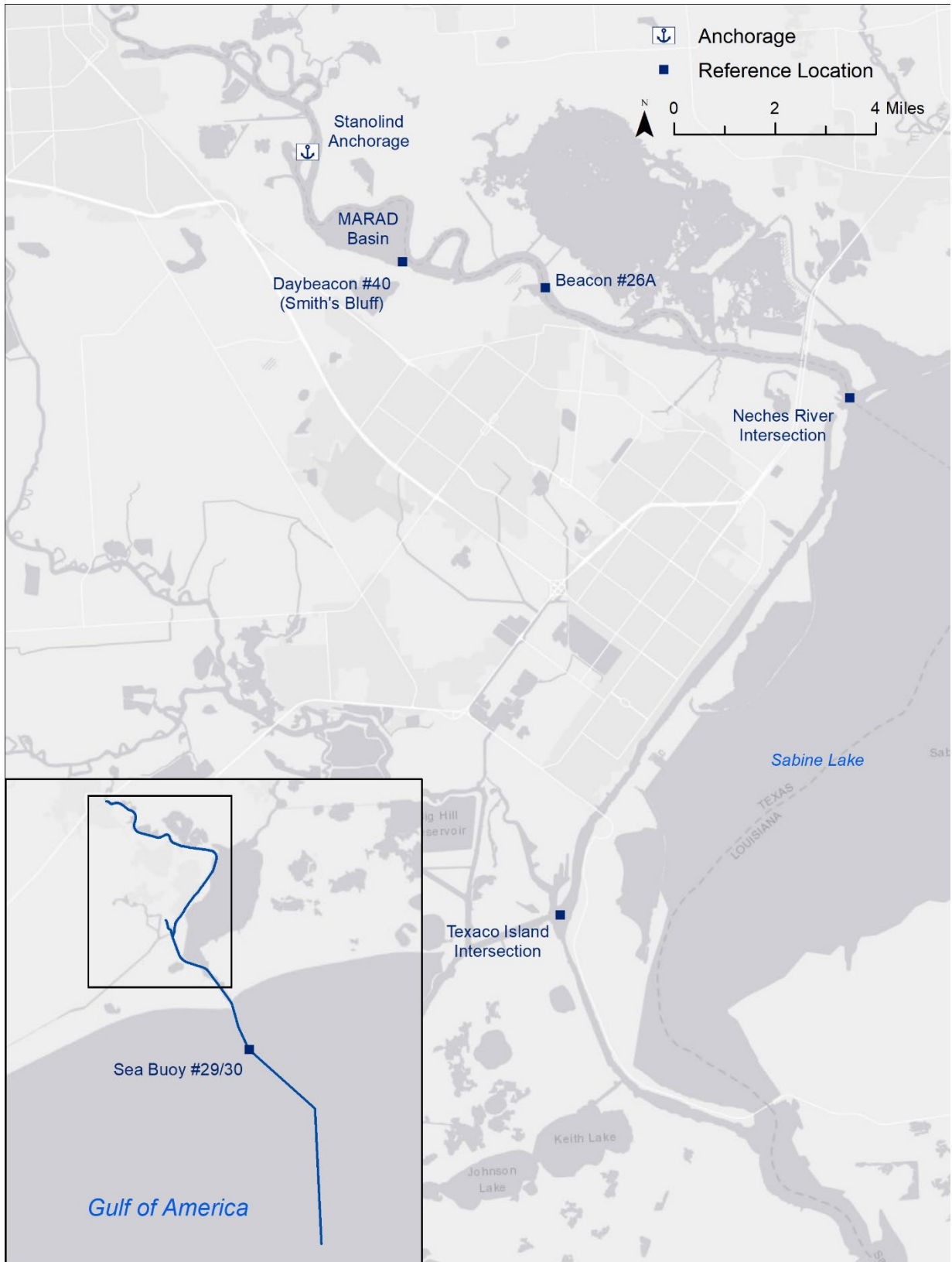
Vessel meeting restrictions affect most vessels transiting above buoys 29/30 (Figure 4-1) where the channel is 400-feet wide. Panamax, LPG, LNG, Aframax and Suezmax vessels cannot meet above buoys 29/30. In 2018, 4,410 vessel transits exceeded the beam and draft criteria used by the SPA to allow vessel meeting in the channel. In 2019, 4,320 vessel transits exceeded the beam and draft criteria used by the SPA to allow vessel meeting in the channel. Vessel meeting restrictions above buoys 29/30 require vessels that exceed the beam and draft criteria to wait for the channel to clear before leaving the dock or entering the SNWW from the sea. Waiting for the channel to clear prior to vessel entry or departure causes delays that directly impact the efficient movement of cargo along the SNWW. The efficiency impacts of meeting restrictions above buoys 29/30 are compounded by the daylight-only transiting restrictions that concentrate all Panamax and LPG vessel meetings with Aframax and Suezmax vessels to only daylight hours.

4.2 Opportunities

Opportunities at the SNWW include:

- Improve navigational safety at nighttime on the SNWW,
- Improve cargo movement efficiency for the projected future commodity volume and the projected future fleet along the SNWW,
- Increase the carrying capacity of the SNWW by reducing navigation restrictions, and
- Provide environmental benefits by restoring habitat through the beneficial use of dredged material.

Figure 4-1
Navigation Restrictions Reference Locations



4.3 Planning Objectives

The goal of USACE involvement in deep draft navigation is to provide efficient and safe general navigation features while meeting the federal objective of increasing national economic development (NED) consistent with protecting the nation's environment. Given this goal, the following planning objectives were used in the formulation and evaluation of alternative plans.

5. Reduce delays and associated transportation costs for the projected commodities and SNWW fleet during the period of analysis (starting in the base year and extending for 50 years). This planning objective supports the Federal objective of maximizing economic development and supports the Council on Environmental Quality (CEQ) Guiding Principle of sustainable economic development.
6. Increase federal navigation channel efficiency for the projected SNWW fleet during the period of analysis. This planning objective supports the Federal objective of maximizing economic development and supports the CEQ Guiding Principle of sustainable economic development.
7. Improve navigation safety for vessels using the SNWW during the period of analysis. This planning objective supports the CEQ Guiding Principle of public safety.
8. Maximize beneficial use of dredged material during the period of analysis. This planning objective supports the Federal objective of protecting and restoring natural systems and supports the CEQ Guiding Principle of healthy and resilient ecosystems.

4.4 Planning Constraints

Plan formulation involves meeting study objectives without violating constraints. The study takes into account all applicable county, state, and federal laws, regulations, and environmental guidance. Specific study constraints include:

- Impacts to social, environmental, and cultural resources will be avoided or minimized to the extent practicable:
- Alternative plans will not impose net negative impacts on the effectiveness of federal projects in the study area, such as
 - Sabine Neches Channel Improvement Project (48-foot deepening project including mitigation components)
 - Sabine to Galveston Storm Damage Reduction Project,
- Alternative plans will not reduce navigational safety along the SNWW, and
- Hardened development, including floodwalls, terminals, docks, and other industrial development, situated adjacent to the navigation channel limit potential widening opportunities. Substantial impacts to these structures will be avoided.

4.5 Key Assumptions and Uncertainties

- Features of the SNWW Channel Improvement Project currently under construction, including turning and anchorage basins, channels and associated berths will be completed by 2028 and maintained to authorized dimensions thereafter,
- Future fleet mix and vessel loading will adjust to the completed SNWW Channel Improvement Project,
- Pilotage and tug resources will be available as needed throughout the period of analysis,
- Planned terminal improvements will be completed according to existing schedules,
- Standard operating procedures on the waterway employed to improve navigation efficiency will continue and will adjust to future conditions, including VTS traffic monitoring and management, offshore lightering, vessel shuttling to and from Neches River anchorages, and vessel caravans, and
- Based on numerous meetings with SPA, Gulf Intracoastal Canal Association (GICA), and joint ship simulation analysis with SPA and GICA, daylight only transiting restrictions on vessels with a beam larger than 125 feet from Texaco Island to the Port of Beaumont can be relieved if channel widths are increased to a minimum of 500 feet.

4.6 Existing and Future Without-Project Conditions

Future without-project conditions are developed from projections based on existing conditions, private and public sector transportation investments that are planned and reasonably expected to be constructed, and U.S. Energy Information Administration (EIA) projections for imports and exports of crude petroleum and petroleum products. The Economics Appendix provides a detailed presentation of the data sources and methods used to develop without-project commodity and fleet forecasts. Existing and without-project future conditions are summarized in the section. Note that the without-project commodity and fleet forecasts are identical to the with-project commodity and fleet forecasts. Consistent with standard USACE Deep Draft Navigation Planning Center of Expertise practices, the alternative plans presented in this analysis are not projected to change future commodity tonnages.

4.6.1 Existing Commodities

The SNWW predominantly serves the energy and petrochemical industries that line the waterway from Sabine Pass to the Port of Beaumont. The SNWW is the largest foreign trade liquified petroleum and natural gas waterway in the nation and the second largest foreign trade crude oil waterway in the Nation (WCSC, 2025). Refiners along the waterway provide various fuel products to states in the mid-west and northeast via the Explorer Pipeline (660,000 barrels per day) terminating near Chicago, IL and the Colonial Pipeline (3,000,000 barrels per day) terminating outside of New York City in Linden, NJ.

Table 4-1 shows total tonnage along the waterway by commodity group from 2019 through 2023 (the last year of WCSC data available at the time of this writing). The crude oil, liquified petroleum and natural gas, and petroleum products groups combined account for nearly 90 percent of all

tonnage on the waterway in each year. This sub-total excludes chemicals that are largely used to support the refining industry. The largest historical growth is exhibited by Liquefied Gases that has increased due to an export Liquefied Natural Gas (LNG) facility coming on-line at Sabine Pass and due to increases in Propane and Butane (aka Liquefied Petroleum Gas (LPG)) exports.

**Table 4-1
SNWW Cargo Tonnage 2019 – 2023 (thousands of short tons)**

Cargo Type	2019	2020	2021	2022	2023
Chemicals & Chemical Products	15,544	14,276	14,944	15,405	15,757
Crude Petroleum	66,973	45,347	35,543	44,522	42,457
Liquefied Gases	27,496	19,707	41,198	43,261	49,375
Petroleum Product	70,030	72,890	74,097	77,818	80,707
Raw Materials	7,672	8,683	4,834	4,225	4,035
Other	4,723	3,018	2,651	3,957	4,318
TOTAL	192,438	163,921	173,267	189,188	196,649
Foreign Trade	107,988	89,139	105,942	113,209	121,795
Domestic Trade	84,450	74,782	67,325	75,979	74,854
Foreign Trade %	56.1%	54.4%	61.1%	59.8%	61.9%

Source: WCSC

4.6.2 Commodity Forecast

The commodity forecast is identical for both with- and without-project conditions and is based on observed 2019 commodity tonnage and characteristics. Projected future commodity flow is based on two references:

- Terminal-specific improvements (provided under non-disclosure agreements) and associated increases in vessel traffic and commodity tonnage, if any, as described by terminal operators, and
- U.S. Energy Information Administration (EIA) Annual Energy Outlook 2021 (AEO) projections for imports and exports of crude petroleum and petroleum products. The AEO explores potential long-term energy trends in the United States. AEO is published in accordance with Section 205c of the Department of Energy Organization Act of 1977 (Public Law 95-91), which requires the Administrator of the U.S. Energy Information Administration (EIA) to prepare an annual report that contains trends and projections of energy consumption and supply. These projections

are used by federal, state, and local governments; industry; trade associations; and other planners and decisionmakers in the public and private sectors.

Cargo not related to crude oil, petroleum products, LPG, or LNG were held at 2019 tonnages throughout the analysis. After an LNG terminal begins operations, tonnage estimates are held constant throughout the analysis and are not subject to EIA growth estimates. Note that the EIA growth rates are not always positive and that the EIA projects very little growth after 2025.

The commodity forecast was developed in five-year increments beginning in 2025 running through 2050 (Table 4-2). After 2050, commodity tonnage is assumed to remain at the 2050 level. The 2025 commodity forecast is a combination of the observed 2019 commodity tonnage adjusted by the EIA growth rates and the effects of planned terminal improvements including operation of the Golden Pass LNG Terminal. Commodity tonnage associated with these improvements was provided by the terminal operators.

**Table 4-2
Sabine Neches Waterway Commodity Tonnages Used in Traffic Model
(thousands of metric tons)**

Commodity	2025	2030	2035	2040	2045	2050
Crude Oil Imports	22,124	20,180	19,974	20,653	20,760	21,037
Crude Oil Exports	47,384	45,337	45,535	44,334	42,572	42,657
LNG (Export)	43,913	65,657	65,657	65,657	65,657	65,657
LPG (Export)	18,813	18,920	18,828	18,673	18,601	18,469
Product & Related Imports	2,559	1,978	2,112	2,483	2,617	2,731
Product & Related Export	39,904	40,808	39,149	37,935	36,991	35,955
Not Oil & Gas Related	4,268	4,266	4,266	4,266	4,266	4,266
Total	178,965	197,146	195,521	194,002	191,464	190,773

4.6.3 Existing Fleet

The existing fleet calling at SNWW terminals is comprised of a deep draft fleet engaged in foreign trade and domestic coastwise trade, and a shallow draft fleet that consists mainly of barge tows that use the GIWW to enter and exit the SNWW. Barge tow configurations range from a single barge 195 feet long by 35 feet wide to a four-barge configuration (two barges wide) 1,069 feet long by 108 feet wide. Much of the barge traffic along the portion of the GIWW shared with the SNWW is through-traffic.

Table 4-3 shows the number of trips by vessel operating draft category along the Waterway from 2019 through 2023 (WCSC, 2025). Note that a trip may be either inbound or outbound. A vessel

call includes both the inbound and outbound trips. A twelve-foot operating draft was used to differentiate between deep draft and shallow draft vessels because the GIWW has a depth of -12 feet before and after it co-locates with the SNWW. Approximately 90 percent of traffic along the SNWW is shallow draft traffic, ranging from 53,000 to 67,000 trips per year. Deep draft vessel trips ranged from 4,600 to 6,200 per year from 2019 through 2023. In 2023, there was an average of 167 trips along the Waterway per day (365 operating days per year) with 167 trips per day by shallow draft vessels and 17 trips per day by deep draft vessels.

**Table 4-3
Waterway Vessel Trips 2019 – 2023**

Vessel Draft	2019	2020	2021	2022	2023
Less than or equal to 12 feet	67,495	56,115	48,696	53,401	54,765
More than 12 feet	5,867	4,642	5,107	5,894	6,225
Total Trips	73,362	60,757	53,803	59,295	60,990
Percent Less than or equal to 12 feet	92%	92%	91%	90%	90%
Percent More than 12 feet	8%	8%	9%	10%	10%

Source: WCSC

Table 4-4 shows detail for deep draft vessels that used the SNWW in 2019. The data indicates that 69 percent (4,010) of vessel transits through the SNWW are to terminals on the Neches River or Sabine-Neches Canal reaches. Vessels destined for or departing from terminals on the Neches River or Sabine-Neches Canal must pass through the Sabine-Neches Canal that is co-located with the GIWW. The combination of more than 4,000 deep draft vessel trips and 62,000 shallow draft vessel trips through the same 400-foot-wide navigation channel provides for frequent meeting of deep draft and shallow draft vessels in this reach.

**Table 4-4
Vessel Class Trips by Terminal Location 2019**

Vessel Class	Terminal Locations				Total
	Neches River Channel	Sabine-Neches Canal	Sabine Pass	Taylor Bayou	
Aframax Tanker	954	0	0	144	1,098
Aframax Bulk	14	0	0	0	14
Articulated Tug Barge	314	34	0	308	656
Handy Bulk	236	112	0	126	474
Handy Tanker	254	6	0	98	358
LNG	0	0	672	0	672
Long RORO	6	2	0	0	8
LPG	272	0	0	0	272
Panamax Tanker	1,018	238	0	356	1,612
Panamax Bulk	120	176	0	78	374
Panamax RoRo	66	6	0	0	72
Suezmax Tanker	182	0	0	16	198
Total	3,436	574	672	1,126	5,808

4.6.4 Fleet Forecast

The fleet observed in 2019 is the basis for the fleet forecast and is referred to as the “baseline fleet” for the remainder of this document. The first year of the fleet forecast is 2025. In the 2025 fleet forecast, future increases (or decreases) in commodity tonnage, as projected by the EIA in the 2021 AEO, were distributed to the baseline fleet on a vessel-by-vessel basis for crude oil and petroleum products. The amount of projected tonnage added to any vessel is constrained by the vessel’s tonnage capacity (including non-cargo tonnage), volumetric capacity, design draft, and operating draft in a -48-foot channel (-44-foot channel assumed for 2025).

Table 4-5 shows the number of vessel calls by vessel class for the baseline and each modeled year. Note that the vessel call list does not change after 2030 because planned improvements are projected to be completed by that time and there is very little change in commodity tonnages as presented in Table 4-2 shown previously.

**Table 4-5
Vessel Calls by Vessel Class for Baseline and Modeled Years**

Vessel Class	2019 Baseline	2025	2030	2035	2040	2045	2050
Aframax Tanker	549	595	595	595	595	595	595
Aframax Bulk	7	7	7	7	7	7	7
ATB	328	326	326	326	326	326	326
Handy Bulk	237	237	237	237	237	237	237
Handy Tanker	179	178	178	178	178	178	178
LNG	336	643	961	961	961	961	961
Long RORO	4	4	4	4	4	4	4
LPG	136	420	420	420	420	420	420
Panamax Tanker	806	1,008	1,008	1,008	1,008	1,008	1,008
Panamax Bulk	187	187	187	187	187	187	187
Pmax RoRo	36	36	36	36	36	36	36
Suezmax	99	245	245	245	245	245	245
TOTAL	2,904	3,886	4,204	4,204	4,204	4,204	4,204

4.7 Without-Project Delays and Delay Costs

The Sabine Neches Traffic Simulation Model (Traffic Model) was developed to evaluate the way different channel widths along select reaches would reduce SNWW congestion delays. For each analysis year, the Traffic Model simulates a full year of deep draft vessel traffic flow to evaluate the effects of various conditions on all vessels' time in the system, including time waiting to enter the channel and time waiting to leave the dock. Simulations for different analysis years reflect projected future traffic, tonnage, and terminal configurations for that year. The Traffic Model is approved by USACE for one-time use in the study. The Traffic Model is summarized in the Economics Appendix and described in detail in the Traffic Simulation Model Report, Appendix C.

Projected future channel width dimensions are characterized as either without-widening or with-widening conditions. Under without-widening conditions, the dimensions of the waterway channels include the Deepening Project's phased construction: 44-foot depth in 2025 and 48-foot depth in 2030 and future years. The without-widening condition is the without-project condition and the reference against which alternative improvements are compared. With-widening conditions include widening the channel to varying widths at multiple locations.

The Traffic Model evaluates projections of traffic flow along the waterway at five-year intervals from 2025 to 2050 to determine impacts of future commodity and fleet distributions on projected future vessel traffic. Model output is used to evaluate traffic flow under alternative future channel width conditions to identify opportunities for potential traffic flow improvements.

The Traffic Model consists of four key components:

- Waterway geographic configuration,
- Vessel call lists for Years 2019 (baseline), 2025, 2030, 2035, 2040, 2045, and 2050,
- Piloted Vessel Operational Rules, and
- Traffic Simulator

The geographic configuration includes detailed data that describe the entire federal navigation channel and associated terminals, docks, turning areas and anchorages. Vessel call lists (fleet forecast) include all deep draft traffic, including articulated tug-barges (ATBs). The waterway geographic configuration and vessel call lists are based on historical and projected data.

The Traffic Model contains logic that reflects alternative traffic rules, resource availability, operating procedures, and operating conditions such as daytime/nighttime and weather. Importantly, the model includes SPA navigation protocols that may be revised under various with-project conditions. Each vessel's total time within the simulated waterway is calculated and includes time spent waiting to enter the federal channel from the sea, time spent working at the dock, time spent waiting to leave the dock, time at anchorage, and time spent delayed by weather.

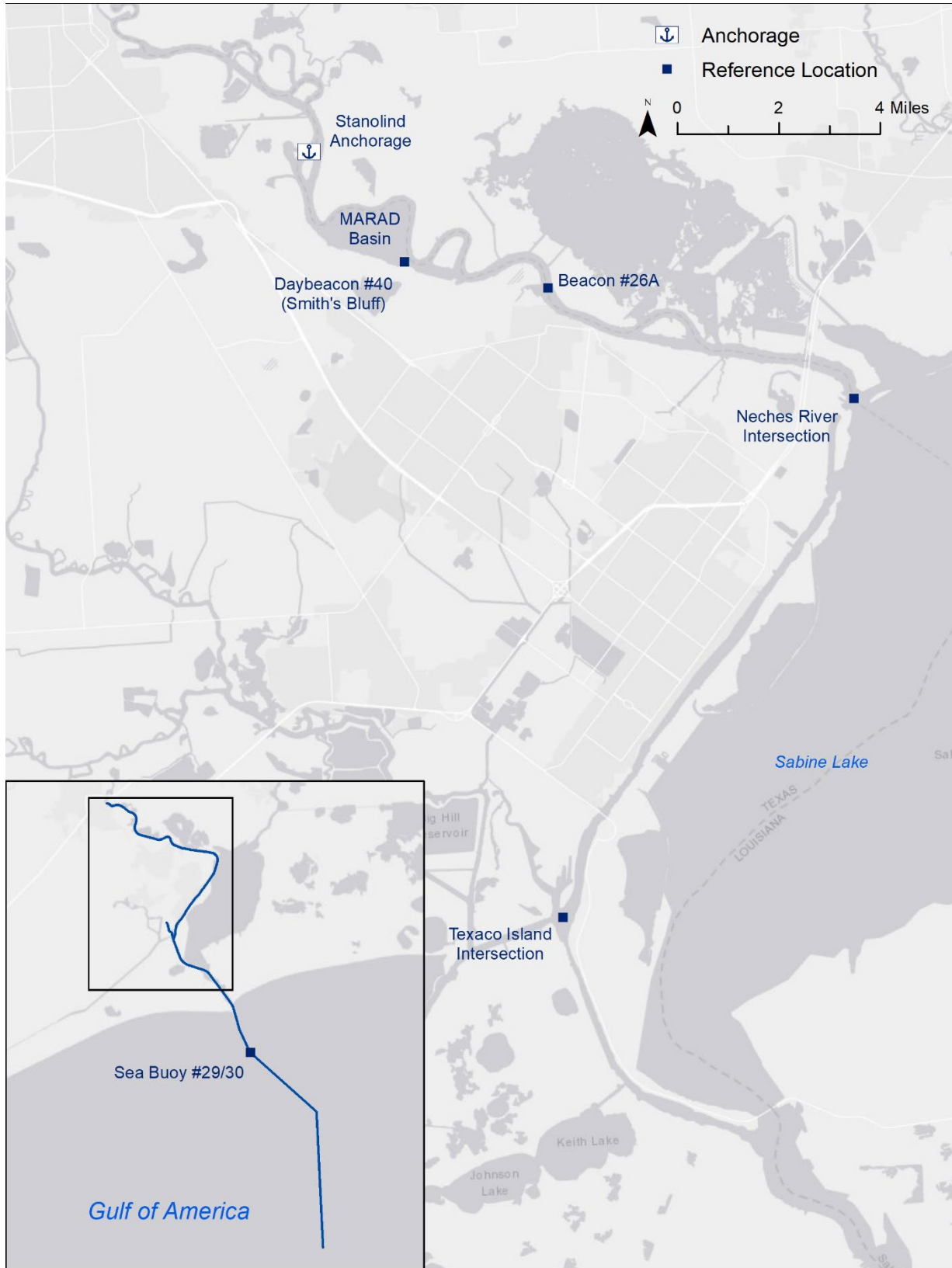
4.7.1 SPA Operations Protocols

According to the SPA's operations protocol, vessel movement within the SNWW is currently restricted to daylight-only for certain vessels moving above Texaco Island (i.e., vessels transiting the Sabine-Neches Canal and the Neches River). If the vessel has a deadweight tonnage greater than 85,000, a length overall of 875 feet or greater, or a beam of 125 feet or greater (i.e., Aframax and Suezmax vessels), then the vessel is restricted to daylight-only transits. In 2019 about 1,200 deep draft vessel trips were subject to daylight-only restrictions.

The daylight restriction is imposed on large vessels to accommodate the constant flow of barge tow traffic on the Sabine-Neches Canal and the Neches River. The SPA considers it unsafe to meet large vessels and barge tow traffic at night in the Sabine-Neches Canal and the Neches River because of nighttime impacts to the visual perception needed to maintain safe distances between the large vessel, the barge tow, and the edge of the channel. Despite the use of flood lights, GPS, and computerized navigational aids, the 400-foot channel width is insufficient for safe nighttime meeting of large vessels and barge tow traffic. During daylight, when visual perception is not impacted, the meeting of large vessels and barge tow traffic is a regular occurrence on the SNWW.

Figure 4-2 shows locations relevant to daylight restrictions and meeting area restrictions. While shown above as Figure 4-1, it is repeated here as an aid to the discussion. SPA operations protocols permit moving a daylight-restricted vessel between docks and nearby anchorages at night, such that vessels below Neches River Beacon 26A may move to another point on the Neches River below Beacon 26A and vessels above Beacon 26A may move to another point above Beacon 26A, but not above the Stanolind Anchorage.

Figure 4-2 Navigation Restrictions Reference Locations



The meeting of two vessels on the SNWW is determined by the SPA's assessment of channel dimensions at the location of the predicted meeting and the characteristics of both vessels. For the meeting to be permitted, the following SPA operations protocols must be satisfied:

1. Vessels with a combined beam that equals or exceeds $\frac{1}{2}$ the channel width will not meet day or night;
2. Vessels 85,000 DWT or more will not meet vessels of either 30,000 DWT or more, or 25-foot draft or more above Texaco Island intersection;
3. Vessels 85,000 DWT or more will not meet vessels of 30,000 DWT or more with a draft of 30 feet or more, above buoys 29 and 30;
4. Vessels 48,000 DWT or more with a draft of 30 feet or more will not meet above buoys 29 and 30;
5. Vessels with a combined draft of 70 feet or more will not meet between the Neches River intersection and daybeacon #40 (Smith's Bluff) at night; and
6. Vessels with a combined draft of 65 feet or more will not meet above daybeacon #40 at night.

Per discussions with SPA, existing vessel operating protocols will remain in effect in the without-project condition. It is important to note that vessel operating restrictions employed by the SPA are largely a function of vessel displacement and maneuverability within the confines of the narrow channels. Deepening the channel to -48 feet and the corresponding deeper operating draft of vessels sailing in the same narrow channel does not relieve the difficulties of maneuvering vessels when meeting in the channel. Daylight restrictions would remain in effect under without-project conditions.

4.7.2 Without-Project Delays and Delay Costs

4.8 Management Measures

Alternative plans are comprised of management measures. Management measures may be “a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives” (USACE 1996). Management measures may be either structural measures, which require construction, or they may be non-structural, such as operating procedures and policies. Management measures were identified through:

- Pilot's workshop,
- Terminal operator's workshop,
- SNND consultation,
- USCG VTS consultation,
- Pilot's, barge operators, USCG COPT and VTS workshops,
- Previous USACE navigation feasibility studies of the SNWW (1982 and 2011), and

- Ship simulation studies (2003 and 2021).

The non-structural measures considered included:

- Traffic controls where tows enter the Sabine-Neches Canal from the GIWW (north and south),
- Adjustments to deep draft vessel operations such as use of smaller vessels, lightering, etc.,
- Adjustments to deep draft vessel traffic flow to better take advantage of available daylight,
- Increase the number of pilots available,
- Increase the number of tugs available, and
- Adjust vessel speeds to reduce vessel meeting impacts.

4.8.1 Non-Structural Measures

The non-structural measures developed for this analysis are currently being implemented to the maximum extent practicable or are not practicable. None of the non-structural measures considered were carried forward for additional analysis. Evaluations of non-structural measures are presented below:

- Traffic controls where tows enter the Sabine-Neches Canal are not practicable because of the high volume of tows and deep draft vessel traffic and because of safety concerns related to tows coming to a full stop in the GIWW. Verbal contact between tow operators and deep draft vessel pilots are standard operating procedures along the SNWW.
- The use of smaller vessels is not practicable because vessel size is selected by shippers that would be unwilling to pay higher transportation costs per ton associated with using smaller vessels. Typically, cargo owners and operators use the largest vessels possible.
- Lightering is a very common practice that is fully utilized under existing conditions.
- Deep draft vessel traffic flow is currently controlled by the pilots to take advantage of available daylight. Deep draft vessels caravan out of the SNWW at first light followed by a caravan of deep draft vessels transiting into the waterway.
- Results of traffic flow simulations performed to see if increasing the currently available number of pilots and tugs would improve traffic flow indicate that the current availability of pilots and tugs are not a constraint on vessel operations.
- Discussions with the pilots, and ship simulations verified, that deep draft vessels are currently operating at or near minimum speeds needed for maneuverability when vessels meet in the channel. Further reducing speeds is not practicable.

4.8.2 Structural Measures

In general, structural measures considered in this analysis were measures that could potentially reduce or eliminate the daylight only restriction, reduce or eliminate meeting restrictions, and/or provide alternative transit routes that would avoid vessels meeting.

The structural measures considered included:

- **Widen the full length of the Sabine Neches Waterway**
 - Note that 700 feet is the maximum channel width considered because two Suezmax vessels can meet in a 700-foot channel and no vessels larger than those in the 2019 fleet are projected to use the waterway during the period of analysis.
 - There would be areas of the SNWW where widening would not be necessary because the pilots would not meet vessels of any size regardless of channel width. These areas occur at the sharp bends throughout the SNWW, at the outfall of Sabine Lake (Figure 1-1), and at the ocean end of the jetties where there are extreme cross currents.
- **Widen individual channel reaches within the SNWW**
 - Widen the Sabine Pass Channel to as much as 700 feet from the Jetty Channel to the Port Arthur Ship Canal (Figure 1-1)
 - Widen the Port Arthur Ship Canal to as much as 700 feet from the Sabine Pass Channel to the western GIWW intersection (Figure 1-1)
 - Widen the Sabine-Neches Canal on the red buoy side (left descending bank) by up to 300 feet to create a maximum 700-foot-wide channel, excluding the reach from the Martin Luther King Bridge to the Port Arthur Turning Basin (Figure 2-1) because pilots do not meet vessels of any size in this reach
 - Widen the Neches River on the red buoy side (left descending bank) by up to 300 feet to create a maximum 700-foot-wide channel
 - excluding the reach from the junction with the Sabine-Neches Canal to the Twin Bridges (Figure 2-1) because pilots do not meet vessels of any size in this reach, and
 - excluding the reach from Anchorage Basin 4 to the Port of Beaumont because of existing waterfront development on both sides of the channel.
 - Partial Neches River Widening
 - Widen the Neches River Channel on the red buoy side (left descending bank) to as much as 700 feet from the Lower Sun Anchorage at Energy Transfer (Figure 2-2) to the western end of the McFadden Bend Cutoff (Figure 1-1)
- **Neches River Traffic Zone (recommended in 1982 but never constructed)**
 - Cut a channel parallel to the Neches River Channel on the northern side (left descending bank) across from placement area 17 (Figure 2-1).
- **Sabine-Neches Canal Barge Lane**
 - Create a barge lane on the red buoy side (left descending bank) of the Sabine-Neches Canal to a depth of 12 feet and a minimum of 125 feet wide from the Martin Luther King Bridge to the eastern GIWW intersection (Figure 2-1).

- **Sabine Lake Barge Lane**
 - Create a barge lane to a depth of 12 feet and a minimum of 125 feet wide through Sabine Lake from the Port Arthur Ship Canal to the eastern GIWW intersection with the Sabine-Neches Canal (Figure 1-1).
- **McFadden Bend Cutoff Anchorage**
 - Expand Anchorage 4 to accommodate multiple vessels (Figure 1-1).
- **Humble Island Anchorage**
 - Create a new anchorage east of the Twin Bridges (Figure 1-1) to accommodate multiple vessels.
- **Offshore terminal**
 - Construct an offshore terminal in the Gulf of America and associated pipelines to the SNWW terminals and refineries to reduce the number of vessel transits affected by daylight only restrictions.
- **Stepped Channel**
 - Deepening one lane within the navigation channel to greater than -48 feet to accommodate deeply loaded vessels.
- **Full width channel deepening**
 - Deepen the entire SNWW to controlling depths greater than -48 feet (-50 feet offshore).

4.9 Initial Screening of Measures Based on Contribution to Objectives

The initial screening of measures was based on the measure's ability to support one or more of the planning objectives, alone or in combination with other measures. If a measure could not meet at least one objective, the measure was dropped from further consideration. Table 4-6, *Initial Screening of Measures* indicates that each measure could potentially support at least one objective.

**Table 4-6
Initial Screening of Widening Measures**

Measure	Notes	Obj 1	Obj 2	Obj 3	Obj 4
Widening Measures					
Widen entire SNWW	Widen up to a 700-foot-wide channel that would be the maximum channel width	Yes	Yes	Yes	Yes
Widen the Sabine Pass Channel	Widen up to a 700-foot-wide channel that would be the maximum channel width	Yes	Yes	Yes	Yes
Widen the Port Arthur Ship Canal	Widen up to a 700-foot-wide channel that would be the maximum channel width	Yes	Yes	Yes	Yes
Widen the Sabine-Neches Canal	Widen up to a 700-foot-wide channel that would be the maximum channel width	Yes	Yes	Yes	Yes
Widen the Neches River	Widen up to a 700-foot-wide channel that would be the maximum channel width	Yes	Yes	Yes	Yes
Partial Neches River Widening	Widen up to a 700-foot-wide channel across from PA 17	Yes	Yes	Yes	Yes
Alternative Routes					
Neches River Traffic Zone	Create a new navigation channel parallel to the Neches River	Yes	Yes	Yes	Yes
Sabine-Neches Canal Barge Lane	Create a barge lane along the Sabine-Neches Canal	No	No	Yes	Yes
Sabine Lake Barge Lane	Create a barge lane through Sabine Lake	No	No	Yes	Yes
Offshore Terminal	Create a new terminal in the Gulf of America	Yes	Yes	Yes	No
Additional Anchorage Space					
Humble Island Anchorage	Create a new anchorage east of the Port Arthur-Orange Bridge	Yes	Yes	Yes	Yes
Expand AB 4	Increase anchorage area to accommodate multiple vessels	Yes	Yes	Yes	Yes
Deepening Measures					
Stepped Channel	Deepen one lane of the navigation channel	No	No	No	Yes
Deepen Entire SNWW	Deepen the full width of the channel	No	No	No	Yes

Objectives

1. Reduce delays and associated transportation costs for the projected commodities and SNWW fleet during the period of analysis (starting in the base year and extending for 50 years),
2. Increase federal navigation channel efficiency for the projected SNWW fleet during the period of analysis,
3. Improve navigation safety for vessels using the SNWW during the period of analysis, and
4. Maximize beneficial use of dredged material during the period of analysis

4.10 Second Screening of Measures

Measures advanced through the initial screening were further developed and evaluated in a second screening (Table 4-7). None of the non-structural measures were advanced for the second screening. All the structural measures were carried forward for the second screening. During the development of measures for the second screening three measures were immediately discarded because they were not practicable:

- The two channel deepening measures (stepped channel and full width channel deepening) would not be implemented because the SNND is not interested in cost-sharing additional channel deepening at this time. The federal channel is currently being constructed to an additional eight feet of depth as a cost-shared project between the SNND and USACE, and
- The creation of a new offshore terminal that would substantially reduce deep draft vessel traffic on the Sabine Neches Waterway is outside any development considerations by the SNND and has low probability of being implemented by others within the foreseeable future.

The following criteria, developed from planning constraints, were used to evaluate structural measures forwarded for a second screening prior to developing alternatives:

1. Environmental issues – a measure that would negatively affect a Wildlife Management Area (WMA) or National Wildlife Refuge (NWR) would be eliminated from further study,
2. Engineering issues – if there is insufficient space to create an operationally effective measure, then the measure would be eliminated,
3. Infringement on another Federal Project – any measure that would negatively affect another Federal project would be eliminated. Other federal projects of concern include the GIWW, Port Arthur Hurricane Flood Protection Project, and the Sabine Pass to Galveston Bay Coastal Storm Risk Management Project, and
4. Sabine Pilots Association input – workshops and meetings were held with the SPA to understand operating procedures and limitations. Measures that would be ineffective in changing operating procedures or that were outside operational limitations would be eliminated.

Five of the six widening measures were advanced for inclusion in the array of alternatives. The widening measure that would widen up to a 700-foot-wide channel across from PA 17 was discarded because the SPA determined that there was insufficient distance for vessel meeting and recovery.

None of the alternative route measures were advanced for inclusion in the array of alternatives. The offshore terminal was discarded as described previously in this section. The Neches River Traffic Zone, that was recommended in a 1982 feasibility report but never was constructed, was discarded because there is insufficient area to build the alternative channel to dimensions that would accommodate the design vessel. The barge lane through Sabine Lake was discarded because there is insufficient area to make the turn towards the GIWW at the southern end of the lake. The intersection between the southern end of the lake and the navigation channel also has strong currents that would make the turn too difficult to be a normal operating procedure.

**Table 4-7
Second Screening of Measures**

<i>Widening Measures</i>	Advance or Discard	Reason for Discard
Widen entire SNWW	Advance	NA
Widen the Sabine Pass Channel	Advance	NA
Widen the Port Arthur Ship Canal	Advance	NA
Widen the Sabine-Neches Canal	Advance	NA
Widen the Neches River	Advance	NA
Widening across from PA 17	Discard	Criterion 4
<i>Alternative Routes</i>	Advance or Discard	Reason for Discard
Neches River Traffic Zone	Discard	Criterion 2
Sabine-Neches Canal Barge Lane	Discard	Criteria 2 & 4
Sabine Lake Barge Lane	Discard	Criterion 4
Offshore Terminal	Discard	Out of scope
<i>Additional Anchorage Space</i>	Advance or Discard	Reason for Discard
Humble Island Anchorage	Discard	Criterion 4
Expand AB 4	Advance	NA
<i>Deepening Measures</i>	Advance or Discard	Reason for Discard
Stepped Channel	Discard	No sponsorship
Deepen Entire SNWW	Discard	No sponsorship

The barge lane along the Sabine-Neches Canal was discarded for multiple reasons.

- The barge lane would not affect deep draft vessel maneuverability and therefore SPA would not eliminate nighttime restrictions if a single red-side barge lane were constructed.
- Barge lanes are typically developed in pairs on adjacent sides of the channel, such as the 125-foot-wide barges lanes on both sides of the Houston Ship Channel and the 200-foot-wide barges lanes on both sides of the Corpus Christi Ship Channel. There is insufficient space for construction these barge lanes without impacting hardened infrastructure and impacting existing dredged material placement areas.

One of the additional anchorage space measures was advanced and one was discarded. The inclusion of additional anchorage space to accommodate more vessels at Anchorage Basin 4 was

advanced for further analysis in the array of alternatives. The construction of a new anchorage in the area at or near Humble Island was discarded because the pilots indicated that currents in that area would make maneuvering in and out of the anchorage infeasible.

4.11 Formulation of Alternative Plans

The measures advanced for inclusion in the development of alternative plans were screened through a preliminary economic assessment of measures implemented individually (i.e., not in combination with other improvements). Measures included in the preliminary economic evaluation include widening channel reaches and increasing anchorage capacity (Table 4-7 above). Widening channel reaches individually does not eliminate the daylight restriction on navigation of large vessels through the Sabine-Neches Canal and the Neches River Channel.

Channel widening allows additional vessel meeting opportunities that reduce vessel delays creating transportation cost reductions. Constructing additional anchorage capacity at AB4 provides additional space where vessels can wait for a Neches River terminal berth to become available. Transportation cost savings would result if a daylight restricted vessel that traveled to AB4 during daylight were to have access to a berth as soon as the berthed vessel departed, rather than having to wait for the departed vessel to travel the entire length of the system before being able to begin the transit from the sea to the open berth.

Preliminary Average Annual Equivalent (AAEQ) costs include construction costs and contingency (23 percent), as determined by the Cost and Schedule Risk Analysis, discounted over 50 years at the FY26 federal discount rate (3.25 percent). Note that costs for PED, Construction Management, and Interest During Construction were not included in this preliminary analysis. Construction costs used in the economic evaluation of measures (Table 4-8) are preliminary cost estimates. Widening costs were developed for the Neches River Channel and the Sabine-Neches Canal North and South by widening only to the red side (left descending bank) of the channel to avoid industrial, transportation, and municipal infrastructure on the green side of the channel.

Widening of the Port Arthur Canal and the Sabine Pass Channel was designed to occur equally on both sides of the channel. Note that channel reaches selected for widening were identified by the SPA as areas where widening would improve navigation. There are areas in the channel where the SPA would not utilize additional width for meeting vessels, including barge-tows, such as the confluence between the Sabine-Neches Canal and the Neches River, approaches to bridges, and the area from the Martin Luther King Bridge to the “eyeball” turning area.

**Table 4-8
Measures Included in the Economic Evaluation**

Channel Reach	Width (feet)	Abbreviation	Construction Cost (\$)
Neches River Channel	500	NR500	78,600,000
Neches River Channel	600	NR600	187,400,000
Port Arthur Canal	600	PAC600	64,935,000
Port Arthur Canal	700	PAC700	99,900,000
Sabine-Neches Canal North	500	SNN500	100,100,000
Sabine-Neches Canal North	600	SNN600	247,200,000
Sabine-Neches Canal North	700	SNN700	610,500,000
Sabine-Neches Canal South	500	SNS500	18,800,000
Sabine-Neches Canal South	600	SNS600	43,500,000
Sabine-Neches Canal South	700	SNS700	100,700,000
Sabine Pass Channel	600	SPC600	27,495,000
Sabine Pass Channel	700	SPC700	42,500,000
Anchorage Basin 2	1,000	AB4-2	19,602,000
Anchorage Basin 3	1,500	AB4-3	39,798,000
Anchorage Basin 4	2,000	AB4-4	59,400,000

Incremental widening for the Neches River Channel and the Sabine-Neches Canal North and South exhibits substantial cost increases, such that each 100 feet of additional width costs more than twice as much as the previous 100-foot increase. This level of incremental costs is not exhibited for the Port Arthur Canal, the Sabine Pass Channel, or Anchorage Basin 4 (Table 4-8).

Preliminary average annual equivalent benefit values (AAEQ) were developed by using the Traffic Model to calculate benefits for 2025 and extrapolating those benefits out to year 2050 based on proportional increases or decreases in tonnage projections. Table 4-9 shows the preliminary net benefits for each measure as stand-alone elements. Negative net benefits are indicated in red font. Note that none of the measures, implemented alone eliminate the daylight restriction on large vessels.

The largest net benefits occur in the channels where most of the terminals are located: The Neches River Channel and the Sabine-Neches Canal South. All widening increments of the Port Arthur Canal and the Sabine-Neches Canal North exhibit negative net benefits as stand-alone improvements (Table 4-9).

**Table 4-9
Individual Measures Net Benefits (\$)**

Channel Reach	Width (feet)	Abbreviation	AAEQ Net Benefits
Neches River Channel	500	NR500	15,284,000
Neches River Channel	600	NR600	9,435,000
Port Arthur Canal	600	PAC600	(1,910,000)
Port Arthur Canal	700	PAC700	(1,712,000)
Sabine-Neches Canal North	500	SNN500	(5,935,000)
Sabine-Neches Canal North	600	SNN600	(6,710,000)
Sabine-Neches Canal North	700	SNN700	(20,933,000)
Sabine-Neches Canal South	500	SNS500	4,063,000
Sabine-Neches Canal South	600	SNS600	10,521,000
Sabine-Neches Canal South	700	SNS700	8,282,000
Sabine Pass Channel	600	SPC600	6,446,000
Sabine Pass Channel	700	SPC700	5,868,000
Anchorage Basin 4	1,000	AB4-2	(4,731,000)
Anchorage Basin 4	1,500	AB4-3	8,358,000
Anchorage Basin 4	2,000	AB4-4	3,089,000

Widening measures are evaluated and combined into alternatives in 100-foot increments, that is the minimum increment that would allow standard operational changes based on SPA discussions. The maximum channel width used in the alternatives is 700 feet, that is the minimum width required for two Suezmax vessels to meet in the channel based on SPA discussions and ship simulations.

The Sabine Pass Channel and the Port Arthur Canal are both currently 500 feet wide, therefore the first increment is a 600-foot-wide channel in these reaches. Channel widening of the Sabine Pass Channel and the Port Arthur Canal would be constructed from the centerline of the channel i.e., a 100-foot widening would increase channel width by 50 feet on each side.

The Sabine-Neches Canal and the Neches River Channel are currently 400 feet wide therefore, the first increment is a 500-foot-wide channel. The maximum width for the Neches River Channel is 600 feet due to industrial infrastructure and active upland placement areas on both sides of the channel. Channel widening of the Sabine-Neches Canal and the Neches River Channel are constructed only on the red side (left descending bank) of the channel to avoid infrastructure on the green side (right descending bank).

There are reaches within the SNWW that are excluded from the widening measures due to SPA standard operating procedures that would not be affected by channel widening:

- The reach from the Entrance Channel to the Sabine Pass Channel would not be widened because the channel currently has sufficient width for meeting two Suezmax vessels,
- The navigation channel would not be widened under the Martin Luther King Jr. Bridge because the SPA does not meet vessels under or near bridges,
- The reach from the Martin Luther King Jr. Bridge to the turning basin known as the “eyeball” would not be widened because the SPA does not meet vessels in this reach due to the proximity of hardened infrastructure,
- The reach that is the confluence of the Sabine-Neches Canal and the Neches River would not be widened because the SPA does not meet vessels in this reach due to currents, and
- The reach approaching and under the Rainbow Bridge (Interstate 10) would not be widened because the SPA does not meet vessels under or near bridges.

4.12 Alternative Plan Costs

Alternative plan costs include planning, preconstruction engineering and design (PED), Lands, Easements, Relocations, and Rights-of-way (LERRs), construction, aids-to-navigation, and operation and maintenance. PED component costs are based on standard USACE percentages of construction cost adjusted with input from USACE, Galveston District. The costs for lands, easements, or rights-of-way (real estate related administrative costs) are included in PED; the purchase of Channel Improvement Easements is expected. Relocation costs include the relocation of an Entergy transmission tower in the Neches River. There are no pipeline relocations required for this project. Costs for relocating aids-to-navigation include relocating channel markers and range markers. Marine archaeology survey costs are included in support of Section 106 requirements of the National Historic Preservation Act of 1966.

Construction costs for each alternative plan include costs for dredging and dredged material placement in an existing upland placement area. No new placement areas need to be developed for this project, although placement area improvements, such as dike raising, required for the placement of dredged material are included in all cost estimates. The estimate assumes a 30-inch cutterhead suction (pipeline) dredge will be used for all dredging work. Beneficial use is a component of each alternative plan and costs for restoring wetlands are included in alternative plan costs. Construction costs also include removing existing, noncontinuous riprap and debris from the Sabine-Neches Canal shoreline by a clamshell bucket working from the water. The material will be loaded onto a barge, hauled to a shore yard, and finally unloaded onto shore. Construction management costs are based on standard USACE percentages of construction costs. Interest during construction was calculated using the FY26 discount rate of 3.25 percent and is based on the proposed construction schedule for each alternative. FY26 costs have been certified by the Walla Walla Cost Engineering Mandatory Center of Expertise.

Operation and maintenance costs are based on shoaling rates developed by USACE for the SNWW Channel Improvement Project Dredged Material Management Study shoaling analysis report published in 2021. Costs per cubic yard of maintenance dredging were calculated from a review of recent maintenance dredging contracts completed along the SNWW by USACE, Galveston District. Projected dredging cycles over 50 years were used to calculate an average annual equivalent maintenance dredging cost.

4.13 Economic Evaluation of Alternative Plans

The economic evaluation of alternative plans was performed in three phases. Phase 1 identifies the net benefit maximizing plan that addresses the problem of daylight only transit restrictions. The net benefit maximizing plan identified in Phase 1 is Alternative 1. In the second phase, incremental widening is added to Alternative 1 to identify the widening plan that maximizes net benefits. In the third phase, incremental increases in Anchorage Basin No. 4 (AB4) vessel handling capacity are added to the net benefit widening plan to identify the NED Plan.

Construction costs used in the economic evaluation of alternative plans include final FY26 costs certified by the USACE Civil Works Cost Engineering and Agency Technical Review Mandatory Center of Expertise. Costs include Preconstruction Engineering and Design (PED), construction costs including beneficial use of dredged material, associated costs, construction management, contingency, and annualized maintenance costs as identified in the Engineering Appendix. Interest during construction is also included and has been calculated at the FY26 federal discount rate of 3.25 percent and at the OMB discount rate of 7 percent. Interest during construction is calculated monthly for each alternative including PED and construction. The base-year for all economic benefit calculations is 2030 although commodity forecasts, fleet forecasts, and traffic simulations were performed for 2025. For all economic evaluations of alternatives, model runs produce benefits in five-year increments from 2030 through 2050 and benefits are interpolated for the years between the model run years. Benefits are always held constant after 2050.

4.13.1 Economic Evaluation of Alternative Plans: Phase 1

The primary operational goal of combining measures in Phase 1 is to reduce or eliminate the daylight only restriction on large vessels transiting the Sabine-Neches Canal and the Neches River. Two alternative plans directly address the problem of daylight only transits. Widening only the Sabine-Neches Canal (South and North reaches) to 500 feet addresses this problem of daylight only transits. Widening the Sabine-Neches Canal to 500 feet reduces the length of channel reaches where large vessels are restricted to daylight only transit (Figure 4-2 above) from approximately 30 miles (Sabine-Neches Canal South to the Port of Beaumont) to 18.6 miles (Sabine-Neches Canal North confluence with the Neches River to the Port of Beaumont). This reduction allows large vessels to transit the length of the Sabine-Neches Canal at night but does not change the daylight restriction on large vessels transiting the Neches River. The 11.4-mile reduction in the length of “daylight restricted” channel allows large vessels to be closer to Neches River terminals at daybreak when arriving from the sea thereby reducing waiting time at sea. Vessels departing from Neches River terminals would still have to wait for daybreak prior to leaving the dock.

Widening both the Sabine-Neches Canal and the Neches River to 500 feet is the smallest alternative plan that eliminates the daylight restriction. This alternative plan provides 24-hour access to the Neches River for all vessels. Both alternative plans also reduce vessel delays by providing opportunities for larger vessels to meet in the navigation channel.

Output from the Traffic Simulator was used to develop the economic evaluation of alternatives. The Traffic Simulator calculates the total time that the vessel is in the waterway system. The time within the system is categorized as either working time or non-working time. Working time includes time spent transiting the channel, turning, docking, and loading or discharging cargo.

Non-working time includes vessel hours spent waiting upon arrival or for departure, vessel hours at anchorage, and the hours that vessels were delayed by weather. In the Phase 1 evaluation, the Traffic Simulator calculated the working and non-working times for each vessel call for the without project condition and for the two smallest alternatives that address the daylight only restriction on large vessels.

Table 4-10 is an example of summary Traffic Simulator output for 2025 that displays the average hours per vessel call for each of the non-working categories for the without-project condition and for the two alternatives.

Table 4-10
Summary Traffic Simulator Output Metrics for 2025
Without-Project & Alternatives that Address the Daylight Only Restriction

Metric	Without- Project Condition	Sabine-Neches Canal 500 feet	Sabine-Neches Canal and Neches River 500 feet
Total Vessel Calls	3,887	3,887	3,887
Calls with Non-working Time	3,268	3,153	3,020
Calls without Non-working Time	619	734	867
Arrival Delay (average hours per vessel call)	3.6	2.6	2.1
Departure Delay (average hours per vessel call)	10.8	7.2	4.4
Anchorage Time (average hours per vessel call)	4.4	2.2	1.5
Weather Delay (average hours per vessel call)	3.7	3.2	2.8
Total Non-working Time (average hours per vessel call)	22.5	15.2	10.8

Both reducing and eliminating the daylight only restriction (Sabine-Neches Canal 500 feet and Sabine-Neches Canal and Neches River 500 feet, respectively) substantially improve navigation efficiency along the waterway. Fewer vessels accumulate non-working time and the average hours per vessel call for each category of non-working time is reduced with these improvements. Arrival and departure delays are reduced because large vessels can use the improved channel reaches 24 hours per day and because larger vessels can meet in the widened channel reaches. Anchorage time is reduced because there is a reduced need for vessels to go to an anchorage to wait for a daylight restricted vessel to depart from the dock. Weather delay time is reduced because vessels that spend less time overall in the waterway system are less likely to be caught in a weather delay. Table 4-11 shows the delay reductions attributable to the two alternatives.

Table 4-11
Time Savings for Alternatives that Address the Daylight Only Restriction (2025)

Metric	Sabine-Neches Canal 500 feet	Sabine-Neches Canal and Neches River 500 feet
Total Vessel Calls	3,887	3,887
Calls with Non-working Time	3,153	3,020
Calls without Non-working Time	734	867
Arrival Delay Reduction (average hours per vessel call)	1.0	1.5
Departure Delay Reduction (average hours per vessel call)	3.6	6.4
Anchorage Time Reduction (average hours per vessel call)	2.2	2.9
Weather Delay Reduction (average hours per vessel call)	0.5	0.9
Total Time Savings (average hours per vessel call)	7.3	11.7

Table 4-12 shows the comparison of Average Annual Equivalent (AAEQ) net benefits for the two smallest alternatives that address the daylight restriction.

Table 4-12
Economic Evaluation of Alternatives that Address Daylight-Only Restriction

	Sabine-Neches Canal 500 feet	Sabine-Neches Canal and Neches River 500 feet
Construction Costs	\$182,319,000	\$310,827,000
Interest During Construction	\$5,986,000	\$16,012,000
Total Construction Cost	\$188,305,000	\$326,839,000
AAEQ Construction Cost	\$7,670,000	\$13,312,000
AAEQ Maintenance Cost	\$1,101,000	\$2,444,000
AAEQ Total Cost	\$8,771,000	\$15,756,000
AAEQ Benefits	\$21,972,000	\$49,144,000
AAEQ Net Benefits	\$13,201,000	\$33,388,000

Note: Interest during construction and AAEQ calculated at the FY26 federal discount rate (3.25%); AAEQ calculated over 50 years

Alternative plans that eliminate the daylight restriction on the Sabine-Neches Canal and the Neches River must necessarily include widening of both channel reaches. The smallest alternative that

eliminates the daylight restriction is widening both the Sabine-Neches Canal and the Neches River from 400 feet to 500 feet. This alternative provides more than double the AAEQ net benefits than widening only the Sabine-Neches Canal, which reduces the length of channel subject to the daylight restriction but does not eliminate the restriction. Widening the Sabine-Neches Canal and the Neches River to 500 feet is identified as Alternative 1, which is the plan that addresses the problem of daylight restricted transits and provides the greatest net economic benefit in Phase 1 of the evaluation.

4.13.2 Economic Evaluation of Alternative Plans: Phase 2

The goal of Phase 2 of the economic evaluation of alternative plans is to identify the widening plan that maximizes net benefits. Incremental widening measures are added to Alternative 1 as displayed in Table 4-13. Incremental widening greater than Alternative 1 provides increased opportunity for vessel meeting resulting in improved traffic flow and reduced vessel delays (Table 4-14). Alternatives 1 – 4 and alternative 6 fully eliminate the daylight restriction. Alternative 5 does not eliminate the daylight restriction in the Neches River, which is where many of the terminals are located (Figure 4-2). All widening alternatives 1 through 6 increase the size of vessels allowed to meet in the various channel reaches because the Pilots Operational Rules state that vessels with a combined beam equal to or greater than one-half the channel width will not meet day or night.

Table 4-13
Alternative Widening Plans Developed for Economic Evaluation

Alternative Plan	Neches River	Sabine-Neches Canal	Port Arthur Canal	Sabine Pass Channel	Anchorage Basin 4 Vessel Capacity
	Channel Width (feet)				
WOP	400	400	500	500	1
Alt1	500	500	500	500	1
Alt2	600	600	500	500	1
Alt3	500	500	700	700	1
Alt4	500	500	600	600	1
Alt5	400	500	500	500	1
Alt6	600	600	600	600	1

**Table 4-14
Time Savings of Alternative Widening Plans (2025)**

	Alt1	Alt2	Alt3	Alt4	Alt5	Alt6
Total Vessel Calls	3,887	3,887	3,887	3,887	3,887	3,887
Calls with Non-working Time	3,020	3,019	2,992	2,997	3,153	3,018
Calls without Non-working Time	867	868	895	890	734	869
Arrival Delay Reduction (average hours per vessel call)	1.5	1.4	1.5	1.5	1.0	1.6
Departure Delay Reduction (average hours per vessel call)	6.4	6.6	6.7	6.7	3.7	6.9
Anchorage Time Reduction (average hours per vessel call)	2.9	2.9	2.9	2.9	2.2	2.9
Weather Delay Reduction (average hours per vessel call)	0.9	0.8	0.9	0.9	0.5	0.9
Total Time Savings (average hours per vessel call)	11.7	11.7	12.1	12.1	7.3	12.2

Net benefits of the six alternative widening plans are shown in Table 4-15. Alternative 1 provides the greatest net benefit of all the widening plans evaluated. Alternative 2 provides an increase in benefits over Alternative 1 but includes the increased costs of widening an additional 100 feet to create a 600-foot-wide channel in both the Sabine-Neches Canal and the Neches River. Alternatives 3, 4, and 6 increase benefits greater than Alternative 1 but there is a substantial increase in costs because these alternatives also widen the Port Arthur Canal and the Sabine Pass Channel. Alternative 5, although the least cost alternative, provides substantially less benefits and net benefits than Alternative 1.

Table 4-15
AAEQ Net Benefits of Alternative Widening Plans
(FY26, \$ thousands)

	Alt1	Alt2	Alt3	Alt4	Alt5	Alt6
Construction Costs	\$310,827	\$887,301	\$634,559	\$457,084	\$182,319	\$890,128
Interest During Construction	\$16,012	\$63,765	\$41,390	\$28,306	\$5,986	\$79,889
Total Construction Cost	\$326,839	\$951,065	\$675,949	\$485,391	\$188,305	\$970,017
AAEQ Construction Cost	\$13,312	\$38,737	\$27,532	\$19,770	\$7,670	\$39,509
AAEQ Maintenance Cost	\$2,444	\$4,804	\$3,961	\$3,203	\$1,101	\$5,905
AAEQ Total Cost	\$15,756	\$43,541	\$31,493	\$22,973	\$8,771	\$45,414
AAEQ Benefits	\$49,144	\$49,602	\$51,223	\$51,134	\$21,972	\$57,928
AAEQ Net Benefits	\$33,388	\$6,060	\$19,730	\$28,161	\$13,201	\$12,513

4.13.3 Economic Evaluation of Alternative Plans: Phase 3

The goal of Phase 3 of the economic evaluation of alternative plans is to evaluate the net benefits of adding incremental increases in AB4 vessel holding capacity to net benefit maximizing widening plan (Alternative 1). The increments of vessel holding capacity include increasing the AB4 capacity from one vessel (without-project condition) up to four vessels. Note that Alternative 1 includes the without-project condition capacity for a single vessel at AB4. Dredged material from the potential expansion of AB4 is unlikely to be used for wetland restoration because of the close proximity of an upland placement area to AB4, which would make beneficial use an unreasonably high cost of dredged material placement.

The incremental time savings of adding holding capacity at AB4 to the improvements included in Alt 1 are marginal (Table 4-16).

Table 4-16
Time Savings: Alternative 1 with Increases in AB4 Vessel Capacity (2025)

	Alt1 (1 Vessel)	Alt1+AB4-2 (2 Vessels)	Alt1+ AB4-3 (3 Vessels)	Alt1+ AB4-4 (4 Vessels)
Total Vessel Calls	3,887	3,887	3,887	3,887
Calls with Non-working Time	3,020	3,025	3,019	3,015
Calls without Non-working Time	867	862	868	872
Arrival Delay Reduction (average hours per vessel call)	1.5	1.5	1.5	1.5
Departure Delay Reduction (average hours per vessel call)	6.4	6.3	6.4	6.4
Anchorage Time Reduction (average hours per vessel call)	2.9	2.8	2.7	2.8
Weather Delay Reduction (average hours per vessel call)	0.9	0.9	0.9	0.9
Total Time Savings (average hours per vessel call)	11.7	11.5	11.5	11.6

The net benefits of Alternative 1 and three incremental increases in AB4 capacity are presented in Table 4-17. Alternative 1 without additional vessel capacity at AB4 provides the greatest net economic benefit of all the plans evaluated and is the NED Plan. Alternative 1 and Alternative 2 are forwarded for the analysis of environmental effects. Alternative 2 is carried forward because this alternative provides more total benefits than Alternative 1, without widening the Port Arthur Canal or the Sabine Channel.

Table 4-17
**Net Benefits: Alternative 1 with Increases in AB4 Vessel Capacity
(FY26 \$ thousands)**

	Alt1 (1 Vessel)	Alt1+AB4-2 (2 Vessels)	Alt1+ AB4-3 (3 Vessels)	Alt1+ AB4-4 (4 Vessels)
Construction Costs (FY26)	\$310,827	\$350,654	\$386,760	\$421,803
Interest During Construction	\$16,012	\$19,989	\$23,951	\$28,210
Total Construction Cost	\$326,839	\$370,643	\$410,711	\$450,013
AAEQ Construction Cost	\$13,312	\$15,096	\$16,728	\$18,329
AAEQ Maintenance Cost	\$2,444	\$2,647	\$2,857	\$3,060
AAEQ Total Cost	\$15,756	\$17,744	\$19,585	\$21,389
AAEQ Benefits	\$49,144	\$49,122	\$34,743	\$33,822
AAEQ Net Benefits	\$33,388	\$31,378	\$15,158	\$12,433

4.14 Table of Effects

The Table of Effects evaluates the three alternatives with the greatest economic benefits that also eliminate the daylight restriction: Alt 1, Alt 2, and Alt 1 + AB4-2. Alt 1 is the smallest widening (100 feet in selected reaches of the Sabine-Neches Canal and the Neches River) that eliminates the daylight restriction. Alt 2 widens the same reaches of the Sabine-Neches Canal and the Neches River as Alt 1, but the widening distance is 200 feet. The other widening-only alternatives (Alternatives 3, 4, 5, and 6) widen reaches in the Port Arthur Canal and/or Sabine Pass Channel that have no effect on the daylight restriction and each of these alternatives have fewer net benefits than Alt 1. Alt 1 + AB4-2 is included in the Table of Effects because it eliminates the daylight restriction and has the highest net benefits of all the alternatives that increase the vessel capacity of AB4.

Each of the final three alternatives and the no action alternative are evaluated on meeting the four formulation and evaluation criteria:

- *Completeness* is the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other federal and non-federal entities. Completeness must consider the sustainability and long-term aspects of the plans and whether all resource requirements are included;
- *Effectiveness* is the extent to which the alternative plans contribute to achieving the planning objectives. Benefit metrics reflect the effectiveness of each alternative;
- *Efficiency* is the extent to which an alternative plan is a cost-effective means of solving the problem and achieving the objectives. Efficiency is determined through a comparison of the costs and benefits of each alternative; and
- *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. Acceptability has two dimensions – implementability and satisfaction. Implementability means the extent to which the alternative is feasible from a technical, financial, and legal perspective. Satisfaction is the extent to which the plan is welcome from a political or preferential perspective.

The Table of Effects (Table 4-18) summarizes the evaluation based on the four formulation and evaluation criteria.

**Table 4-18
Table of Effects**

	No Action	Alt 1	Alt 2	Alt1 + AB4-2
AAEQ Total Costs	\$0	\$15,756,000	\$43,541,000	\$17,744,000
AAEQ Benefits	\$0	\$49,144,000	\$49,602,000	\$49,122,000
AAEQ Net Benefits	\$0	\$33,388,000	\$6,060,000	\$31,378,000
BCR	NA	3.6	1.3	3.2
Regional Economic Benefits	None	Minor	Minor	Minor
Beneficial Use Cubic Yards	None	500,000 cy	500,000 cy	500,000 cy
Vessel Safety	No Improvement	Substantial Improvement	Substantial Improvement	Substantial Improvement
Completeness	No	Yes	Yes	Yes
Acceptability	No	Yes	Yes	Yes

4.14.1 Completeness

All three of the action alternatives (Alt 1, Alt 2, and Alt 1 +AB4-2) are complete in that they provide and account for all necessary investments or other actions to ensure the realization of the planning objectives. The No Action Alternative does not achieve any of the planning objectives and therefore is not complete.

4.14.2 Effectiveness

Each of the action alternatives is effective in that they each contribute to achieving the planning objectives but to different degrees.

Objective #1 - Each of the action alternatives reduces delays and associated transportation costs with Alt 2 having the greatest AAEQ benefit (\$49.6 million).

Objective #2 - Each of the action alternatives increases federal navigation channel efficiency for the projected SNWW fleet during the period of analysis by eliminating the daylight restriction.

Objective #3 - Each of the action alternatives also improves navigation safety by allowing for safe nighttime transit by large vessels in the Sabine-Neches Canal and Neches River, which could not be transited safely at night under without-project conditions.

Objective #4 - Each of the action alternatives provides for up to 500,000 CY of dredged material for beneficial use for wetland restoration.⁹ Each action alternative makes that same amount of new work material available for beneficial use because that is the projected capacity of new work material from this project that can augment beneficial use material provided by the Deepening Project to the same beneficial use area (Bessie Heights BU site).

The No Action Alternative is not effective because it does not contribute to achieving any of the planning objectives.

4.14.3 Efficiency

The cost-effectiveness of an alternative is quantified by the net benefits of the alternative. The alternative with the greatest AAEQ net benefits is the NED Plan. Alt 1 has the greatest AAEQ net benefits of all plans evaluated (\$33.4 million).

4.14.4 Acceptability

Each of the action alternatives and the no action alternative are feasible from a technical, financial, and legal perspective. From the perspective of satisfaction *i.e.*, the extent to which the plan is welcomed from a political or preferential perspective, each of the action alternatives are welcomed by the local navigation interests, business community, and Jefferson County municipal leadership. The No Action Alternative is not welcomed by the local navigation interests, business community, and Jefferson County municipal leadership because the loss of potential benefits and opportunities afforded by the action alternatives would be a major disappointment.

4.14.5 Table of Effects Conclusion

The result of plan formulation is that Alt 1 is the NED Plan and the Recommended Plan. The No Action Alternative and Alt 2 are also carried forward for the evaluation of environmental effects presented in Section 7. Alt 1 + AB4-2 is not carried forward because it does not provide greater net benefits than Alt 1.

⁹ During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

5 Recommended Plan/Proposed Action*

5.1 Description of the Recommended Plan

The analysis within this integrated document is based upon feasibility level design and reasonable assumptions regarding the proposed actions and experience with dredging within the SNWW. Estimates for construction and material placement were developed from best professional judgment, final designs and construction experience from the ongoing channel deepening, and the Galveston District's ongoing routine maintenance dredging. The construction assumptions within this section are sourced from the Engineering Appendix and are used to inform the analysis of the potential environmental consequences in Section 7, Affected Environment and Environmental Effects.

While the components of the recommended plan/proposed action described in this evaluation are not final design, the basic function of their features and the footprint for their construction should remain substantially the same as the project progresses through detailed design. The design and construction assumptions developed were used to quantify the magnitude of the proposed actions and not to prescribe detailed materials, specify quantities, or to define design specifications. The description of the construction and material placement in this analysis does not represent a commitment to final design, equipment for use, vendors, or methods of construction, but gives an approximation of how the recommended plan/proposed action could be reasonably constructed allowing a quantification of the associated environmental consequences.

The proposed widening would be assumed to be constructed after the ongoing channel deepening (currently under construction) is completed. As such, the extent of the assumed changes to the physical environment from the proposed channel widening would be compared to the expected conditions after the ongoing channel deepening has been completed.

The recommended plan/proposed action would widen the existing federal navigation channel by 100 feet along the left descending bank, over a combined length of approximately 19.4 miles. As shown in Figure 5-1, the proposed widening would be within the:

- Sabine-Neches Canal (South) (magenta line in Figure 5-1),
- Sabine-Neches Canal (North) (blue line in Figure 5-1), and the
- Neches River Channel (yellow line in Figure 5-1).

Of the 19.4 miles to be widened that are shown in Figure 5-1, 16.8 miles of the channel widening (> 86-percent) would occur completely underwater and would result in no changes to the adjacent shoreline or land. The locations where the proposed widening would result in changes to the adjacent land would occur at the locations shown as red polygons in Figure 5-2. Figure 5-2 shows the areas converted from land to open water on the left descending bank of the lower Neches River and the Sabine-Neches Canal (North) (i.e., from Pleasure Island).

Figure 5-1
Proposed Areas to Be Widened

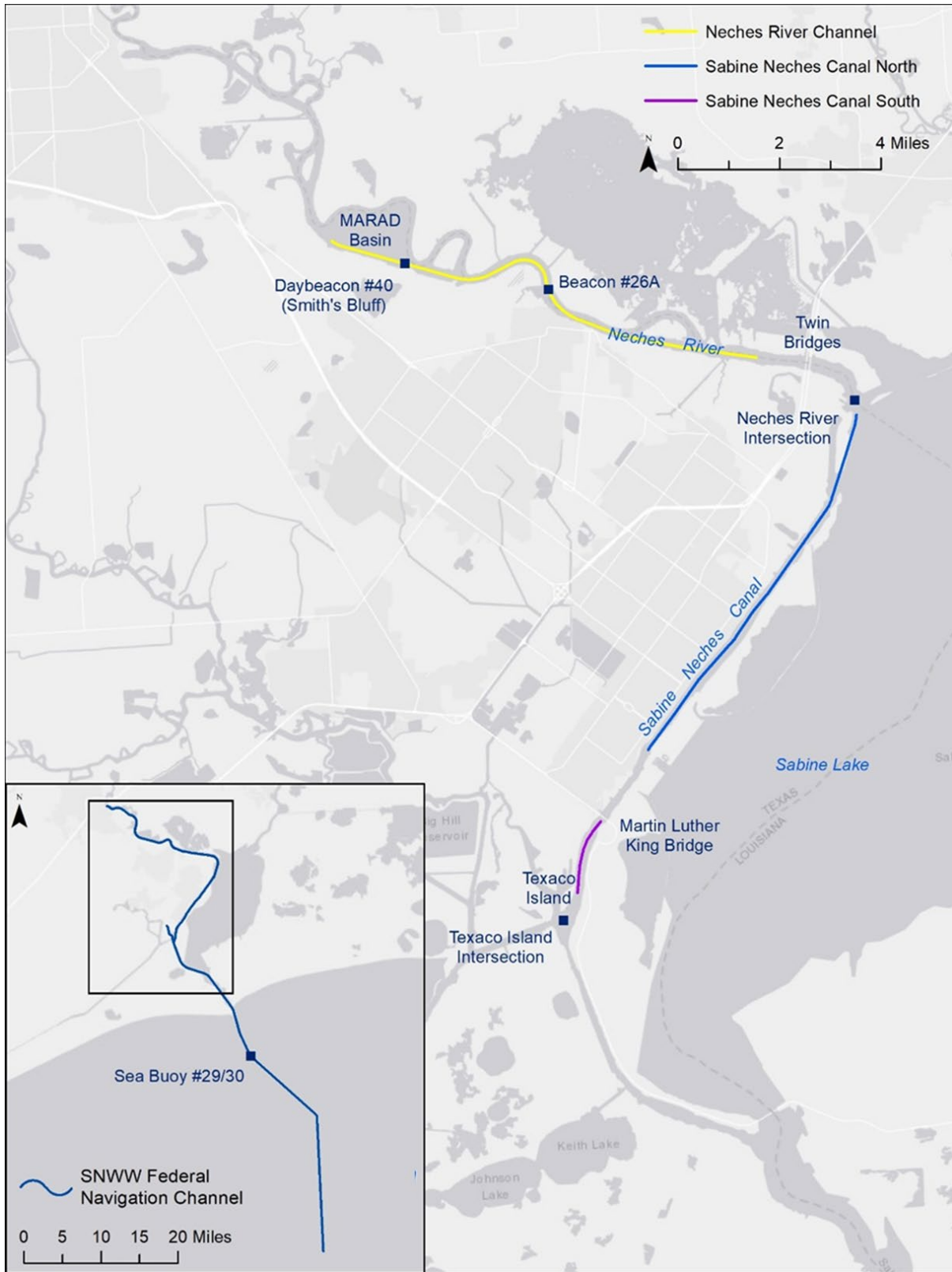


Figure 5-2
Areas of Landside Excavation - Proposed Widening

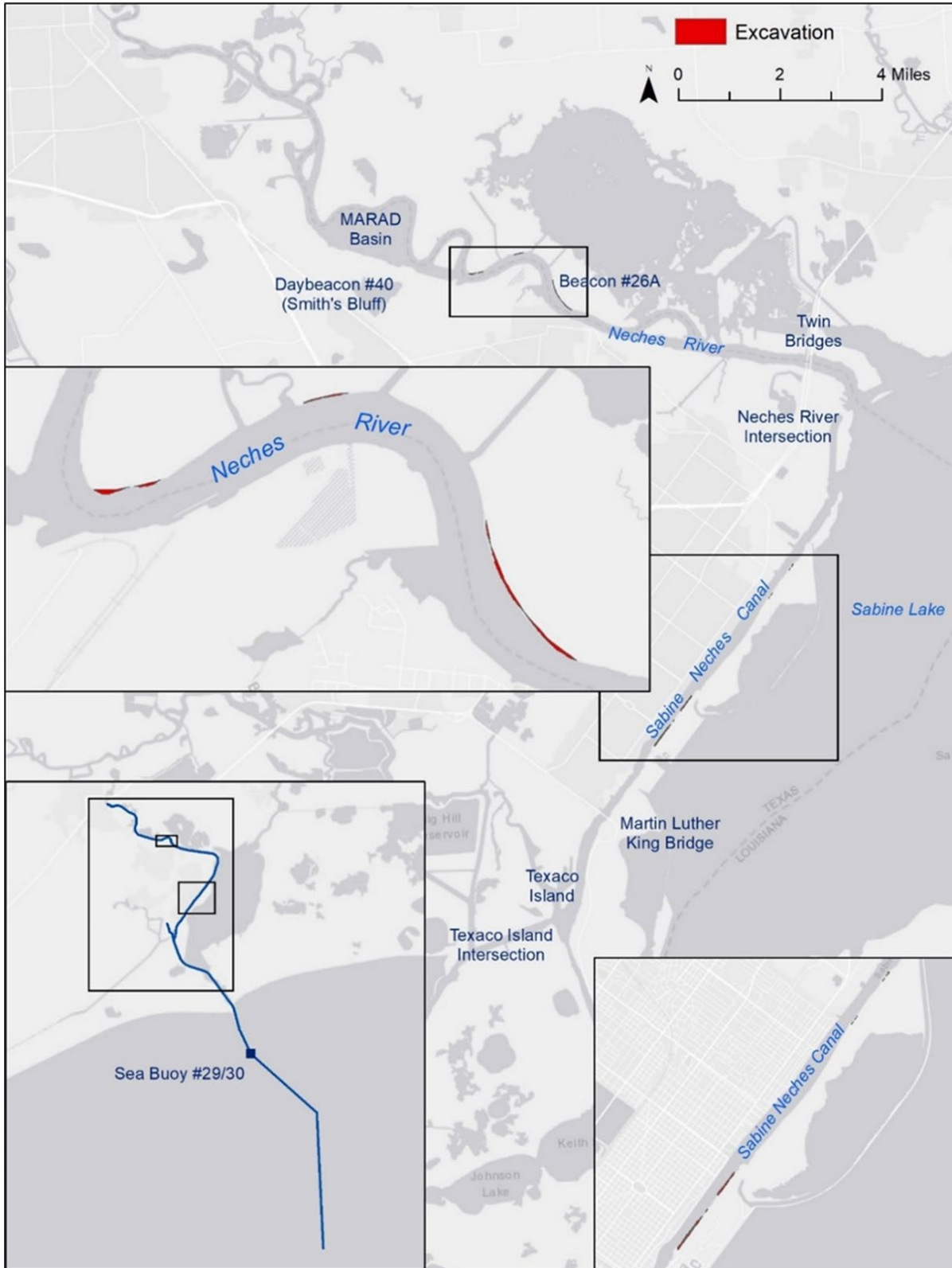


Table 5-1 shows the predicted changes to physical environment from the proposed widening, depicted in Figures 5-1 and 5-2. As shown in Table 5-1, the total area to be added to the federal navigation channel for the widened segments shown in Figure 5-1 would be approximately 231.8 acres and would be entirely under the existing water line.

**Table 5-1
Proposed Widening: Extent of Physical Modifications**

Segment of Federal Channel Widening	Subtidal Area of Widened Channel (AC)	Upland Area of Disturbance (AC)	Affected Shoreline Length (MI)	Dredge Volume Removed (CY)
Sabine-Neches Canal (South)	18.2	0.0	0.0	812,000
Sabine-Neches Canal (North)	98.5	10.9	1.3	5,470,000
Neches River Channel	115.1	6.2	1.2	4,950,000
TOTAL	231.8	17.2	2.5	11,232,000

5.1.1 General Navigation Features

General Navigation Features (GNF) of the recommended plan include:

- Widening selected reaches of the Sabine-Neches Canal and the Neches River, and
- Modified 50-year DMMP for new work and maintenance material that includes upland placement areas and beneficial use features.

Non-GNF project features include electric transmission tower relocation and aids to navigation.

5.1.2 Channel Dimensions

The recommended plan includes widening the following reaches by 100 feet. Channel depth would remain -48 feet. No changes would be made to reaches not listed in Table 5-2.

**Table 5-2
Sabine Neches Waterway Recommended Plan**

Channel Reach	Reach	Bottom Width (Feet)	
		Without Project	With Project
Sabine-Neches Canal (South)	63+500 to 66+235	718 to 435	718 to 535
Sabine-Neches Canal (South)	66+235 to 72+700	435 to 400	535 to 500
Sabine-Neches Canal (North)	81+742 to 121+517	400 to 500	500 to 600
Neches River Channel	0+00 to 40+00	500	600
Neches River Channel	122+40 to 640+00	400	500

5.2 Construction Assumptions for the Recommended Plan/Proposed Action

Construction assumptions for the recommended plan are presented in this section. Construction assumptions for next likely alternative plan (Alternative 2) are presented in Section 5.3 to inform the environmental effects of alternative plans analysis that follows in Section 7.

Because the downstream-most area for widening (Sabine-Neches Canal (South) segment, magenta line in Figure 5-1) is already relatively deep water, widening in the Sabine-Neches Canal (South) segment would not result in any changes to adjacent shoreline or land. As such, Table 5-1 shows the area of upland disturbance for the Sabine-Neches Canal (South) segment is zero acres because the entire footprint of disturbance for this segment would be under water.

Within the Sabine-Neches Canal (North) segment (blue line in Figure 5-1), 1.3 miles of shoreline and a total of 10.9 acres of uplands would be converted to open water. Within the Neches River Channel segment (yellow line in Figure 5-1), 1.2 miles of shoreline and a total of 6.2 acres of uplands would be converted to open water. Constructing the recommended plan/proposed action would affect a total of 2.5 miles of shoreline and 17.2 acres of upland habitat as summarized in Table 5-1.

Dredging would also be performed on the adjacent side slope (i.e., outside of the widened navigation channel) as dredging outside the geometry of the navigation channel prevents large quantities of adjacent sediment from sloughing into the navigation channel after initial construction. The constructed channel side slope would be at a 2H:1V based on geotechnical investigations and is the same value used for analyses in the 2011 Feasibility Report and Final EIS for the ongoing channel deepening (USACE, 2011).

Dredging to widen the navigation channel would be performed by a 30-inch cutterhead suction (pipeline) dredge. The dredge would remove approximately 15,000 CY/day, seven days a week, 24-hours operation per day, and actively dredging 60-percent of the time. Dredging would remove nearly 11.2 million CY of dredged material (Table 5-1) and constructing the recommended plan/proposed action would take approximately 30 months. Staging areas for equipment and materials would use existing industrial waterfront facilities within the adjacent Port Arthur and Port Neches.

Where constructing the widened areas had a landside footprint, an additional 12-25 foot wide temporary equipment access corridor would be assumed. Where possible, equipment access and staging would utilize previously disturbed corridors and existing access features to the extent possible. Adjacent to the Neches-River Channel, the landside actions could occur within the former golf course property and within the disturbed access corridors adjacent to Placement Area 11. Along the Lower Neches River, landside actions could occur along the frequently disturbed existing access to Placement Areas 18, 19, 20, and 21. Access to the areas adjacent to the Sabine-Neches Canal (North) segment would be via public surface roads to the property and access along the lower Neches River would be via private roads maintained by the Sabine Neches Navigation District for management of the dredged material placement areas. As such, no temporary construction easements or right away agreements, right of entry agreements would be necessary. Landside actions within these previously-disturbed corridors could include:

- Clearing and grubbing all unwanted surface material with heavy equipment (e.g., bulldozer, bobcat-type equipment with brush hog);
- Picking up and removing piles of cleared material with barge-based equipment;
- Removing non-engineered shoreline protection and staging it for disposal¹⁰ or re-use;
- Pushing the earthen material into the water for dredging with heavy equipment (e.g., bulldozer); and
- Deploying sediment/runoff control while the disturbed area revegetates due to the ubiquity of plant propagules and the humid, subtropical climate.

Along the Sabine-Neches Canal (North), (i.e., along Pleasure Island, blue line in Figure 5-1), widening would require removal of the non-engineered shoreline protection (i.e., concrete rubble) along the shoreline. Figure 5-3 shows a typical example of non-engineered shoreline protection along Pleasure Island that would be removed prior to dredging. Based on site visits and aerial imagery assessments, approximately 5,300 linear feet of shoreline protection material would be removed and the volume of the various shoreline protection materials to be removed is assumed to be ten CY of material per linear foot (SNND, 2024). As such, construction of the proposed widening would require removal of approximately 53,000 CY of material using a barge-based crane (SNND, 2024).

Figure 5-3
Typical Non-Engineered Shoreline of Pleasure Island



Further upstream, but still within the Sabine-Neches Canal (North) segment, a 3,300 linear foot portion of the Placement Area 11 riprap that stabilizes the shoreline would be removed and then replaced on the new shoreline alignment (SNND, 2024). This replaced shoreline protection would be constructed with approximately 27,000 CY of rock riprap placed on geotextile fabric with crest at elevation +5 ft MLLW, a toe at elevation -10 ft MLLW, and a thickness of five feet (SNND, 2024). Moving the shoreline would also require the relocation of approximately 3,700 linear feet

¹⁰ If not re-used, it will be disposed of at an existing location licensed to accept this type of material.

of the Placement Area 11 perimeter dike (SNND, 2024). This relocation is assumed to use the existing earthen berm materials to reconstruct the dike on the new alignment.

Because there are no existing shoreline protection features within the Neches River Channel segment, shoreline protection removal or replacement would not occur in the yellow area as depicted in Figure 5-1 (shown previously).

5.2.1 Maintenance Dredging

As is the current USACE practice, maintenance dredging of the Sabine-Neches Canal and Neches River Channel would be assumed to be performed by a 30-inch cutterhead suction (pipeline) dredge capable of up to 25,000 CY/day.¹¹ The recommended plan/proposed action widening would not be expected to change the frequency of maintenance dredging within the waterway, but would increase the footprint of the navigation channel being maintained and the volume of maintenance material generated per maintenance dredge cycle. The increase in the maintenance material (Table 5-3) would be an increase of slightly over half a million CY per year and would add approximately 20 additional days per year of maintenance dredging to the approximately 130 days per year of maintenance dredging that is done annually for the Sabine-Neches Canal and Neches River Channel combined (SNND, 2024).

Table 5-3
Proposed Action: Annual Maintenance Dredging Volumes and Durations

Alternative and Area	Annual Dredge Volume (CY/YR)	Annual Days of Additional Maintenance Dredging¹²
Sabine-Neches Canal (South)	65,200	3
Sabine-Neches Canal (North)	155,760	6
Neches River Channel	280,000	11
TOTAL	500,960	20

5.2.2 Dredged Material Placement

Within just the past 50 years, more than 250 million CY of maintenance material has been dredged from the interior channels of the SNWW and placed in adjacent upland placement areas (PAs) (USACE, 2021). The upland PAs are confined with earthen containment dikes and dredging effluent is discharged from the PAs via controlled spillways to outfall canals and drainage ditches. As shown in Figure 5-4, there are confined, upland dredge material PAs, along the entire waterway that sum to more than 11,500 acres within the dikes, that are maintained and operated for dredge

¹¹Note that dredge productivity for maintenance dredging is assumed to be greater than new-work dredge productivity because maintenance material is less compacted than new-work material and therefore flows more readily into the dredge.

¹²Annual Days Maintenance Dredging estimated by dividing CY by the assumed 25,000 CY/DY production.

material placement along the SNWW. These existing dredged material placement areas are all adjacent to the navigation channel and are proximate to areas for the proposed widening.

Review of the existing Dredged Material Management Plan (DMMP) (USACE, 2010b; USACE, 2011d), the existing PAs, the ongoing routine maintenance dredging, and the placement needs for dredged material generated from the ongoing Deepening Project has been conducted within the Engineering Appendix as the “50-Year Placement Capacity Analysis.” Therein, the evaluation concludes that “*New work and maintenance dredging volumes from the proposed widening improvements were determined to fit within the overall 50-yr DMMP that was developed as part of the FWOP design.*” As such, the evaluation in the Engineering Appendix demonstrates that sufficient placement capacity is available for all widening-generated new-work as well as future increased maintenance volumes without the need to develop new dredged material placement areas, as described below.

The 50-yr DMMP is a living document and modifications to the plan are under development as part of the engineering and design of the Deepening Project. As shown in Table 5-4, the SNWW PAs and BU sites have sufficient capacity to hold all new work and 50-year maintenance material for the Deepening Project and Recommended Plan presented in this FR/EA assuming the future dike heights presented in the feasibility report for the Deepening Project (USACE 2011).

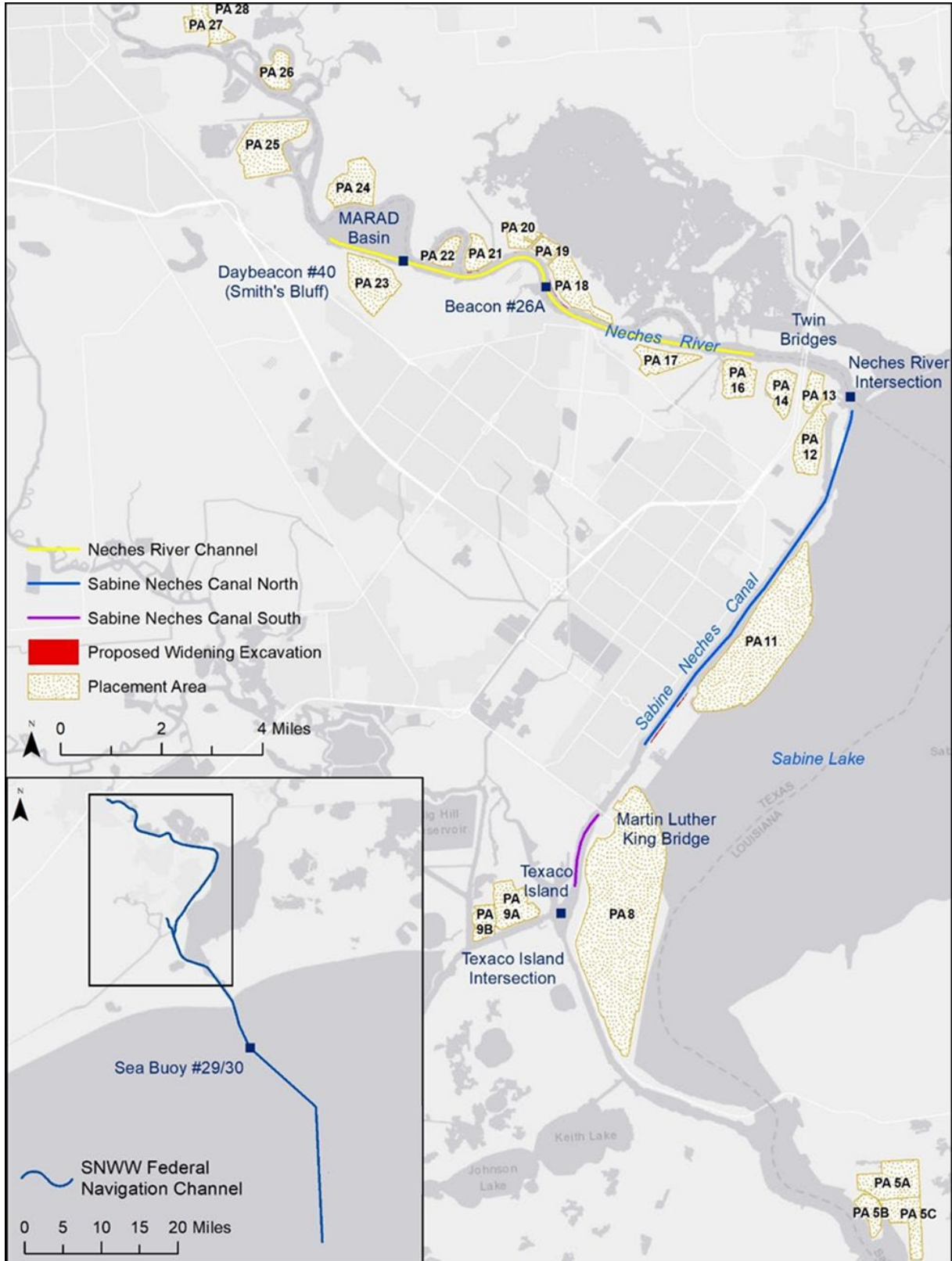
**Table 5-4
50-year Placement Capacity Summary**

Project Element	Volume, CY
FWOP New Work Placement Capacity (After Deepening)	41,523,000 ^[1]
New Work Dredging Volume (Widening)	12,813,000 ^[2,3]
Remaining Capacity After Widening New Work Placement:	28,710,000
50-Year O&M Placement Capacity after New Work Placement (Deepening and Widening)	199,259,000 ^[4]
50-yr O&M Dredging Volume (Deepening)	172,101,000 ^[5]
50-yr O&M Dredging Volume (Widening)	17,534,000 ^[5,6]
Remaining Capacity After 50 Years:	9,624,000

Notes:

- 1) FWOP placement capacity includes dikes raises at existing PAs as well as construction of BU sites, which will be constructed as part of the channel deepening work. FWOP placement capacity was estimated for the deepening project design documentation reports (DDRs).
- 2) New work dredging volumes were increased by 10 percent to account for material bulking.
- 3) Refer to Table 5-1 for new work volumes by widening section.
- 4) The 50-yr PA capacity assumes dike raises will be constructed to the future heights in the FWOP Engineering Appendix (USACE 2010a).
- 5) Long term placement of O&M material includes a shrinkage factor of 0.7.
- 6) Refer to Table 5-3 for O&M volumes by widening section.

Figure 5-4
Dredged Material Placement Areas Along the SNWW



5.2.3 Beneficial Use of Dredged Material in the Neches River Habitat Features

The use of dredged material for habitat nourishment, restoration, or establishment of various habitat types is a preferred alternative use of dredged material over conventional placement options (USACE, 2015). Within any habitat, several distinct biological communities may occur such as in the creation of a dredged material marsh that results in benefits to shallow aquatic habitats, wetlands, and potentially uplands depending on the final elevation of the dredged material placement. The creation of dredged material islands creates and nourishes transitional habitats and diversity of habitats with longer lengths of aquatic/upland shorelines where there would otherwise be limited transitions and isolated habitat. The environmental effect of most habitat beneficial use (BU) projects results from the transformation from the existing, degraded open-water habitat (i.e., continually subtidal) into marsh where the placing of dredge material into the open water and raising the elevation produces this conversion. The need for restoring marsh habitat is considered especially critical in areas that have already been lost or are in the process of losing marsh and shallow aquatic habitat (USACE, 2015). Wetland (i.e., marsh) habitat nourishment is often the most desirable form of BU of dredged material in the coastal environment as these habitats are often vulnerable and have experienced the most loss (USACE, 2015).

The DMMP for the ongoing channel Deepening Project included the beneficial use of dredged material for the construction of marsh restoration as general navigation features (GNFs) of the DMMP (USACE, 2011d). Sediment placement is the purposeful placement of suitable dredged material (sediment) in a manner that produces a desired elevation allowing for the growth of functional marsh ecosystems. The DMMP BU features were not part of an ecosystem restoration plan and were not ecosystem restoration measures; as such, the DMMP BU features did not target a specific historical condition for the level of restoration (USACE, 2011d). The BU planning included using new work and maintenance material dredged from the Neches River Channel to restore emergent marsh in the adjacent “Neches River habitat features” (USACE, 2011; USACE, 2012). The Final EIS (USACE, 2011) accounted for the environmental consequences from construction of the Neches River BU features addressing water quality, sediment quality, vegetation, aquatic ecology, listed species, and compliance with the applicable environmental laws (USACE, 2011).¹³

The Bessie Heights East component of the Neches River BU features was planned to use 1,000,000 CY of new work material and a “to be determined” quantity of maintenance material to restore approximately 1,869 acres of emergent marsh in the State of Texas as shown in Figure 5-5 (USACE, 2010b). The construction assumptions for Bessie Heights East presumed placing dredged material into the open-water area that now averages two to three feet in depth.

The construction sequence would begin with *“new work material would be used to build a containment levee along the southern end of the BU area, and the marsh would be in 7 maintenance cycles, over 28 years”* (USACE, 2011d). As such, the ecosystem benefits from the Bessie Heights East marsh restoration presumed 1,000,000 CY of new work and then pumping an unspecified quantity of sediment during seven different maintenance cycles (each separated by four years) over 28 years to complete construction (USACE, 2011a). Figure 5-6 shows the Bessie

¹³ Clean Air Act, Clean Water Act, Section 10 of the River and Harbor Act, Fish and Wildlife Coordination Act, Coastal Zone Management Act, Endangered Species Act, Fish Conservation and Management Act, etc.

Figure 5-5
Neches River Beneficial Use Features

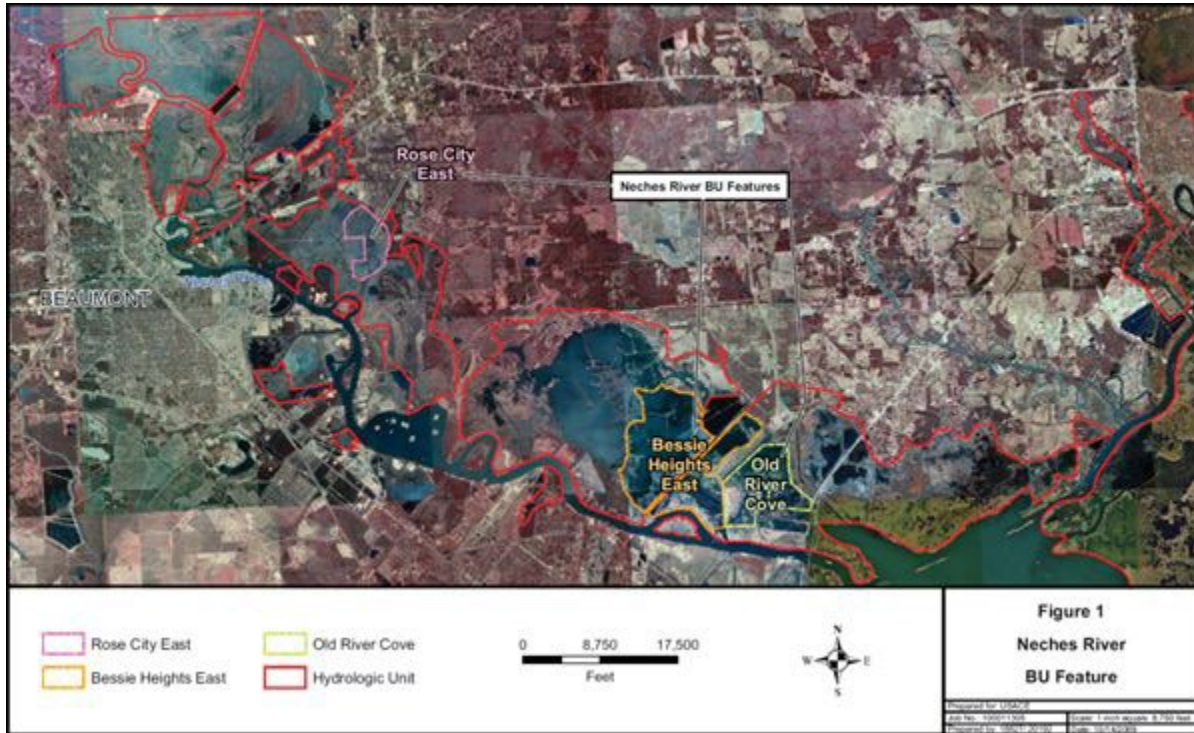
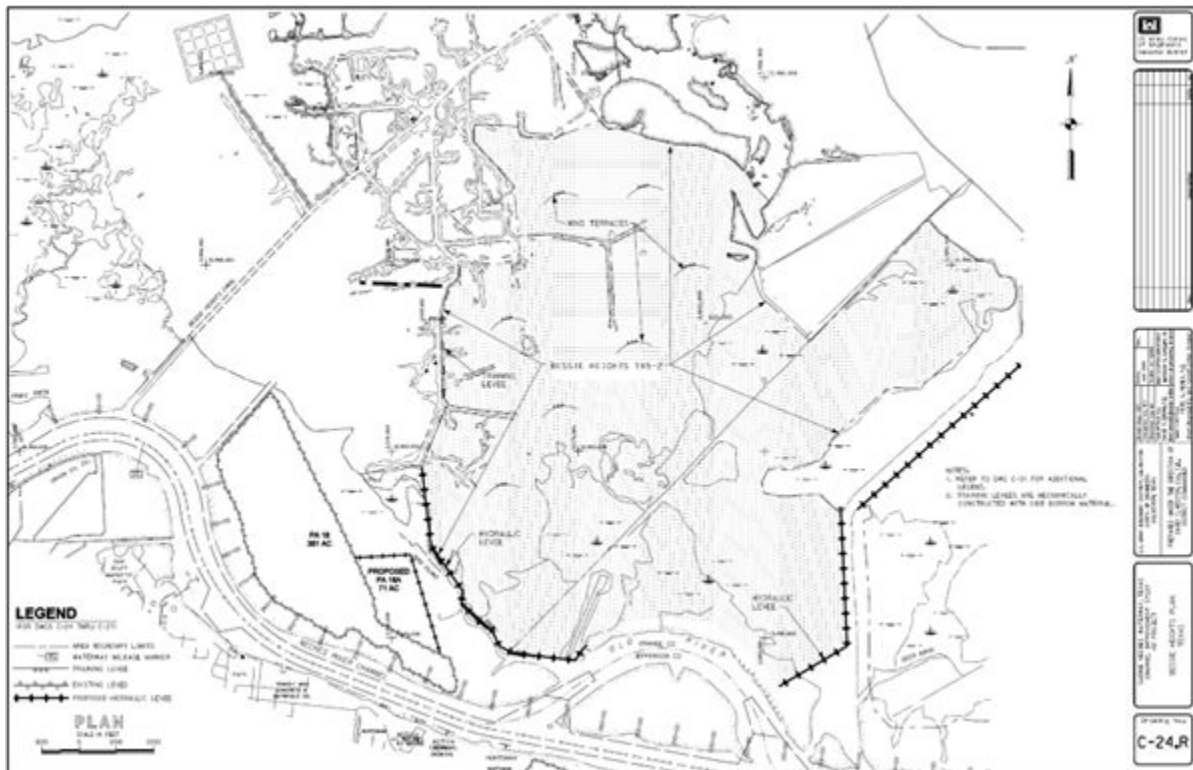


Figure 5-6
Bessie Heights Beneficial Use Marsh Restoration



Heights East BU site as shown in the Engineering Plates of the Final Feasibility Report (USACE, 2011e).

Because of the presumed seven dredging cycles it would take for construction of the Bessie Heights East site, dredged material generated from the present Recommended Plan/Proposed Action would provide a beneficial use (BU) opportunity to accelerate the marsh construction. Marsh would be constructed by the unconfined flow of dredged material from a hydraulic pipeline with frequent pipe movement and careful elevation control to obtain the appropriate marsh elevations (USACE, 2011a). As a component of the Recommended Plan/Proposed Action, up to 500,000 CY of dredged material would be utilized to build marsh in the Bessie Heights East site, decreasing the BU feature construction duration (currently 30+ years) and achieving the ecosystem benefits of the restored marsh habitat more quickly (USACE, 2011a). During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

The Bessie Heights East BU feature is scheduled for construction within Contracts 8 and 9 of the ongoing deepening (2028-2029) and is reliant on the availability of dredged material in proximity. Providing BU material to the Bessie Heights East site as part of the Recommended Plan/Proposed Action was encouraged by the USFWS in their Planning Aid Letter for the proposed widening (USFWS, 2024).

5.2.4 Relocations, Including Aids to Navigation

Constructing the Recommended Plan/Proposed Action would not require the relocation of any bridges, docks, or wharfs. However, within the footprint of the proposed widening, pipelines, cables, and utilities that traverse the channel were identified. Because of the ongoing Deepening Project construction, all facilities traversing the channel would have been relocated to accommodate construction of the channel deepening prior to beginning construction for the proposed widening. As such, there would be no submerged pipeline, cables, or utility relocations needing relocation as part of the proposed widening. As typical for any channel modification project, during Preconstruction Engineering and Design (PED), utility depths would be verified, and a detailed hazard survey (magnetometer, side-scan sonar, or similar) would be performed as a best management practice.

The Entergy electricity transmission line crossing the Neches River channel will be relocated as a component of the recommended plan. Widening the transmission line crossing will require two new crossing towers to maintain the existing crossing clearance. Tower height will be over 200', FAA approval will be obtained, lighting and aerial marking will be required for the towers, foundations, and wires. Two new foundations will be required for the new towers and specialty equipment will be required to work in the waterway. The two foundations will consist of multiple driven piles with a concrete pile cap or helical piles with a pile cap. Relocating aids to navigation (ATON) is a federal responsibility with the U.S. Coast Guard (USCG) responsible for all costs for new channel markers and relocation of existing ATON. Large ATON (e.g., range towers) requiring relocation for both the deepening and the proposed widening were assumed to be moved only a single time because of the time and expense required to move these types of structures. Other ATON (e.g., channel marker lights) were assumed to be moved for the deepening and again

for the proposed widening. Approximately 24 ATONs were estimated to require relocation to implement the Recommended Plan/Proposed Action.

5.3 Construction Assumptions - Alternative 2

Construction of Alternative 2, the channel would be widened by 200 feet (from 400 to 600 feet) within the same segments shown in Figure 5-1 and would take approximately five years. Table 5-4 presents the extent of the physical modifications necessary to construct Alternative 2. Because Alternative 2 doubles the width of the proposed areas to be widened vs. the recommended plan/proposed action, the values in Table 5-4 are larger.

**Table 5-4
Alternative 2: Extent of Physical Modifications**

Segment of Federal Channel Widening	Area of Widened Navigation Channel (AC)	Adjacent Land Mass Loss (AC)	Affected Shoreline Length (MI) ¹⁴	Dredge Volume (CY)
Sabine-Neches Canal (South)	35.1	0.0	0.0	2,540,000
Sabine-Neches Canal (North)	190.5	44.7	1.6	15,570,000
Neches River Channel	230.4	46.7	3.2	13,540,000
TOTAL	456.0	91.3	4.8	31,650,000

The total area to be added to the federal navigation channel (i.e., the below-water area of the widened navigation channel for deep draft vessels) for Alternative 2 would be approximately 456 acres, approximately twice the area for the recommended plan/proposed action. Alternative 2 would also require the removal of approximately 7,200 linear feet of non-engineered shoreline protection (as shown in Figure 5-3) along Pleasure Island generating an estimated total of 72,000 CY of material to be removed prior to dredging.

For Alternative 2, a 4,900 linear foot portion of the existing riprap that stabilizes the shoreline adjacent to Placement Area 11 would be removed and then replaced after completion of the 200-foot widening. This shoreline would be constructed the same as for the recommended plan/proposed action, but would require approximately 40,000 CY of rock riprap because of the longer segment. Implementing Alternative 2 would also require the relocation of approximately 5,500 linear feet of the Placement Area 11 perimeter dike and would also use the existing earthen berm materials to reconstruct the dike on the new alignment.

¹⁴ Under the FWOP condition, a total of 1.13 miles of Pleasure Island shoreline will be moved landward because the side slopes for the deeper channel will extend onto land. The length of shoreline disturbance from widening presumes the Pleasure Island shoreline and lands will have already been affected by completion of the ongoing channel deepening.

As with the recommended plan/proposed action, because there are no shoreline protection features within the Neches River Channel segment to be widened, implementing Alternative 2 would not include any actions for shoreline protection removal or replacement therein.

Maintenance dredging for Alternative 2 would result in slightly over 25 million CY of additional maintenance material generated over the 50-year period of analysis. Because Alternative 2 would be double the area to be maintained vs the recommended plan/proposed action, slightly over 50 million CY of additional maintenance material would be generated over the same 50-year period of analysis.

Although annual maintenance dredging is not performed for these segments, presenting the additional maintenance material as annualized volumes allows easy comparison among alternatives. Table 5-5 shows that, the annual increase in maintenance material to maintain Alternative 2 would be slightly over 1,000,000 CY per year requiring an additional 40 days of maintenance dredging. Maintenance dredging of the entire Sabine-Neches Canal and Neches River Channel typically require approximately 130 days per year, so maintaining Alternative 2 would add 40 more days of maintenance dredging per year.

Table 5-5
Alternative 2: Estimated Annual Maintenance Volumes and Durations

Segment of Federal Channel Widening	Annual Dredge Volume (CY/YR)	Annual Days of Additional Maintenance Dredging¹⁵
Sabine-Neches Canal (South)	130,400	5
Sabine-Neches Canal (North)	311,520	13
Neches River Channel	560,000	22
TOTAL	1,001,920	40

5.4 Implementation Requirements

This section describes the implementation requirements for Sec 203 studies (33 U.S. Code sec. 2231) and federal and non-federal construction cost sharing responsibilities.

5.4.1 Section 203 Requirements

The ASA(CW) is required to review each Section 203 feasibility study to determine whether the study and the process under which it was developed comply with Federal laws and regulations applicable to feasibility studies of water resources development projects. The ASA(CW) may not submit to Congress an assessment of a section 203 study until the ASA(CW) determines that the study complies with all of the requirements that would apply to a feasibility study undertaken by

¹⁵Annual Days Maintenance Dredging estimated by dividing CY by the assumed 25,000 CY/DY production.

the ASA(CW) and completes all the federal analyses, reviews, and compliance processes under NEPA that would be required if the ASA(CW) had undertaken the study.

5.4.2 Cost Sharing

33U.S. Code section 2211 – Harbors defines the cost sharing requirements for the general navigation features of a navigation project. The non-federal interest shall pay 25 percent of the cost of construction for projects that have a depth in excess of 20 feet but not in excess of 55 feet. The non-federal interest shall also pay an additional 10 percent of the construction cost of general navigation features in cash over a period not to exceed 30 years at the rate determined by the federal government for this purpose.

The value of lands, easements, rights-of-way, and non-utility relocations and the costs of utility relocations borne by the non-federal interests shall be credited toward the 10 percent payment.

Table 5-6 provides the cost sharing calculation for this project.

**Table 5-6
Project Cost Shares FY26 Costs**

Cost Category	Total	Federal	Non-Federal
Construction Cost (Including Mob / Demob)	\$195,176,000	\$146,382,000	\$48,794,000
Enviro Mitigation & Monitor	\$0	\$0	\$0
Cultural Resource Preservation	\$103,000	\$77,000	\$26,000
Construction S&A	\$18,097,000	\$13,573,000	\$4,524,000
Preconstruction Eng. & Design (PED)	\$33,336,000	\$25,002,000	\$8,334,000
Contingency	\$50,743,000	\$38,057,000	\$12,686,000
Total Construction of GNF	\$297,455,000	\$223,091,000	\$74,364,000
Utility Relocation w/Contingency	\$13,104,000	\$0	\$13,104,000
Total Project First Costs	\$310,559,000	\$223,091,000	\$87,468,000
Associated Costs	\$0	\$0	\$0
Relocating Aids to Navigation	\$269,000	\$269,000	\$0
10% GNF Non-Federal less Relocation		-\$16,642,000	\$16,642,000
Total Cost	\$310,828,000	\$206,718,000	\$104,110,000

The estimated Federal and non-federal shares of the project first cost are \$223,091,000 and \$87,468,000, respectively, as apportioned in accordance with the cost sharing provisions of Section 101 of WRDA 1986, as amended (33 U.S.C. 2211): the cost for dredging greater than 20

feet and less than 55 feet will be shared at a rate of 75 percent by the Federal Government and 25 percent by the non-federal interest.

In addition to the non-federal interest's estimated share of the total first cost of constructing the project in the amount of \$87,468,000, pursuant to Section 101(a)(2) of WRDA 1986, as amended, the non-federal interest must pay an additional 10 percent of the costs of general navigation features of the project in cash over a period not to exceed 30 years, with interest. The value of the costs for lands, easements, rights-of-way and relocations provided by the non-federal interest under Section 101(a)(3) of WRDA 1986 as amended will be credited toward this payment. The costs for lands, easements, rights-of-way or relocations provided by the non-federal interest for this project total \$13,104,000 and 10 percent of the GNF cost is \$29,746,000, which results in a net 10 percent General Navigation Features (GNF) requirement of \$16,642,000.

Additional costs of operation and maintenance for this TSP, over and above the costs to operate and maintain the existing Federal project, are estimated to be \$2,444,000 annually. In accordance with Section 101(b)(1) of WRDA 1986, as amended (33 U.S.C. 2211(b)(1)), the Federal Government will be responsible for an amount equal to 100 percent of the excess of the cost of operation and maintenance of the project over the cost of which would be incurred for operation and maintenance for project depths up to 55 feet. Therefore, the Federal share of the incremental annual maintenance cost is estimated to be \$2,444,000.

There are no local service facility improvements or construction required for the realization of project benefits. The projected additional costs for aids to navigation, \$269,000, are a 100 percent Federal responsibility.

5.5 Section 203 Study Costs

Should the project that is recommended in this feasibility study be authorized by Congress, the Sabine Neches Navigation District, who has fully funded this Section 203 feasibility study, intends to seek credit under the provisions of WRDA 1986, Section 203(d) Credit and Reimbursement, as amended:

(1) In general - If a project for which a feasibility study has been submitted under subsection (a)(1) is authorized by a Federal law enacted after the date of the submission to Congress under subsection (c), the Secretary shall credit toward the non-federal share of the cost of construction of the project or modification to the project an amount equal to the portion of the cost of developing the study that would have been the responsibility of the United States if the study had been developed by the Secretary.

(2) Maximum Amount – Any credit provided to a non-federal interest under this subsection may not exceed the maximum federal cost for a feasibility study initiated by the Secretary under section 1001 (a) (2) of the WRRDA of 2014 (33 USC 2282c(a)).

Note that WRDA 2024 increased the maximum federal cost for a feasibility study to \$5 million.

5.6 Analysis of Sponsor's Financial Capabilities

A financial analysis is required for any plan being considered for USACE implementation that involves non-federal cost sharing. The purpose of the financial analysis is to ensure that the non-federal interest understands the financial commitment involved and has reasonable plans for meeting that commitment. The financial analysis includes the non-federal interest's statement of financial capability, the non-federal interest's financing plan, and an assessment of the non-federal interest's financial capability.

The Sabine Neches Navigation District has expressed support for a potential project. Their funding of this Section 203 study is proof of their willingness to proceed with the proposed solution to the channel constraint problems identified at the SNWW. The Sabine Neches Navigation District has the capability to fund the non-federal share of project design and construction costs. Furthermore, their capability as a non-federal interest has been evidenced by their performance as the non-federal interest for the ongoing Deepening Project at the SNWW.

The non-federal interest will provide a Self-Certification of Financial Capability for Agreements prior to submission of the Project Partnership Agreement. Included with the self-certification, the financial analysis shall include the non-federal interest's statement of financial capability, the non-federal interest's financing plan, and an assessment of the non-federal interest's financial capability.

5.7 Risk and Uncertainty

A Cost and Schedule Risk Analysis was performed with technical assistance from the USACE Galveston District (see the Engineering Appendix, Cost Report Attachment). The resulting contingency for construction costs at the 80 percent confidence level is 23.0 percent and the contingency for PED costs is 5 percent, which have been included in all cost estimates.

Multiple sensitivity analyses were performed (see Economics Appendix) to evaluate the performance of the recommended plan:

Sensitivity Analysis #1 evaluates the recommended plan (Alt #1) using a 7.0 percent discount rate for calculating all costs and benefits including interest during construction, AAEQ construction and maintenance costs, and AAEQ benefits. The resulting AAEQ net benefits are \$21,660,000 and the benefit to cost ratio is 1.8.

Sensitivity Analysis #2 evaluates the recommended plan (Alt #1) but restricts the fleet forecast to the 2025 forecast as presented in Table 4-5 and repeats that same forecast for 2030, 2035, 2040, 2045, 2050. Sensitivity Analysis #2 uses the FY26 3.25 percent discount rate for calculating all costs and benefits including interest during construction, AAEQ construction and maintenance costs, and AAEQ benefits. The resulting AAEQ net benefits are \$32,574,000 and the benefit to cost ratio is 3.4.

Sensitivity Analysis #3 evaluates the recommended plan (Alt #1) but restricts the fleet forecast to 2025 forecast as presented in Table 4-5 and repeats that same forecast for 2030, 2035, 2040, 2045, 2050. Sensitivity Analysis #3 uses a 7.0 percent discount rate for calculating all costs and benefits including interest during construction, AAEQ

construction and maintenance costs, and AAEQ benefits. The resulting AAEQ net benefits are 21,026,000 and the benefit to cost ratio is 1.8.

5.8 Resiliency

ER1105-2-103 Planning Policy for Conducting Civil Works Planning Studies states that “*the intent is to formulate alternatives that support climate resilient communities, economies, ecosystems, and infrastructure*”. In this context, resiliency is assessed for considerations of changing sea levels. Potential sea level change at the end of the 50-year period of analysis range from a projected low increase of 1.02 feet to a projected high increase of 3.3 feet analysis (see Engineering Appendix, Attachment 6, Water Quality Modeling Report).

Implementing the Recommended Plan would not be expected to result in any changes to the regional climate. The functioning of the proposed widening navigation feature, including the continued use of the dredged sediment placement areas and the beneficial use features, would not be affected by the full range of potential sea level change projected.

Under the resiliency assessment assumptions, shoaling rates toward the end of the period of analysis could increase due to an enlarged cross section and greater saltwater penetration, this small effect would probably be offset by increased overall water depths. Dredged material placement areas and beneficial use features have been designed to accommodate sea level changes and the PAs are located at sufficiently high elevations to withstand the potential rise and include appropriate erosion control measures in their basic design and monitoring. The beneficial use features were designed to withstand the full range of potential sea levels currently predicted (USACE, 2011). As such, there would be no anticipated effect on climate from implementing the Recommended Plan nor would the range of projected sea levels affect the proposed widening, dredge material placement in the PAs, or the construction and function of the beneficial use features.

6 Scope of the Environmental Assessment

To the extent that it could assist the Assistant Secretary for the Army for Civil Works (ASA(CW)) in reasoned decision making, the EA should document “*where and how*” the scope of analysis establishes a reasonable and manageable line in relation to the consideration of environment effects from the action at hand that extend outside the geographical territory of the project or might materialize later in time (USDoD, 2025). Although not required by NEPA, the EA may analyze additional analysis of other separate projects (by the USDoD or others), that extend outside the geographical territory of the project or might materialize later in time, relating to the consideration of such effects from such separate projects. There are a number of other nearby private and public projects on the waterway, but given the short-term duration of the widening construction, the inconsequential changes to channel geometry, the use of existing confined upland placement for dredge material, the adjacent land use, and the habitat quality within adjacent land to be affected, there is no further consideration of the potential environmental effects from such separate projects in this analysis.

More than 2,000 pages in length for the main reports and appendices, the Sabine Neches Waterway Channel Improvement Project Final Feasibility Report and Final Environmental Impact Statement (FEIS) (USACE, 2011) comprehensively characterized the affected area and examined the environmental consequences from the decade-long, channel deepening project that is currently under construction on the SNWW. Data developed from the 2011 feasibility analysis and FEIS, detailed deepening design, and the ongoing construction planning for the deepening project have all been applied to the evaluation of the widening project where appropriate. Evaluations included utilizing, compiling, and assessing readily available bathymetric, geophysical, and topographic survey data; aerial photography; and navigation charts that serve as the basis for evaluating channel alignment and geometry. This information allowed the design to identify and avoid potential interferences and conflicts with various infrastructure (e.g., docks, bulkheads, shoreline protection, roads, buildings, and dredged material placement areas). Where applicable, the resource-specific summaries in Section 7 rely upon the data and analyses from the 2011 FEIS as well as other previously completed studies to provide the baseline information on the affected area. In addition to the 2011 FEIS for the SNWW CIP, there are recent NEPA documents for other projects on or near the SNWW (e.g., FERC, 2016; FERC, 2019; FERC, 2023; USACE, 2025a). Where these documents provide additional relevant detail, the information has been summarized and cited with attribution.

This EA has been prepared because the proposed widening does not have a reasonably foreseeable significant effect on the quality of the human environment. In addition, the EA content herein is “concise” as directed by Congress in NEPA § 106(b)(2); 42 U.S.C. § 4336(b)(2) (USDoD, 2025).

6.1 Alternatives Considered and Eliminated from Detailed Consideration

In consideration of developing a focused NEPA document, the effects analysis considers three alternatives: the no action alternative (Future Without Project/FWOP), the alternative with the best economic performance (Recommended Plan/Proposed Action), and the alternative with the largest effect on improving navigation performance (Alternative 2). Other alternatives that did not meet economic or navigation performance criteria were not advanced for detailed environmental effects evaluation.

6.1.1 Eliminated Alternative 3

In the initial phase of project development, Alternative 3 was developed where the proposed widening measures in the Neches River Channel and the Sabine-Neches Canal would be the same as the Recommended Plan/Proposed Action (+100 feet, from 400 to 500 feet), but an additional six miles of the waterway in the Sabine Pass Channel and Port Arthur Canal reaches (further down the SNWW towards the Gulf of America) would have been also widened by an additional 100 feet on both sides of the channel for a total width of 700 feet (+200 feet). After economic evaluation, the costs of Alternative 3 would not provide sufficient benefits to merit detailed consideration of this alternative and it was eliminated from further consideration.

6.1.2 Eliminated Full Build Alternative

In support of the hydrodynamic modeling, an additional alternative called *Full Build* was developed by combining the largest structural measures being examined in each of the alternatives into a single alternative for the purpose of analysis. Under the *Full Build* alternative, the Sabine Pass Channel and Port Arthur Canal reaches were assumed to be widened an additional 100 feet on both sides of the channel for a total width of 700 feet (+200 feet) as under Alternative 3 and the Sabine-Neches Canal and Neches River Channel segments would be widened by +200 feet (from 400 to 600 feet) as under Alternative 2. Establishing *Full Build* early in the analysis allowed the hydrodynamic models to be developed, setup, run, calibrated, and validated before detailed plan selection was completed. Economic evaluation showed that the costs of the *Full Build* alternative would not provide sufficient benefits, so the alternative was eliminated from detailed consideration.

6.2 Resources Considered and Eliminated from Detailed Consideration

6.2.1 Socioeconomics

As such, a number of resources and associated impacts that can be the focus of lengthy analyses and discussion within NEPA documents have been considered and dismissed from further analysis. The 2011 FEIS evaluated population, demographic, community cohesion factors, employment, labor force characteristics, economics, tax base, transportation, community services, aesthetics, future development and development restrictions, life, health, and public safety within a single section called *socioeconomic resources* (USACE, 2011).

The assessment of potential socioeconomic effects from the entire 10-year, \$1 billion dollars' worth of construction for the CIP was determined to “*not likely have an effect on population growth trends within the study area*” and “*have minimal effect on the demographics of the study area,*” “*would not result in disproportionately high and adverse impacts on minority and low-income persons living within the study area,*” “*...would not result in a negative impact to community values,*” “*...available housing would not affect the proposed project,*” “*would not result in negative impacts to the local economy,*” “*no change in land use,*” and “*...would have a minimal effect on the overall visual quality within the study area*” (USACE, 2011).

Because the detailed analysis of the construction for the channel deepening resulted in the assertion that “*Potential impacts to socioeconomic resources from the [deepening] are not expected to be*

significant,” the evaluation of socioeconomic effects from the shorter duration, smaller scale construction for the proposed channel widening would be predicted to result in no significant socioeconomic effects. As such, the detailed consideration of socioeconomic effects from the proposed widening action alternatives is eliminated from further consideration.

6.3 Geographic Extent of the Widening Analysis

For the proposed widening, the dredging would all occur within the Sabine Neches Waterway’s inshore channels (i.e., the Neches River Channel and the Sabine-Neches Canal) and dredged material disposition (upland placement areas or for beneficial use) would all be entirely within existing areas for placement in the State of Texas. Because the downstream-most widening actions would occur more than 12 miles upstream from the confluence with the Gulf, the EA does not include evaluation of the environmental resources of the offshore environment.

6.4 Significance Determination – Affected Area and the Degree of the Effects

The determination of whether an impact significantly affects the quality of the human environment must consider the *affected area* within which the action would be implemented and the *degree of the effects* wherein a consideration is made of the magnitude of predicted change. The reason agencies need to consider the affected area is because the potential significance of a proposed action varies with the local setting. In general, the more fragile or rare a resource is within an *affected area*, the smaller a predicted change to that resource could need to be for the potential effect to be considered significant. Conversely, the smaller the magnitude of the predicted change to the environment, the less scrutiny even sensitive resources need because of the overt inability of an action to effect change to the physical environment. If the local affected area is within a highly modified environment, the magnitude of a predicted change within the *affected area* may be less important, because the environmental characteristics of the affected area already reflect the influence of human activity.

Effects or impacts means changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives. This includes those effects that occur at the same time and place as the proposed action and may include effects that are later in time or farther removed in distance from the proposed action. As with most deep-draft navigation channel alteration projects, the effects of this proposed channel widening on the environment stem from short-term construction-related activities, the longer-term effects from the physical alternations of the navigation channel, and the disposition of dredged material (USACE, 1982).

Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic (such as the effects on employment), social, or human health effects. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. The description of the affected environment and the likely environmental consequences are summarized in Section 7.

7 Affected Area and Environmental Effects*

This section describes the environmental resources of the affected area and the reasonably foreseeable environmental consequences based on the construction assumptions in Section 5.2.

Section 102 of the U.S. Department of Defense National Environmental Policy Act Implementing Procedures (USDoD, 2025) asserts that the effects analysis to determine the potential for significant environmental effects must consider both the affected area (national, regional, or local) and its resources as well as the reasonably foreseeable effects where the USACE may consider:

- (i) Both short- and long-term effects,
- (ii) Both beneficial and adverse effects,
- (iii) Effects on public health and safety;
- (iv) Economic effects; and
- (v) Effects on the quality of life of the American people.

The analyses presented in this section address these categories with an understanding that detailed design often includes refinements to the construction planning during final design, but that these refinements would not compromise the integrity of the assessment. The short-term effects primarily result from construction activities, and the long-term effects result from the widened geometry of portions of the SNWW federal navigation channel and the effects of material placement. Beneficial effects primarily result from the beneficial use of up to 500,000 CY of dredged material for marsh restoration and an improved margin of vessel safety from decreased vessel congestion in the waterway.

Dredging the recommended plan/proposed action will occur after the ongoing Channel Improvement Project (USACE, 2011) that is deepening the SNWW by eight feet (-40 feet MLLW to -48 feet MLLW) and that will have dredged more than 100 million CY of new work from the federal navigation channel. Using cutterhead/pipeline dredges to safely remove material from the waterway for channel improvements while being protective of public health and safety has been proven.

There would be a short-term economic effect from implementing the recommended plan/proposed action from the construction contract spending in the regional economy, but the substantial economic benefits to the Nation result from improving the navigational efficiency on the Sabine Neches Waterway. Improving navigational efficiency in the Waterway would also reduce waterway congestion for the deployment of DOD resources if called upon. The SNWW hosts the #1 U.S. Military Commercial Strategic Seaport and hosts the largest Ready Reserve Fleet in the U.S. The U.S. military missions on the SNWW primarily involve military deployments and cargo, leveraging the Port of Beaumont for troop and equipment movement to and from global operations, particularly exercises with NATO allies. The 842nd Transportation Battalion, for example, uses the Port of Beaumont as a gateway to move thousands of pieces of military equipment and aircraft, for training exercises and deployments to Europe.

The contractors that would construct the widened portions and maintain them in the future are contractually required to implement best management practices to minimize the construction-related environmental consequences (see Section 8, Mitigation Planning and Best Management

Practices). This work does not represent a novel or unprecedented activity; on the contrary, widening the navigation channel and maintaining the waterway in the future are actions that the USACE, Galveston District has a proven record of executing while being protective of public health and safety and not violating federal, state, Tribal, or local laws that are protective of the environment.

7.1 Topography and Geology

The project area is in the Coastal Plain physiographic province of Texas containing marine sediments (USACE, 2010b). The area is characterized by a diversity of features that are a result of the natural transition between marine and freshwater environments and substantial anthropogenic alterations to the landscape (USACE, 2011). This area is characterized by low-lying flat land and has evolved to its present conditions by erosion, deposition, compaction, and subsidence, all of which are still active.

The geology in the affected area is characterized by modern marine deposits overlaying recent Holocene deposits that in turn overlay Beaumont and Lissie Formations of the Pleistocene Series (USACE, 2011). The modern deposits are generally consolidated clays, silts, and fine sands that were deposited through natural overwash and sedimentation processes or through dredged material placement (USACE, 2010b). The recent deposits of the Holocene are generally encountered to depths of 30 to 40 feet and consists of silts, clays, silty sands, clayey sands, and clayey silts that exhibit the characteristics of normally, to lightly overconsolidated materials (USACE, 2011). The Beaumont Clay is the predominant Pleistocene formation whose eroded surface forms the upper limit of stiff to very stiff clay material; lenses of fine grained, poorly graded sand and silt, and calcareous nodules are sometimes encountered in this formation (USACE, 2011). Based on recent subsurface soil borings in the Sabine-Neches Canal, more than 75-percent of the new-work material is cohesive clays and sandy clays with a strength/density of medium (36-percent), stiff (36-percent), and very stiff (6-percent) (see Engineering Appendix). The stiffness of these materials are the basis for the design assumption that side slopes, after dredging, will be stable at a 2H:1V slope (Engineering Appendix).

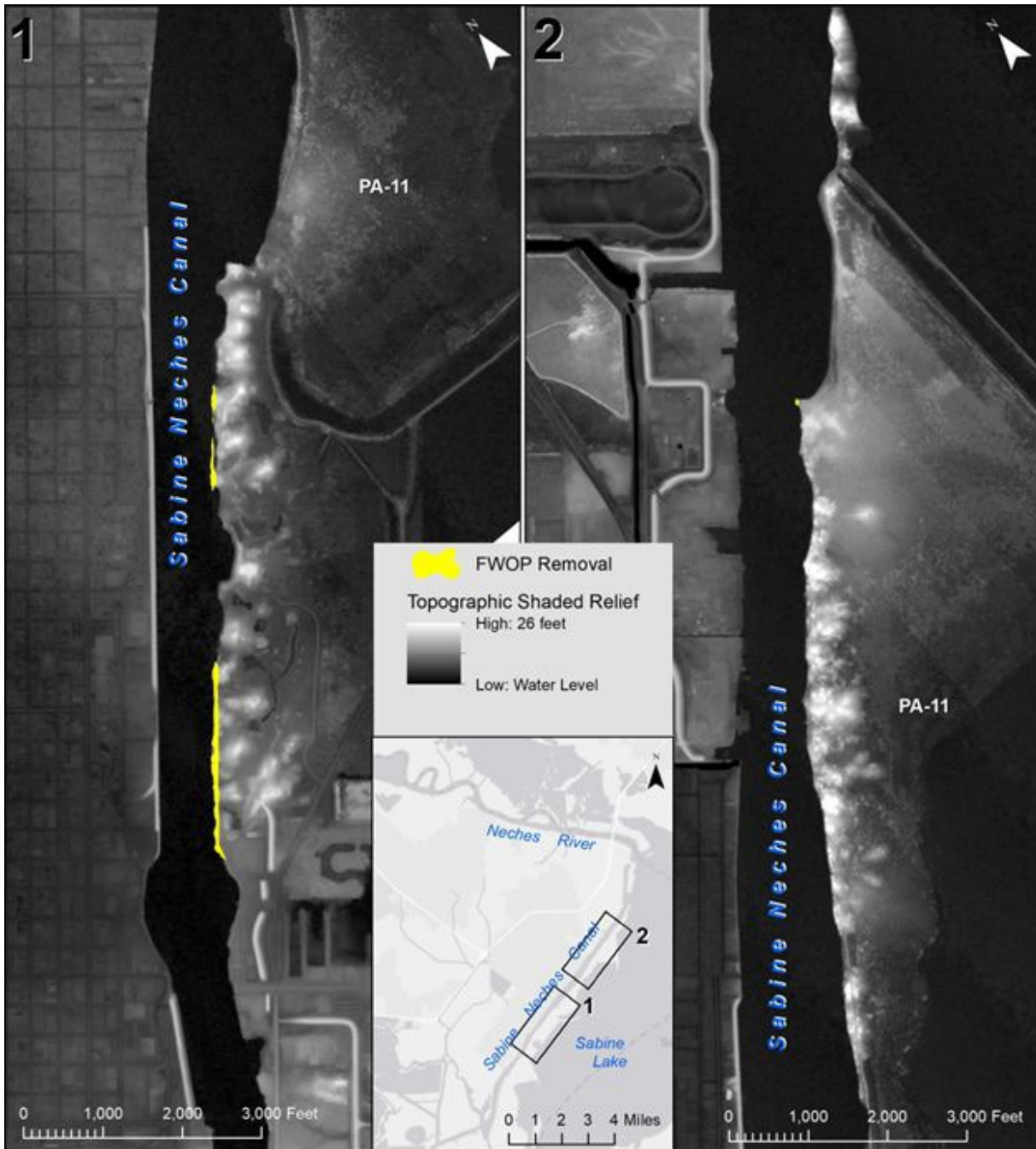
7.1.1 No Action/Future Without Project Condition

Under the no action/future without project (FWOP) condition, the ongoing construction of the SNWW deepening would be completed and the annual maintenance dredging and material placement would continue. The total estimated amount of dredged material to be generated from the ongoing deepening is approximately 98 MCY of new-work material and approximately 650 MCY of maintenance material over the 50-year period of analysis (USACE, 2011).

The predicted changes to local geology during the ongoing channel deepening and annual maintenance dredging includes redistribution of existing sediment, potential minor changes in local scouring and shoaling rates, the continued use of existing dredged material placement areas (PAs), and placement of new-work and maintenance material into the Neches River Beneficial Use (BU) habitat features (USACE, 2011). The 2011 FEIS concluded that the net impacts of the deepening project on local geology would be minimal and there would be no impacts or modifications to geologic hazards such as faulting and subsidence (USACE, 2011).

Under no action (described in Section 3), deepening the channel will require the removal of areas of the shoreline and uplands adjacent to the Sabine-Neches Canal. The three yellow polygons in Figure 7-1 sum to approximately 4.5 acres and include 0.7 miles of shoreline of the former golf course. All of these areas will be removed during construction of the ongoing channel deepening. Dredging these areas would first require the removal of approximately 4,470 linear feet of existing, non-engineered shoreline protection materials (see Figure 5-3 above) generating approximately 44,700 CY of debris. Under the FWOP, all of these construction actions would be taken, but no subsequent widening would occur.

Figure 7-1
FWOP: Shoreline and Land Removal on Pleasure Island



7.1.2 Recommended Plan/Proposed Action

The predicted changes to the local topography and geology during dredging and dredged material placement associated with the Recommended Plan/Proposed Action would include changes to the channel geometry and adjacent shorelines and redistribution of existing sediment and potential changes in local scouring and shoaling rates. Additionally, there would be changes within the

upland placement areas and BU site as described in Section 5.2, Construction Assumptions for the Recommended Plan/Proposed Action.

As shown in Figure 5-2, *Areas of Landside Excavation from the Proposed Widening* and Table 5-1, *Proposed Widening: Extent of Physical Modifications*, constructing the Recommended Plan/Proposed Action would require the relocation of an additional 2.5 miles of shoreline (i.e., in addition to the shoreline affected under the FWOP) and land loss of a total of approximately 17.2 additional acres (i.e., in addition to the land loss under the FWOP) within the Sabine-Neches Canal and the Neches River Channel segments.

While local changes would occur to bathymetry and the adjacent shoreline and topography during construction and maintenance of the proposed action, these alterations would be expected to have negligible effects on the regional physiography of the underwater portions of the project area. Additionally, there would be no predicted changes to the geologic hazards or the local geology from implementing the proposed action.

The evaluation of potential changes to scouring, shoaling, and adjacent shoreline erosion was examined with the hydrodynamic models where it was determined that “*The proposed widening is not expected to increase drawdown, return currents, or bank erosion.*” (See Engineering Appendix, Vessel Effects Modeling Report, Attachment 5). Based on the analyses in the Hydrodynamic Modeling there would be no predicted discernable change to the erosion of inshore channel shorelines compared to the No-Action/Future Without Project Condition.

7.1.3 Alternative 2

The predicted changes to the local topography and geology associated with Alternative 2 would be similar to the Recommended Plan/Proposed Action, but would require relocating a longer extent of shoreline and the removal of a larger area of adjacent lands. As shown in Table 5-4, *Alternative 2: Extent of Physical Modifications*, constructing Alternative 2 would require in the relocation of an additional 4.8 miles of shoreline (i.e., in addition to the shoreline affected under the FWOP) and land loss of a total of approximately 91.3 additional acres (i.e., in addition to the land loss under the FWOP) within the Sabine-Neches Canal and the Neches River Channel segments. While these physical changes are larger than the predicted changes under the Recommended Plan/Proposed Action, hydrodynamic modeling would not predict substantial changes to scouring, shoaling, and adjacent shoreline erosion (See Engineering Appendix, Vessel Effects Modeling Report, Attachment 5).

7.2 Climate and Relative Sea Level Change (RSLC)

The climate of the study area is both tropical and temperate with prevailing winds generally from the south and southeast with an average speed of about 10 miles per hour (USACE, 2011). In the winter months, cold air masses bring in polar air and prevailing northerly winds with temperatures moderated by the influence of the winds from the Gulf, resulting in mild winters and relatively cool summer nights (e.g., the air temperature rarely drops below 22°F (degrees Fahrenheit) or rises above 98°F) (USACE, 2011). Mean daily temperatures range from the mid-50s in December and January to the mid-80s in the summer months and the average period from the last frost in

spring to the first frost in fall is 294 days (USACE, 2011). Relative humidity levels average approximately 78 percent throughout the year (USACE, 1975a).

Another effect of proximity to the Gulf is abundant rainfall distributed throughout the year; the average annual rainfall is about 52 inches, with monthly precipitation averaging from 3.2 inches to about 6.6 inches (USACE, 2011). The region averages 117 days per year of clear skies, 191 days of partly cloudy skies, and 57 days of overcast days; heavy fog (which typically halts deep draft navigation on the SNWW) occurs on an average of 29 days per year (USACE, 2011).

Along the Texas coastline, sea levels have risen 5–17 inches over the last 100 years, depending on local topography and subsidence (sinking of land) and the analysis of relative sea level change (RSLC) was incorporated into this study in accordance with USACE guidance contained in ER 1100-2-8162, Incorporating Sea Level Change in Civil Works Programs (USACE, 2013). ER 1100-2-8162 prescribes methods for determining a range of possible future rates of global, regional, and local RSLC that planning studies are required to consider. The RSLC rates represent eustatic¹⁶ sea level change and vertical land motion, and are classified as low, intermediate, or high scenarios, as prescribed in the ER (USACE, 2013).

The RSLC scenarios use tide gage data¹⁷ (Sabine Pass North, TX) that are collected approximately three miles from SNWW's mouth at the Gulf of America. The USACE's online sea-level calculator¹⁸ was used to generate RSLC rates for 20, 50 and 100 year-durations based on the SNWW CIP construction start in 2020 and an assumed channel widening construction beginning in 2025 (see Engineering Appendix, Water Quality Modeling Report, Attachment 6).

Values for each of the calculated RSLC scenarios are presented in Table 7-1. The low RSLC rate, based on the observed data at NOAA 8770570, predicts a 1.02-foot (0.31 m) RSLC over the 50-year period of analysis. The intermediate and high RSLC scenarios result in 1.56 feet (0.48 m) and 3.29 feet (1.00 m) respectively at the end of the 50-year period of analysis (see Engineering Appendix, Water Quality Modeling Report, Attachment 6). The ER 1100-2-8162 guidance suggests a single scenario can be used to evaluate the tentatively selected plan under that scenario.¹⁹ Performance of the tentatively selected plan (ALT1) can then be evaluated under all RSLC scenarios to determine its overall performance.

The hydrodynamic and water quality modeling performed in support of this environmental analysis incorporated these RSLC assumptions into model runs. As such, the potential effect of RSLC has been addressed throughout this analysis within each of the relevant subsections.

¹⁶ Relating to worldwide changes in sea level.

¹⁷ <https://tidesandcurrents.noaa.gov/stationhome.html?id=8770570>

¹⁸ https://cwbi-app.sec.usace.army.mil/rccslc/slcc_calc.html

¹⁹ This approach is appropriate since the performance of widening alternatives is not highly sensitive to RSLC. For this analysis, the high scenario for the 50-year RSLC was used in modeling to blanket possible RSLC effects that could then be used to infer project performance for other scenarios (see Engineering Appendix, Water Quality Modeling Report, Attachment 6).

**Table 7-1
RSLC Values - USACE's Online Sea Level Calculator**

RSLC Scenario	2020-2045	2020-2075	2020-2125
Low	0.46 ft (0.14 m)	1.02 ft (0.31 m)	1.95 ft (0.59 m)
Intermediate	0.64 ft (0.20 m)	1.56 ft (0.48 m)	3.45 ft (1.05 m)
High	1.22 ft (0.37 m)	3.29 ft (1.00 m)	8.22 ft (2.51 m)

Source: Engineering Appendix, Water Quality Modeling Report, Attachment 6.

7.2.1 No Action/Future Without Project Condition

As asserted in the FEIS for the channel deepening, implementing the FWOP would not be expected to have any effect on the climate. The RSLC analyses²⁰ determined that the net result of the deeper channel (under the No Action alternative) would be small and that relative sea level change would be unlikely to have a significant impact on dredging requirements (USACE, 2010). The RSLC analysis also asserted that channel deepening would have negligible effect on the existing environmental resources of the study area, included consideration of potential changes in salinity and the coastal marsh ecosystem (USACE, 2011a).

7.2.2 Recommended Plan/Proposed Action

Implementing the Recommended Plan/Proposed Action would not be expected to result in any changes to the regional climate. The functioning of the proposed widening navigation feature, including the continued use of the dredged sediment placement areas and the beneficial use features, would not be affected by the full range of potential sea level change projected. Construction dredging would occur in a relatively small area, would be completed in fewer than four years, and would not be discernibly affected by RSLC over that brief period of time.

Under the RSLC assumptions, shoaling rates toward the end of the period of analysis could increase due to an enlarged cross section and greater saltwater penetration, this small effect would probably be offset by increased overall water depths. Dredged material placement areas and beneficial use features have been designed to accommodate sea level changes through the high RSLC range and the PAs are located at sufficiently high elevations to withstand the potential rise and include appropriate erosion control measures in their basic design and monitoring. The beneficial use features were designed to withstand the full range of RSLC currently predicted (USACE, 2011). As such, there would be no anticipated effect on climate from implementing the Recommended Plan/Proposed Action nor would the range of predicted RSLC values affect the proposed widening, dredge material placement in the PAs, or the construction and function of the beneficial use features.

²⁰ In Section 4.1.2 of the 2011 FEIS, the USACE concluded that "...the "most likely" amount of RSLC by the year 2069 is 1.1 feet."

7.2.3 Alternative 2

Even with the larger footprint for Alternative 2, implementing Alternative 2 would not be expected to result in any changes to the regional climate. Although taking longer to complete, the functioning of the proposed widening navigation feature--including the continued use of the dredged sediment placement areas and the beneficial use features--would not be substantially affected by the full range of potential sea level change projected. Construction dredging would occur in approximately five years and would therefore not be discernibly affected by RSLC over that relatively brief period of time.

7.3 Hydrology and Tidal Processes

The SNWW is a Y-shaped commercial waterway comprised of interlocking natural river channels and manmade canals (USFWS, 2010). The waterway presently extends from the Gulf of America, through the Sabine Jetties, 63.8 miles northward across the western edge of Sabine Lake; at 100 square miles in area the system is the fifth largest estuary in Texas (USFWS, 2010). The hydrodynamic regime in the northwestern Gulf results from a complex interaction of tides, meteorological driving forces, freshwater inflows, and Coriolis acceleration where major storms profoundly influence waves, tides, currents, and sediment movement (USACE, 2011). Astronomical tides are generally small in the Gulf with an average amplitude of approximately one foot (USACE, 2011).

The range in annual average flows in the Sabine and Neches Rivers varies from about 1,000 to 17,000 cubic feet per second (cfs) in the Sabine River and from about 1,200 to 19,000 cfs in the Neches River. These two large freshwater inflows have a substantial impact on the salinity distribution in the Sabine Neches Estuary through the magnitude and timing of freshwater flows. The hydrology of the lower Neches River is influenced by tidal exchange with Sabine Lake and the Sabine-Neches Canal at the lower end and seasonally variable freshwater inputs on the upstream end (USACE, 2011). Within the lower Neches River, peak ebb and flood velocities are low at approximately 0.8 foot/second and 0.3 foot/second, respectively (USACE, 2011).

Three separate modeling frameworks and software tools were utilized to evaluate the potential changes to the hydrodynamics of the SNWW from the alternatives. The approach to the modeling was based on a review of the hydrodynamic modeling performed in support of the 2011 FEIS (USACE, 2011) as well as the independent, external, peer review comments on that modeling (Battelle, 2007; 2010). The present-day modeling frameworks considered astronomical and meteorological tides; a range of hydrologic scenarios representing seasonal variations such as drought, normal, and flood; as well as extreme events associated with cold fronts, tropical storms and hurricanes. The completed modeling includes three distinct components: two-dimensional hydrodynamic modeling to assess tidal currents and storm surge using MIKE 21 HD-FM²¹, modeling of vessel passing and associated shoreline effects using AdH, and three-dimensional hydrodynamic modeling to assess water quality using MIKE 3 HD-FM. Additionally, changes in hydrodynamics related to sea level changes based on 50-year projections were investigated in accordance with the USACE guidance (ER 1100-2-8162). Lastly, the hydrodynamic modeling

²¹ MIKE 21 Flow Model HD FM is a two-dimensional (2D) hydrodynamic model with a flexible mesh that simulates hydrodynamics based on oceanic tidal boundary conditions and meteorological (wind and pressure) forcing.

underwent independent, external, peer review²² to ensure the modeling was technically sound, represented the system being modeled, correctly applied the models, appropriately used data for calibration and validation, and that the conclusions being drawn were supported by the model output. Within the Engineering Appendix, Tidal Circulation Modeling Report, Attachment 3 are the detailed modeling assumptions and results.

7.3.1 No Action/Future Without Project Condition

Under the No Action (FWOP) condition, the ongoing channel deepening to an authorized depth of -48 ft (MLLW) will have been completed. While this channel configuration is under construction, the entire deepening is expected to take 7-10 years to complete. As such, the FWOP assumes the entire channel deepening is completed and the effects of channel deepening on hydrology and tidal processes that were predicted to occur in the 2011 FEIS have been realized on the entire system. The FWOP also presumes the initial construction and ongoing use of the Beneficial Use features in Texas has been initiated as described in the 2011 FEIS (USACE, 2011).

7.3.2 Recommended Plan/Proposed Action

Model results were compared between the FWOP condition and the Recommended Plan/Proposed Action based on peak absolute current velocity and peak flood and ebb current velocity and direction. The modeled change to both flood and ebb tidal currents generally shows a small decrease in the maximum current speeds within the widened segments of the channel and a small increase in current speeds for areas that were not widened. The greatest current speed differences between the FWOP and the Recommended Plan/Proposed Action channel widening were approximately 0.2 m/s, but in general the differences were typically 0.1 m/s and less. Qualitatively, these differences are relatively small and were also less than the model uncertainty bounds of 0.3 m/s (see Engineering Appendix, Tidal Circulation Modeling Report, Attachment 3). In addition, the predicted changes to water surface elevation comparing the FWOP to the Recommended Plan/Proposed Action were small differences (less than approximately 0.03 meter) and less than the reported model error (see Engineering Appendix, Tidal Circulation Modeling Report, Attachment 3).

The results of running the model including RSLC in the modeling domain showed increased peak and average current speeds throughout the domains, but the relationship between the FWOP and Recommended Plan/Proposed Action remained the same. As such, the RSLC model runs showed that the higher water surface levels would affect the entire region with higher water levels, but the effects of RSLC do not seem to be affected by the channel widening. Inclusion of a moderate wind in the model domain had little effect on the small differences between the FWOP and the Recommended Plan/Proposed Action in the model comparisons.

The Recommended Plan/Proposed Action is not expected to have a noticeable impact on peak velocities in the channel and the small, predicted changes in current speeds would not affect navigation or shoaling rates associated with the recently deepened channel (see Engineering Appendix, Tidal Circulation Modeling Report, Attachment 3). Additional shoaling in the widened

²² <https://www.asce.org/education-and-events/explore-education/instructors/william-h-mcanally>

areas would only increase proportionally to the increased channel area to be maintained from the channel widening, not because of discernible changes to deposition.

7.3.3 Alternative 2

Similar to the Recommended Plan/Proposed Action, the modeled changes to peak ebb and flood currents under Alternative 2 would be relatively small and would not affect navigation or shoaling rates associated with the deepened channel. All other predicted changes to the hydrology and tidal processes from implementing Alternative 2 under the RSLC and moderate wind model runs had little effect compared to the FWOP condition (see Engineering Appendix, Tidal Circulation Modeling Report, Attachment 3).

7.4 Land Use

The environmental characteristics of a landscape are inexorably connected to past land use and habitat manipulation. Along the SNWW, land use and habitat manipulation has been for the benefit of commercial and military navigation, evidenced by the extent of industrialization, urbanization, and adjacent land dedicated to placement of dredged material. The land use along the right descending bank on the lower Neches as well as the Sabine-Neches Canal is substantially developed for industrial and municipal use as well as flood risk reduction features (i.e., levee).

Within the Sabine-Neches Canal (across from Port Arthur), the left descending bank of the project area is Pleasure Island. This land mass was created by the placement of dredged material from constructing and maintaining the Sabine Neches Waterway; this pattern of material placement, began in the 1840s and continues to the present day. On the upstream end is Placement Area 11. In the central portion of Pleasure Island there are municipal greenspace/parks, recreational vehicle parks, a yacht club/marina, permanent residences, and an abandoned 18-hole golf course. Review of historical aerial imagery on Google Earth reveals that the golf course was operating as recently as 2005 but suffered extensive flooding damage associated with Hurricane Ike (visible in Google Earth's September 2008 imagery). As a result of the damage, the golf course was abandoned and has been undergoing natural succession for more than a decade (Wiley, 2021).

All action alternatives consider widening measures on the left descending bank of the waterway segments and these segments are consistently man-made areas of sediment deposition that are placement areas (adjacent to the Neches River Channel and Sabine-Neches Canal) and the abandoned golf course on Pleasure Island.

The left descending bank of the Neches River Channel has been used for dredged material placement for more than 100 years. The area of affected terrestrial habitat along the left descending bank of the Neches River where widening would occur has *“been modified extensively by past placement activities and levees that isolate them and prevent contributions to the adjacent wetlands and riparian corridor. All contain degraded habitat with low habitat values, primarily roosting habitat for birds and some wildlife cover”* (USACE, 2011). The dredged material placement areas and surrounding access roads adjacent to the proposed widening continue to be maintained and operated for dredged material placement.

The terrestrial habitat that would be removed from Pleasure Island during widening (in the Sabine-Neches Canal segment) was once the open waters of Sabine Lake and was made dry land by the dredging of the Sabine-Neches Canal and placing the dredged materials onto Sabine Lake to create the present-day Pleasure Island (USACE, 1982). Figure 7-2 shows the 1901 Sabine Lake shoreline along the City of Port Arthur, prior to the construction of the Sabine-Neches Canal and Pleasure Island and Figure 7-3 is a contemporary aerial image of approximately the same area showing the extent of the created land that is in the present day, identified as Pleasure Island. On both figures, the red lines trace diagonal roads originating from a circular feature to help the viewer see the history of land use with dredged material fill into Lake Sabine.

The more recent land use on the Pleasure Island area affected by the widening was when the property was modified into a golf course which was abandoned after repeated hurricane damage. The history of the land creation and use (made land with constant anthropomorphic modifications for dredged material placement and then modification into, and maintenance as, a golf course) dictate the soils present, the seed bank within the soils, the slope and the hardening of shorelines, drainage, and the current natural succession dominated by invasives and alien plant species as the abandoned golf course progresses through “old field” succession.

Figure 7-2
Port Arthur and Sabine Lake (1901)

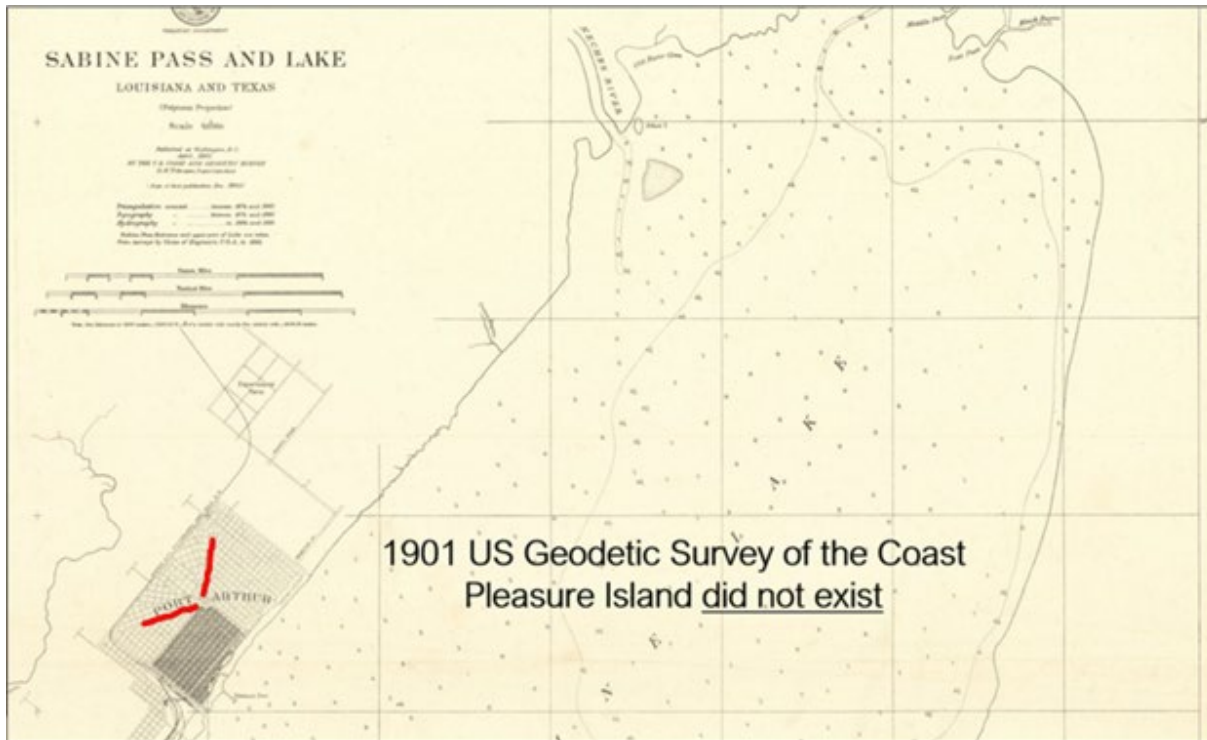
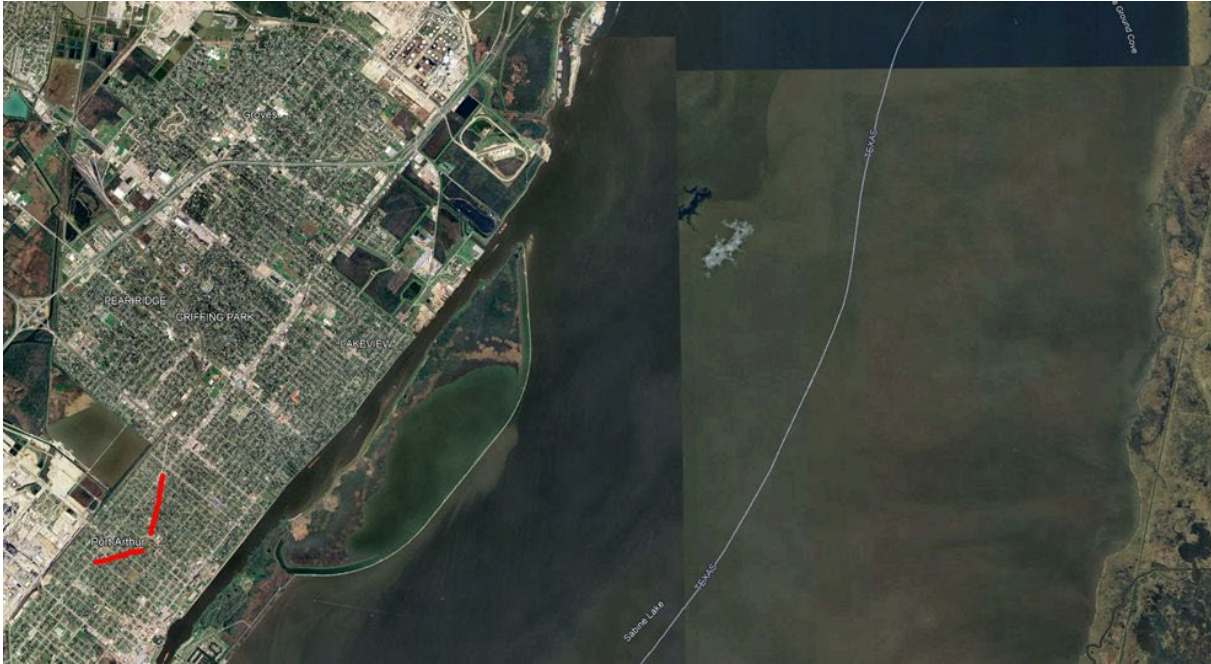


Figure 7-3
Port Arthur, Sabine Lake, and Pleasure Island (2024)



7.4.1 No Action/Future Without Project Condition

Under the No Action/FWOP condition, the areas potentially affected by the widening would continue to be used for dredged material management (along the Neches River Channel) and would likely remain idle in the derelict former golf course property of Pleasure Island. As described in the USACE EIS for the maintenance of the SNWW and management of the dredged material placement areas (USACE, 1975), the lands dedicated to dredge material management (within and adjacent to Placement Areas 8, 11, 18, 19, 20, 21, and 22) would continue to be managed for dredge material. In addition, the areas dedicated to marsh creation in the Bessie Heights East BU site would occur as described in the 2011 FEIS for channel deepening (USACE, 2011). Note that all potentially affected lands had updated land title and boundaries in 2024, as describe in Appendix D, Real Estate Plan.

7.4.2 Recommended Plan/Proposed Action

Under the recommended plan/proposed action, there would be no predicted change to land use in the project area from implementing the proposed widening. The navigational efficiencies that would be provided by the proposed widening would not change the number or size of vessels using the SNWW, but would simply reduce vessel delays (i.e., relieve vessel congestion) allowing the same vessels to move through the waterway more efficiently. Lands dedicated to dredged material management and marsh creation in the Bessie Heights East BU site would continue to be used as under the No Action/FWOP alternative.

7.4.3 Alternative 2

Under Alternative 2, the effects to land use along the SNWW would be no different from the Recommended Plan/Proposed action except for the slightly larger footprint of the proposed widening. As such, there would be no different predicted changes to land use compared to the Recommended Plan/Proposed Action or the No Action/FWOP alternative.

7.5 Soils and Dredged Sediment Management

The soils of Jefferson and Orange Counties are separated mainly into Holocene and Pleistocene sediments with modern river sediments in the vicinity of the Neches River channel (USACE, 1982). A review of historical and recent boring logs of the previously undisturbed material to be dredged (i.e., new work) showed that new work material along the Neches River Channel is primarily comprised of very soft clays with intermittent very loose, to loose sands and clayey sands (SNND, 2024). The new work material along the SNC North is primarily comprised of very soft to stiff clays and the new work material along the SNC South is primarily comprised of firm to stiff clays and very loose to loose sands (SNND, 2024). Bed sediments (i.e., the material removed during maintenance dredging) average 62-percent silt and clay and 38-percent sand in the Neches River Channel and 78-percent silt and clay and 22-percent sand within the Sabine-Neches Canal (USACE, 2011).

Along the waterway and dredged material placement areas, the soils are classified as Ijam clay ranging from poorly drained to well drained clays and sands and typically occur on zero to five percent slopes (USDA, 2006). The soils thus classified in Jefferson County (8,785 acres) and Orange County (5,273 acres) sum to more than 14,000 acres adjacent to the SNWW in Texas alone (USDA, 2006). These soils are typically not suited to crop production, pasture, rangeland, or forestland because of salinity, flooding, tidal inundation, and wetness (USDOT, 2011).

Historically, hundreds of millions of cubic yards of dredged material have been dredged from the interior channels of the SNWW and placed along the SNWW (USACE, 2021). The 1975 EIS for the maintenance dredging of the SNWW identified more than 60 different disposal areas that had been or were in use for the disposal of dredged materials (USACE, 1975). Within the most recent 50 years, more than 250 million CY of maintenance material has been dredged from the interior channels of the SNWW and placed in adjacent upland placement areas (USACE, 2021). There are currently more than 11,500 acres of upland dredge material placement areas in 20 different locations along the SNWW (SNND, 2024).

The proposed action evaluated in that EIS stated *“It is proposed to maintain the Federal project [Sabine Neches Waterway] to the authorized depths and dimensions of the various reaches of the waterway...”* including the use of numerous dredge material placement areas, specifically, *“disposal areas Nos. 12 through 27 are located on the banks of the Neches River and are used for contract pipeline disposal operations for the Neches River Channel. Disposal areas Nos. 14 through 24 and 26 are existing confined areas, with spillways.* Therefore, the proposed action evaluated in the 1975 EIS included evaluation of the environmental effects to these areas for dredge material management, including future maintenance dredging and the continued use, management, and improvement of the dredged material placement areas (USACE, 1975).

Figure 5-4, shown previously, graphically displays the array of dredged material placement areas adjacent to the waterway in the areas for widening. The existing Dredged Material Management Plan indicates that sufficient placement capacity is available for the material generated during initial construction as well as future increased maintenance dredging volumes from maintaining the wider channel segments (USACE, 2011d; SNND, 2022).

As part of the ongoing dredged material management, the height of PA area perimeter dikes is periodically raised to increase PA capacity. Dike-raising would not be required prior to implementing the proposed widening, but would necessitate raising the elevation of some PA dikes sooner than scheduled without the proposed widening (SNND, 2024). Implementing the proposed widening, and the increased future maintenance material would not require the design, site selection, or construction of any additional dredge material placement areas (SNND, 2024). As under current practices, heavy equipment (e.g., dozers, excavators) would be used within the PAs to ensure proper material distribution and effluent would be released (and monitored) from the PAs through existing weirs.

Prior to the proposed widening, the ongoing deepening of the entire waterway's channels will have been completed with hundreds of thousands of cubic yards of dredged material having been placed into the PAs. As such, the interior of the PAs that would be used for placement of dredged material for the widening would all have had large quantities of recently-placed dredged material within them.

7.5.1 No Action/Future Without Project Condition

Under the no action/future without project (FWOP) condition, the ongoing construction of the SNWW deepening would be completed and the annual maintenance dredging and material placement would continue. Under the FWOP alternative, deepening the channel within the Sabine-Neches Canal reach will require the removal of approximately 4,470 linear feet of existing, non-engineered shoreline protection materials, generating approximately 44,700 CY of debris as well as the removal of approximately 0.7 miles of shoreline and a total of 4.5 acres of land from the former golf course within the areas of proposed widening (SNND, 2024). Over the 50 year period of analysis, approximately 98 MCY of new-work material and approximately 650 MCY (13.0 MCY per year) of maintenance material will be dredged from the SNWW (SNND, 2024).

Dredging for the ongoing deepening as well as maintenance dredging of the Neches River Canal and the Sabine-Neches Canal segments, pumps the sediment to various permitted upland placement areas in proximity (see Figure 5-4, shown previously). All of these PAs, containment dikes, access roads, and surrounding areas have been modified extensively by past placement activities and associated containment systems that have artificially altered the hydrology (USACE, 2011). The surrounding dikes hold water and isolate the areas from adjacent waterbodies, preventing them from contributing to the function of the adjacent wetlands and riparian corridor, but protecting the adjacent habitat from uncontrolled release (USACE, 2011). Continued use of these PAs would be assumed under the FWOP condition and the 50-year placement area capacity analysis shows that the existing placement areas and the Neches River beneficial use sites (see Section 5.2.3, Bessie Heights East, Old River Cove, and Rose City East) provide sufficient capacity for dredged material management (SNND, 2024). This assertion presumes the episodic

raising of perimeter dikes to increase capacity (as described in the 2011 FEIS' Dredged Material Management Plan) (SNND, 2024).

Under the FWOP condition, there would be the continued use and maintenance of existing dredged material placement areas (PAs) as well as the design, construction, and use of the Neches River Beneficial Use (BU) habitat features for the receipt of dredged material (SNND, 2024).

7.5.2 Recommended Plan/Proposed Action

New-work material within the Sabine-Neches Canal would be very soft clays with intermittent very loose, to loose sands and clayey sands; the new work material along the SNC North would be very soft to stiff clays and the new work material along the SNC South would be firm to stiff clays and very loose to loose sands. All of these materials are suitable for removal with a cutterhead suction (pipeline) dredge. As described in Section 5.2 Construction Assumptions for the Recommended Plan/Proposed Action, construction would generate a total of approximately 11,646,000 CY of new-work and add an additional 501,000 CY/YR in maintenance material. The Engineering Appendix evaluated the existing placement areas and beneficial use planning and determined that there would be sufficient capacity for placement of both the new-work and additional volume of dredged material (SNND, 2024).

As summarized in Section 5.2.3, as a component of the Recommended Plan/Proposed Action, up to 500,000 CY of dredged material would be utilized to build marsh in the Bessie Heights East site, decreasing the BU feature construction duration (currently 30+ years) and achieving the ecosystem benefits of the restored marsh habitat more quickly (USACE, 2011a).²³

7.5.3 Alternative 2

Under Alternative 2, widening would occur within the same segments at the recommended plan/proposed action and the materials to be removed would also be suitable for removal with a cutterhead suction (pipeline) dredge. As shown in Table 5-4, construction of Alternative 2 would generate approximately 31.6 MCY of new-work and add just over one million CY/YR in maintenance material (approximately twice the volume of material under the Recommended Plan/Proposed Action). The Engineering Appendix evaluated the existing placement areas and beneficial use planning and determined that, presuming more frequent containment dike raises to increase capacity, there would be sufficient capacity for placement of both the new-work and additional volume of dredged material for Alternative 2 as well (SNND, 2024).

7.6 Hazardous, Toxic, and Radioactive Waste (HTRW)

An Interagency Coordination Team Contaminants Work Group (ICT CW), including the TCEQ and LDEQ, conducted a review of the sediment and water quality data available at the time of the 2011 FEIS for channel deepening (USACE, 2011). Based on this review, the work group concluded that new-work sediments from the deepening within the lower Neches River and

²³ During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

Sabine-Neches Canal were deemed suitable for use in constructing restoration or mitigation sites, BU features, and placement in upland confined PAs (USACE, 2008).

The 2011 FEIS for channel deepening asserted “*there appear to be no reaches of the SNWW that exhibit a cause for concern*” over HTRW issues (USACE, 2011). The HTRW survey indicated that “*there may be potential for encountering contaminated material during construction of the project, especially near industrial facilities that have not yet completed remediation efforts,*” but this “*...potential for encountering contaminated material during dredging operations is considered minimal* (USACE, 2011).”

Within the HTRW Report (Engineering Appendix, Attachment 7), a desktop investigation (Tier I evaluation) was conducted to evaluate HTRW sources that could pose an environmental risk due to their proximity to channel reaches proposed for widening (SNND, 2023). As documented in the HTRW Report, USEPA and TCEQ site portals were reviewed and confirmed the minimal risk of encountering contaminated material where widening is proposed. Six of the nine priority sites investigated in support of the 2011 FEIS were re-examined in additional detail as listed below:

- Woodcrest Site,
- Star Lake Canal Superfund Site,
- Maintech International,
- Bailey Waste Disposal Site,
- Palmer Barge Lines Superfund Site, and the
- State Marine of Port Arthur Superfund Site.

The current investigation concluded that the review of the regulated facilities and current agency database reviews (USEPA and TCEQ) for events (i.e., spills and releases) do not identify any recognized environmental conditions that would affect project alternatives (SNND, 2023). As a conservative approach, sediments in the vicinity of the State Marine, Palmer Barge Lines, and Star Lake Canal sites (SNND, 2023) were recommended for additional sampling prior to construction when considering potential beneficial use of this material (SNND, 2023).

7.6.1 No Action/Future Without Project Condition

From the 2011 FEIS Summary (USACE, 2011) addressing the potential effects of implementing the deepening, “*Findings of the HTRW survey indicate that there may be potential for encountering contaminated material during construction of the project, especially near industrial facilities that have not yet completed remediation efforts. Encountering contaminated material could increase project cost and/or lost time. However, based upon recent chemical analyses of water and sediment collected from within the channels, the potential for encountering contaminated material during dredging operations is considered minimal.*” Implementing the No Action/FWOP condition would not change any of the risks from incurring contaminated materials during ongoing channel deepening or future maintenance dredging.

7.6.2 Recommended Plan/Proposed Action

An assessment of the information provided in the 2011 FEIS (USACE, 2011), 2017 Sabine Pass to Galveston Bay FEIS (USACE, 2017), and additional research of government records (SNND, 2023) indicate that the potential for encountering contaminated material requiring specific handling and remediation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) during dredging operations is considered minimal for the recommended plan/proposed action. This conclusion is further supported by the fact that the proposed channel widening would occur on the left descending bank, beyond the maintained navigation channel opposite the identified priority HTRW sites (SNND, 2023).

Review of the regulated facilities and current USEPA and TCEQ database reviews for events (i.e., spills and releases) do not identify any recognized environmental conditions that would affect the recommended plan/proposed action and has confirmed a minimal risk of encountering contaminated material. This gives no cause for concern that dredging would mobilize contamination during construction.

7.6.3 Alternative 2

The larger footprint of disturbance that would be dredged for Alternative 2 would represent a slight increase in the risk of incurring contaminated sediments during initial construction or maintenance dredging as Alternative 2 would affect a larger area of disturbance. As with the recommended plan/proposed action, there would be minimal risk of encountering contaminated material, giving no cause for concern that dredging would mobilize contamination during construction.

7.7 Erosion

Erosion is a continuing natural process that can be accelerated by construction and earth-disturbing activities. Factors that influence erosion potential include soil characteristics, climate, topography, vegetation cover, soil texture, surface roughness, percent slope, and length of slope. The soils along the shoreline of the SNWW where proposed widening would occur were dredged from the adjacent SNWW (USACE, 1982), placed to create dry land, and are predominantly clay and sandy clays as described in Section 7.5, Soils and Dredged Sediment Management. Erosion of these placed materials occurs chronically from wave action and episodically during very high flow events. Within the SNWW, existing erosion is most severe along within the Sabine-Neches Canal where the SNWW passes through between Pleasure Island and Port Arthur (USACE, 2011).

In support of the analysis of channel deepening previous investigations (Maynard, 2005; USACE, 2011) concluded that the effect of the channel deepening would be that “*inland channel erosion rates [would be] reduced...because of the larger channel and the fewer vessel trips predicted.*”

Because shoreline erosion within the SNWW has been described as primarily from the passing of large vessels, the SNND conducted vessel effects modeling to examine the potential effects upon shoreline erosion from the proposed widening alternatives. The analysis and supporting documentation are in Attachment 5, Vessel Effects Modeling Report, of the Engineering Appendix (SNND, 2024a). For the evaluation, the SNND utilized AdH, water circulation modeling software developed by the Coastal and Hydraulics Laboratory (CHL) of the USACE that can incorporate

moving vessels.²⁴ The AdH model has been applied to evaluate similar effects (i.e., to simulate vessel drawdown and return currents) in the Houston Ship Channel, Corpus Christi Ship Channel, and additional locations, including several calibration exercises (SNND, 2024a).

7.7.1 No Action/Future Without Project Condition

Under the without project future condition, the ongoing construction of the SNWW deepening and ongoing maintenance dredging and material placement would continue as described in the 2011 FEIS (USACE, 2011). In the 2011 FEIS, future rates of erosion were predicted to be reduced because of the deepening along the inshore channels because there would be fewer vessel trips contributing to shoreline erosion relative to the un-deepened SNWW (USACE, 2011).

7.7.2 Recommended Plan/Proposed Action

Because the proposed widening would not modify the number or size of vessels calling to the SNWW, the evaluation of potential effects to shoreline erosion for this analysis was focused on qualitative comparisons of vessel hydrodynamics. The conclusions of the hydrodynamic modeling of vessel-induced waves and erosion (see Engineering Appendix, Attachment 5, Vessel Effects Modeling Report) were that the proposed widening does not increase drawdown and return current (the vessel hydrodynamics that have historically contributed to bank erosion) and would not be expected to cause increased bank erosion compared to the no action/FWOP condition. Under the Recommended Plan/Proposed Action, transiting vessels would be expected to remain close to the channel center, transit at speeds would remain as they are currently, and therefore, will not increase the vessel hydrodynamics along the bank. Vessel hydrodynamics theory and the modeling presented in the Vessel Effects Modeling Report support that the widening would result in small to no changes to the vessel hydrodynamics in the SNWW. Because the proposed widening does not increase drawdown and return current compared to FWOP, it is also not expected to cause increased bank erosion.

As with any construction activity, clearing, grading, and equipment movement necessary to widen the areas described in Section 5.2, could accelerate the erosion process without adequate soil protection. Implementation of best management practices during construction (e.g., use of geotextile silt fences) and the rapid revegetation of disturbed soils in the warm climate minimize the potential effects of construction-related erosion. The BMPs to be deployed during construction are summarized in Section 8, Mitigation Planning and Best Management Practices.

7.7.3 Alternative 2

Under Alternative 2, the additional 100-feet of width (total width of 600 feet) would provide a wider channel slightly diminishing the vessel effects for the same vessel size, draft, and speed (see Engineering Appendix, Attachment 5, Vessel Effects Modeling Report) when compared to the recommended plan/proposed action or the FWOP. However, given that the predicted change in vessel hydrodynamics under the recommended plan/proposed action does not predict increased

²⁴ AdH uses hydraulic flow dynamics to solve two-dimensional shallow water flows, including hydraulic processes caused by the movement of single or multiple vessels.

bank erosion compared to FWOP, the wider areas of Alternative 2 would also not predictably change bank recession.

7.8 Water Quality

Freshwater inflow into the lower Neches River is primarily from the main stem channel of the river, which has regulated flow from two upstream reservoirs and from Pine Island Bayou and Village Creek tributaries (USACE, 2011). The reservoir operation does not affect the annual mean river flow, but does affect the timing and fluctuations of river flows (NOAA, 1993). During extreme low-flow years, the inflow to the estuary from the Neches River becomes essentially negligible and the longitudinal salt gradient in the Neches River vanishes (NOAA, 1993). Seasonally, the deep navigational channel within the Neches River maintains wedges of higher-density saltwater that underlie freshwater inflows (USACE, 2011).

As such, the salinity structure in the estuary is primarily determined by seasonal freshwater discharge with salinities of 0.5 parts per thousand (PPT) (nearly freshwater) and greater than 15 PPT (brackish) during low flow (NOAA, 1993). During a low-salinity period, the estuary is completely dominated by freshwater (i.e., salinities are generally fresh-to-brackish, stable, and vertically homogeneous), except deep within navigation channels (NOAA, 1993). The region's high (55.8 in.) annual rainfall and two large river systems make it, on average, the freshest estuarine system in Texas (USFWS, 2010).

Average salinities in Sabine Lake range from fall lows of three PPT in the upper portion of the lake at median river flow to highs of 15 PPT in the lower lake (USFWS, 2010). At low flow conditions (average of lowest 20 percent of historic flows), these salinities rise to 12 PPT in the upper lake and 21 PPT in the lower lake; historic drought conditions have produced salinities in excess of 28 PPT in the lower lake (USFWS, 2010).

The Texas Commission on Environmental Quality (TCEQ) has designated certain larger streams or bayous, or segments thereof, as “classified” segments for the purpose of developing water quality criteria (WQC) specific to each segment. As such, each water body (or subsegment thereof) is given a unique identifier (SegID), segment name, and location so the area can be discretely considered.

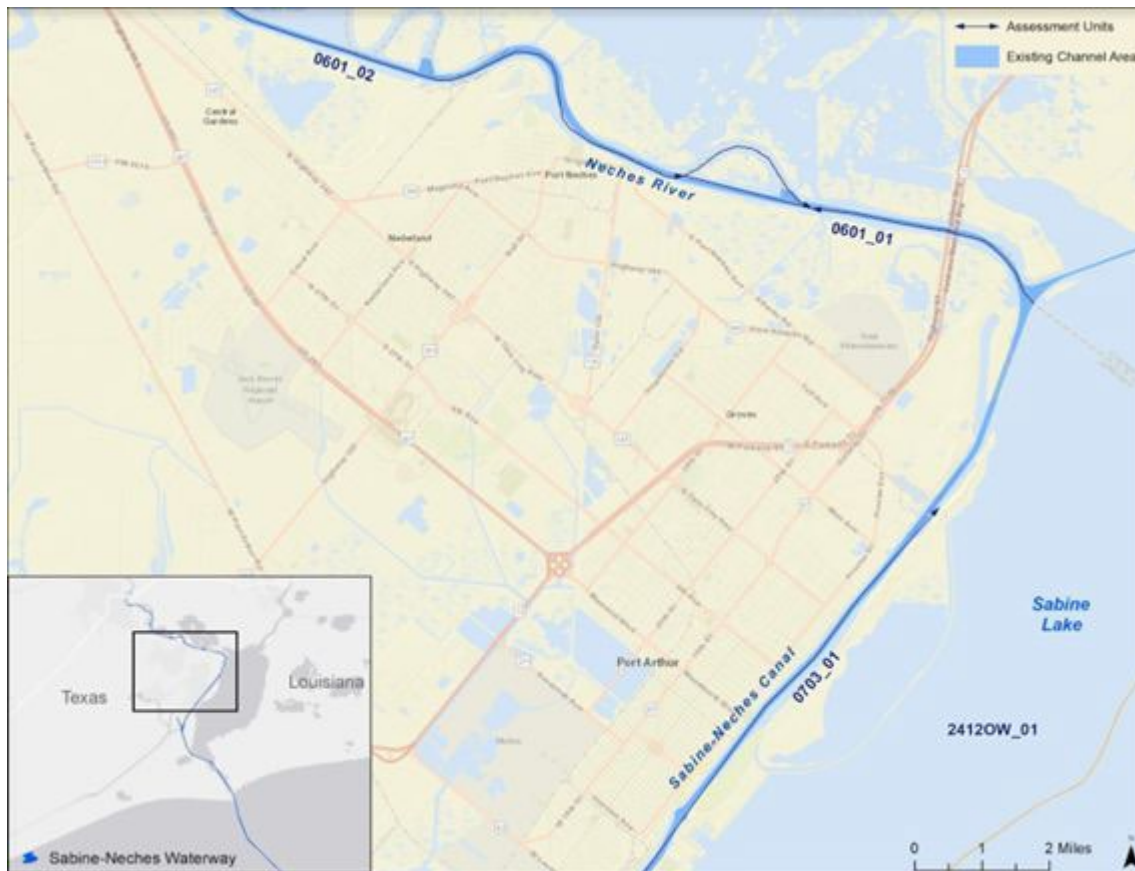
For each segment of water body, TCEQ assigns designated uses for the protection of aquatic life, fish consumption, shellfish consumption, recreational use, and public water supply. In addition to the designated uses, each segment is also assigned numeric standards for various criteria such as dissolved oxygen, temperature, toxics, bacteria, and metals and these numeric criteria determine whether a water body can support the designated uses. The TCEQ continuously evaluates water bodies in the state and identifies those that do not meet uses and criteria defined in the Texas Surface Water Quality Standards and these findings are documented biennially in the Texas Integrated Report (TCEQ, 2024). Water bodies that do not meet the numeric criteria are considered impaired and placed on the statewide list and included in the Texas Integrated Report (TCEQ, 2024).

As shown in Figure 7-4, the lower Neches River Tidal section is designated as 0601 with smaller divisions of assessment units encompassing the downstream most areas of the Neches River from

the “lower boundary of the first oxbow above Bird Island Bayou confluence” as 0601_01 and the “top of first oxbow to top of the U.S. National Defense Reserve Fleet Basin” as 0601_02 (TCEQ, 2024). Along Port Arthur, the Sabine-Neches Canal Tidal assessment unit (0703_01) is “from the confluence with Sabine Pass at the southern tip of Pleasure Island in Jefferson County to the Sabine Lake seawall at the northern tip of Pleasure Island in Jefferson County” (TCEQ, 2024). The Texas waters of Sabine Lake are an assessment unit and designated as oyster waters (2412OW_01).

Table 7-2 lists the 2024 impairments (polychlorinated biphenyls (PCBs) in edible tissue) for both of the Neches River assessment units; there were no impairments on the Sabine-Neches Canal Tidal section (TCEQ, 2024). The 2024 Texas Integrated Report - Potential Sources of Impairments and Concerns asserts that the source of PCBs in fish tissue within segments 0601_01 and 0601_02 is an “Upstream Source” and “Source Unknown” (i.e., the PCB contaminant source does not originate within these segments) (TCEQ, 2024a). The 2024 Texas Integrated Report removed bacteria in water (recreation use) from the Neches River Tidal’s 0601_01 and 0601_02 as well as the Sabine-Neches Canal Tidal’s 0703_01 assessment units (TCEQ, 2024).

Figure 7-4
Waterbody Segments in the Affected Area



**Table 7-2
Neches River Tidal: Texas 2024 303(d) Impairments**

Segment and Assessment Unit ID	Parameter	Year First Listed	Impairment
Neches River Tidal 0601_01	PCBs in edible tissue	2012	flesh of gafftopsail catfish
Neches River Tidal 0601_02	PCBs in edible tissue	2012	flesh of gafftopsail catfish

Source: 2024 Texas Integrated Report - Texas 303(d) List (Category 5) (TCEQ, 2024)

The water quality impairments the designated use impairment in edible tissue is because levels of PCBs exceeding standards have been detected in the flesh of gafftopsail catfish (*Bagre marinus*) from Sabine Lake (LNVA, 2015). The Texas Department of State Health Services issued an advisory limiting the consumption of gafftopsail catfish from Sabine Lake and contiguous Texas waters, including the Neches River (LNVA, 2015). Texas Department of State Health Services did not find elevated levels of contaminants in samples of alligator gar, black and red drum, sand trout, southern flounder, spotted seatrout, or striped bass (LNVA, 2015).

As with all industrialized areas, there is potential for chemical contamination within the Sabine Neches Estuary because there is a century-long history of petroleum-related industries along the SNWW, including refineries and transshipment docks for a variety of petroleum products (USACE, 2011). Throughout the SNWW maintenance as well as the ongoing construction for the channel deepening, there has been no indication of current water or elutriate²⁵ contaminant problems along the SNWW.

The Engineering Appendix details the numerical modeling to assess the potential effects on water quality from the proposed widening. For the analysis, a 3D hydrodynamic model (MIKE3 FM) of the affected area was developed²⁶ to provide transport from both freshwater inflows as well as tidal influences at the Gulf and Intracoastal Waterway boundaries in addition to density driven circulation. The modeling was completed to investigate the effects of proposed channel modifications on current speeds, water elevation, salinity, and temperature in the SNWW where channel modifications are proposed and other surrounding areas. While salinity and temperature were quantitatively modeled, direct quantitative modeling of DO concentrations was not performed. The potential changes to DO levels were inferred from changes in current speed, salinity, and temperature due to the widening as calculated with the hydrodynamic model along with review of available DO concentration data in the SNWW and surrounding areas.

The analyses also included examining the potential effects of relative sea level change (RSLC) to water quality over the 50-year period of evaluation. The complex details of the modeling are not repeated herein as they are comprehensively presented in the Engineering Appendix, Water Quality Modeling Report, Attachment 6 (SNND, 2024).

²⁵ An elutriate test of dredged material requires mixing dredged material with dredging site water and allowing the mixture to settle. The liquid portion remaining after settling and centrifugation is the elutriate.

²⁶ Details on the model mesh development, calibration, forcing, boundary conditions, detailed model results and the external peer review of the water quality modeling are in the Engineering Appendix, Attachment 6.

7.8.1 No Action/Future Without Project Condition

Under the FWOP, there would be no widening to the SNWW, the ongoing deepening construction would be completed, and the USACE's ongoing maintenance dredging would continue to be performed over the 50-year period of analysis. As described in the 2011 FEIS, the deepening would remove approximately 98 MCY of new-work material and approximately 650 MCY of maintenance material over the 50 year period of analysis (USACE, 2011).

Given the large quantities to be dredged for the deepening, the 2011 FEIS, asserted that when constructing the deeper channel, *“there should be little, if any, difference in inland turbidity or DO levels”* and *“significant detrimental environmental effects [to water quality] have not been noted in past construction and maintenance operations and are not expected.”* Short-term increases in turbidity were expected during construction, but would not result in significant effects to water quality. Also, *“the USACE routinely tests the elutriates prepared from maintenance material before dredging to ensure that there is no contamination and past evaluations of maintenance material elutriates with chemical analyses and water column bioassays have indicated no cause for concern (USACE, 2011).”* As such, implementing the No Action/Future Without Project Condition will result in *little, if any, difference in inland turbidity or DO levels* and would have no detrimental environmental effects to water quality in the affected area.

7.8.2 Recommended Plan/Proposed Action

As described in Section 5.2, under the Recommended Plan/Proposed Action, the SNWW would be widened by 100 feet over three discontinuous segments totaling approximately 19.4 miles of the navigation channel generating approximately 11.6 MCY of dredged material over a 30-month construction period. The potential effects to water quality considers both the short-term (i.e., construction related) effects and the long-term effects that result from changes to the federal navigation channel bathymetry.

The potential short-term effects are construction related and would be typical of any dredging work within and adjacent to a maintained federal navigation channel. The short-term effects include localized degradation of water quality from the dredging and material placement in adjacent upland placement sites and the Neches River beneficial use site. Following initial construction, the annual maintenance of the widened portions of the SNWW would similarly result in short-term, localized degradation of water quality for approximately 20 additional days of maintenance dredging per year in addition to the estimated 130 days per year to maintain the deepened Sabine-Neches Canal and Neches River Channel reaches under the FWOP (see Section 5.2, Construction Assumptions for the Recommended Plan/Proposed Action).

The localized temporary decrease in water quality would result from an increase in turbidity and suspended sediments, a mobilization of nutrients and detritus from the bottom, that would potentially lead to a localized minor reduction in dissolved oxygen. Concerns over the potential for PCB contaminants in the dredged material were voiced by Peter Schaefer (TCEQ) during the May 2024 agency webinar (see Section 1.10) because, the 2024 Texas Integrated Report identifies impairments (polychlorinated biphenyls (PCBs) in edible tissue) for both of the Neches River assessment units. However, the 2024 Texas Integrated Report - Potential Sources of Impairments and Concerns asserts that the source of PCBs in fish tissue within segments 0601_01 and 0601_02

is an “Upstream Source” and “Source Unknown” (i.e., the PCB contaminant source does not originate within these segments) (TCEQ, 2024a). Therefore, although the Neches River tidal assessment unit is listed as impaired for PCBs, the 2024 Texas Integrated Report asserts that the source is unknown and upstream (i.e., not within the assessment unit), giving no cause for concern that dredging would mobilize PCB contamination during construction.

The overall degradation of water quality would be minor; dredging methods have been proven to be effective and not unacceptably degrade water quality during maintenance dredging and new-work dredging of the very same segments for the ongoing deepening. Dredged material placement would not be expected to adversely affect water quality as the new-work and maintenance material would be placed into existing confined upland placement areas with the dewatering taking place through monitored outfalls. Adherence to best management practices during construction should minimize the risk of unintended water quality effects.

Where dredged material would be used to accelerate the development of the Bessie Heights East beneficial use site (See Section 5.2.3), there would be localized, temporary increase in turbidity and a potential lowering of dissolved oxygen in the area of active placement, but placement into the shallow water areas would allow for the beneficial effects of the marsh restoration.

The potential long-term water quality effects to the affected area would occur due to the changes to the waterway’s hydrodynamic features from the proposed channel geometry changes (i.e., the widening). Implementing the proposed widening would not change freshwater inputs into the system, so potential changes to water quality would result from changes to the water exchange between the SNWW and the Gulf. In general, increasing the width of a channel increases the volume of the channel along with the potential for an increase in the upstream water transport of higher-salinity water. However, because the proposed widening begins more than 12 miles upstream from the confluence with the Gulf, discernible changes to the upstream water transport would not be expected. Details of the predicted changes to water quality parameters assessed in the modeling (surface water elevation, salinity, temperature, and dissolved oxygen) are given below (Engineering Appendix, Water Quality Modeling Report, Attachment 6 (SNND, 2024)).

Water Surface Elevation

Water surface elevation modeling shows there would be negligible changes to elevation at the 13 evaluated locations from the Recommended Plan/Proposed Action as compared to FWOP condition as the model results indicated the predicted average water elevation changes were less than $0.1 \text{ cm} \pm 4 \text{ cm}$ (reported model error). These changes to water surface elevations at all of the 13 evaluated locations were considered negligible.

Salinity

Salinity modeling within the navigation channel and Neches River target locations predicted average surface salinity would increase by 0.03 practical salinity units (PSU)²⁷ due to the Recommended Plan/Proposed Action compared to the FWOP. There was no predicted change in average bottom salinity at these target locations due to the Recommended Plan/Proposed Action with a maximum salinity increase of 0.08 PSU at a single target location in the model (the mouth of the Neches River). At all other target locations, average surface salinity decreased by 0.01 PSU (maximum increase of 0.12 PSU) and average bottom salinity decreased by 0.02 PSU (maximum

²⁷ Salinity PSU has the same numerical value as salinity in parts per thousand (PPT); PSU is equal to PPT.

increase of 0.08 PSU) with the maximum changes occurring at the mouth of the Sabine River. All of these calculated salinity changes due to the Recommended Plan/Proposed Action as compared to the FWOP baseline are considered negligible (less than $0.34 \text{ PSU} \pm 3 \text{ PSU}$, reported model error).

The increased channel volume within the widened portions may potentially increase residence time in the widened channel areas, but without a reasonable chain-of-causation to predict changes to transport from the ocean, there is no mechanism for higher salinity in the system; therefore, negligible changes in salinity would be expected in the surrounding marshes.

Temperature

The average surface and bottom temperature changes due to the Recommended Plan/Proposed Action were 0.01°C with a maximum predicted increase in the surface of 0.11°C and in the bottom of 0.06°C . All calculated temperature changes due to the Recommended Plan/Proposed Action as compared to the FWOP baseline were negligible (less than $0.11^\circ\text{C} \pm 0.7^\circ\text{C}$, reported model error).

Dissolved Oxygen (DO)

DO levels in the navigation channel, rivers, and Sabine Lake are affected by both tidal water transport and kinetic interactions that produce or deplete oxygen. Changes to system geometry, such as the proposed widening, can change the tidal transport with the potential for increased residence time and therefore, allowing greater opportunity for oxygen consumption mechanisms to decrease DO levels. While longer residence times could lead to lower DO levels, this effect may be offset to some degree by atmospheric reaeration. In summary, the DO evaluation for the Recommended Plan/Proposed Action indicates that the potential changes to DO saturation concentrations, oxygen consumption, and residence time due to the widening are negligible and not expected to change existing DO levels in the SNWW study area.

At the 13 locations from which model results were extracted for water quality evaluation, the calculated change in DO saturation concentration under the Recommended Plan/Proposed Action ranged from -0.01 to $+0.01 \text{ mg/L}$. This calculated change in DO saturation concentration is negligible. Because the change in DO saturation concentration is considered negligible (i.e., zero average change), the Recommended Plan/Proposed Action would not be expected to change DO levels within the affected area.

The predicted maximum temperature increase of 0.06°C for the Recommended Plan/Proposed Action (considered negligible), was used to calculate a change in the BOD oxidation rate, sediment oxygen demand rate and the atmospheric oxygen reaeration rate; these calculated values predict increases of less than 0.5-percent and are therefore, also negligible. Given the predicted negligible changes to current speeds and residence time due to the Recommended Plan/Proposed Action as compared to the FWOP baseline, changes to DO concentrations in the SNWW study area are not expected to occur. Lastly, the simulations of the FWOP and Recommended Plan/Proposed Action conducted with RSLC showed that changes to current speed, elevation, salinity, and temperature between the FWOP and Recommended Plan/Proposed Action were about the same magnitude as the non-RSLC cases and all were negligible.

7.8.3 Alternative 2

As summarized in Section 5.3, Construction Assumptions - Alternative 2 would take approximately five years of dredging to construct. Since the Alternative requires a 100-foot wider channel alteration than the Recommended Plan/Proposed Action, the temporary, localized, construction-related decrease in water quality from dredging would occur over approximately twice as long (five years vs. 30 months). The results of the water quality modeling show that the calculated differences due to Alternative 2 are slightly greater than that for the Recommended Plan/Proposed Action, but would still be considered negligible (Engineering Appendix, Water Quality Modeling Report, Attachment 6 (SNND, 2024)).

7.9 Air Quality

The Clean Air Act (CAA) designates air quality standards for criteria pollutants to protect public health and welfare and the USEPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, called "criteria" pollutants. The USEPA established primary standards to protect public health; these are based on observable human health studies and are intended to be protective of sensitive segments of the population. In addition, secondary standards have been established to protect public welfare interests such as structures, vegetation, and livestock.

The pollutants included in the NAAQS include carbon monoxide, nitrogen dioxide, ozone, lead, particulates, and sulfur dioxide. Ozone is a gas that forms in the atmosphere when three atoms of oxygen are combined (O₃). Ozone is not emitted directly into the air, but is created at ground level by a chemical reaction between oxides of nitrogen (NO_x), and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC, also known as ozone precursors. Strong sunlight and hot weather, typical in summer months, can cause ground-level ozone to form harmful concentrations in the air. The lead emissions have not been included in the analyses as lead emissions are typically negligible from diesel and gasoline engines after the phase-out of lead in these fuels.

The General Conformity regulations in 40 CFR§93, Subpart B, dictates that a conformity review be performed when a federal agency action would generate air pollutants in a region that has been designated a nonattainment or maintenance area for one or more NAAQS. The general conformity rule was designed to ensure that federal agency actions do not impede local efforts to control air pollution. It is called a "conformity rule" because federal agencies are required to demonstrate that their actions "conform with" (i.e., do not undermine) a state's ability to attain or maintain compliance with their approved State Implementation Plan (SIP) and NAAQS for the geographic area.

The Texas Commission on Environmental Quality (TCEQ) has adopted the EPA's promulgated ambient air quality standards (Title 30, Subchapter 101A, Section 21 of the Texas Administrative Code, which is part of the EPA-approved SIP for Texas). The proposed widening would be in Jefferson County and Orange County, Texas, which are part of the Beaumont-Port Arthur (BPA) area. The BPA area is currently designated as "unclassifiable" (considered "attainment") or attainment for all criteria pollutants.

Because the proposed widening activities would occur in areas considered in attainment of the NAAQS, neither a General Conformity applicability analysis nor a conformity determination is required. However, an examination of airborne emissions resulting from the proposed widening has been prepared to evaluate the potential for environmental consequences unrelated to the question of General Conformity. The changes to airborne pollutants from implementing the proposed widening are both short-term related to the burning of fossil fuels (primarily diesel) from the construction equipment (i.e., non-point sources) and long term as a result of reducing vessel delays because of the wider channel. Because the changes to emissions are all related to combustion of diesel and gasoline, the parameters included in this analysis are: oxides of nitrogen (NO_x), volatile organic carbon (VOCs), carbon monoxide (CO), particulate matter (PM), and carbon dioxide (CO₂).

Assumptions regarding the emissions from the project are based on construction assumptions in the Engineering Appendix, Attachment 8 – Cost Report (e.g., equipment type, engine type, engine horsepower (HP), and hours of operation for each piece of equipment) (SNND, 2024). In addition, the emissions evaluation examines deep draft vessel emissions associated with both vessel delays at dock (hours/year) waiting to exit the waterway and delays waiting to enter the Sabine Neches Waterway as described in the Economics Appendix.

7.9.1 No Action/Future Without Project Condition

Under the FWOP alternative, the USACE will complete the ongoing deepening and continue maintenance dredging of the deepened channel. According to the 2011 FEIS, emissions from the channel deepening were not considered regionally significant for purposes of General Conformity (USACE, 2011). From the FEIS text: “*emissions from the project construction would not:*

- *Cause or contribute to new violation of any NAAQS in any area;*
- *Increase the frequency or severity of any existing violation of any NAAQS in any area; or*
- *Delay timely attainment of any NAAQS or interim emission reductions or other milestones in any area.”* (USACE, 2011).

In the intervening time since the publication of the 2011 FEIS, the attainment status of Jefferson and Orange Counties has been revised to be “in attainment” for all criterial pollutants. Additionally, the Southern Louisiana-Southeast Texas Interstate AQCR 106 is “in attainment.” As such, the completion of the channel deepening construction and future maintenance would not interfere with the air quality budgets in the SIP or be expected to lead to changes to ambient air quality.

Vessel Emissions During Delay

Under the No Action/Future Without Project condition, the proposed widening would not be constructed and maintained and would not provide navigational efficiencies in how deep draft navigation vessels move into and out of the SNWW. These navigational efficiencies are described as hours/year of delay that would not be avoided by having the navigational improvements (i.e., widened areas) change how vessels move into and out of the SNWW. This is relevant to changes to emissions because when navigational congestion delays vessel movements (i.e., vessels are unable to exit or enter the waterway), they use diesel fuel to run auxiliary power sources while

waiting. Under the No Action/Future Without Project condition, the delays would continue over the 50-year period of analysis and the vessel emissions during delays have been calculated as shown below.

The number of hours of delay used for this analysis is consistent with the hours/year of vessel delays at dock (waiting to exit the waterway) and hours/year of vessel delays at the SNWW entrance (waiting to enter the Sabine Neches Waterway) as described in the Economics Appendix. Because of how vessels operate in the waterway, hours of delay are also hours of auxiliary power operation for each hour of vessel delay. Each hour of vessel delay that continues because the proposed widening project would not be built, represents an hour of auxiliary engine operations that would continue to create emissions. According to the Economics Appendix, a total of approximately 1,370,000 hours of dock delays and 795,000 hours of delay at sea could be avoided over the 50-year project life. Therefore, under the No Action/Future Without Project condition, emissions related to the operation of diesel auxiliary power support engines, from multiple sources (e.g., the fleet of support engines on multiple deep draft vessels) would occur as shown in the calculations.

Assuming each vessel is equipped with a 250 hp Cummins 6CT/6CTA8.3-D(M) marine diesel-powered engine for high-output marine applications, with Tier 2 compliance, and no additional emissions modifications. The equipment-specific emissions factors are listed below, and emissions were calculated where Emissions (tons) = Power (hp)×Operating Hours (hr)×Emission Factor (g/hp-hr) × (1 ton / 907,185 g).

Auxiliary Power Emissions Factor:

- NO_x: 0.0114 lb/hp-hr
- VOC: 0.0010 lb/hp-hr
- PM: 0.0002 lb/hp-hr
- CO: 0.0057 lb/hp-hr
- CO₂: 0.884 lb/hp-hr.

The estimated 50-year emissions that would occur because of continued vessel delays under the No Action/Future Without Project condition are provided in Table 7-3.

Table 7-3
50-Year Vessel Delay Emissions (tons)

Emissions Source	NO_x	VOCs	PM	CO	CO₂
Dock Delays	1,952	171	34	976	151,574
Sea Delays	1,133	99	20	566	87,962
Totals	3,085	270	54	1,542	239,536

7.9.2 Recommended Plan/Proposed Action

Construction of the widened areas under the Recommended Plan/Proposed Action would take approximately 30 months with active dredging not occurring throughout that entire period. Maintaining the widened portions of the channel would add approximately 20 additional maintenance dredging days per year to the estimated 130 days per year to maintain the deepened Sabine-Neches Canal and Neches River Channel segments as described previously in Section 5.2.

Implementing the proposed channel widening measures would result in temporary, localized emissions from the burning of diesel fuel from the operation of dredging and booster pump equipment and other support equipment for initial channel widening construction. In addition, there would be an annual increase in emissions because of the increase in the number of days (+20 days) for annual maintenance dredging within the widened segments.

Construction Emissions

The proposed widening would utilize a 12,400 horsepower (hp) cutterhead dredge removing 11,646,000 CY of material over a four-year construction period (July 2028–June 2032) at a production rate of approximately 1,300 CY per hour. The emission factors used for the cutterhead dredge are presumed to be based on the Tier 2 emissions standards for marine diesel engines. The Tier 2 emissions standards effective between 2007-2011 depending on the size category of the engine, and with more than a decade since the initial effective dates for nonroad equipment, Tier 2 dredges are a more common part of the national dredge fleet. Using the Tier 2 emission factors represent a conservative assumption for estimating emissions.

Additional equipment to be used in support of the dredging operations includes a 500 hp barge-based crane (debris removal), a 200 hp bulldozer, a 150 hp track excavator, and a 100 hp survey boat. Emissions were calculated for this diesel-powered equipment compliant with Texas Low Emission Diesel (TxLED) standards and all equipment excepting the dredge is presumed to meet Tier 3 emission standards.

Operating at 1,300 CY per hour, the dredge runs for approximately 8,958 hours ($11,646,000 \div 1,300$), or 2,240 hours per year ($8,958 \div 4$). Additional equipment operates as follows:

- Barge-based crane: 100 hours total over the first three years (33.33 hours/year);
- Bulldozer and track excavator: 18,663 hours each over four years (4,666 hours/year); and
- Survey boat: 80 hours total over four years (20 hours/year).

Emissions are generated from diesel-powered engines, with TxLED compliance reducing NOx emissions by 5-percent. The inventory includes NOx and VOC as ozone precursors, along with PM, CO, and CO₂. The assumed emissions factors for the different equipment are as follows:

Cutterhead Dredge:

- Power: 12,400 hp.
- Operating Hours: 8,958 hours total, 2,240 hours/year.
- Production Rate: 1,300 CY/hour.
- Emission Factors (Marine Diesel, Tier 2, EPA AP-42, Chapter 3.3, Diesel Industrial Engines):

- NOx: 6.5 g/hp-hr
- VOC: 0.4 g/hp-hr
- PM: 0.2 g/hp-hr
- CO: 1.3 g/hp-hr
- CO₂: 925 g/hp-hr

Barge-Based Crane:

- Power: Assumed 500 hp (typical for barge-mounted cranes used in dredging support).
- Operating Hours: 100 hours total, 33.33 hours/year for three years (2028–2030), zero hours in 2031.
- Emission Factors: Tier 3 nonroad diesel. EPA AP-42, Chapter 3.3).
 - NOx: 3.0 g/hp-hr
 - VOC: 0.1 g/hp-hr
 - PM: 0.1 g/hp-hr
 - CO: 2.5 g/hp-hr
 - CO₂: 925 g/hp-hr

Bulldozer and Track Excavator:

- Power: Assumed 200 hp bulldozer and 150 hp track excavator (typical for construction equipment in dredging projects).
- Operating Hours: 18,663 hours each over four years, 4,666 hours/year.
- Emission Factors (Tier 3 nonroad diesel, EPA AP-42, Chapter 3.4, Diesel Construction Equipment):
 - NOx: 3.0 g/hp-hr
 - VOC: 0.1 g/hp-hr
 - PM: 0.1 g/hp-hr
 - CO: 2.5 g/hp-hr
 - CO₂: 925 g/hp-hr

Survey Boat:

- Power: Assumed 100 hp marine gasoline (typical for survey vessels in dredging operations).
- Operating Hours: 80 hours total, 20 hours/year.
- Emission Factors: AP-42.
 - NOx: 10.0 g/hp-hr
 - VOC: 2.0 g/hp-hr
 - PM: 0.1 g/hp-hr
 - CO: 200 g/hp-hr
 - CO₂: 950 g/hp-hr

Emissions were estimated as shown, where: Emissions (tons) = Power (hp)×Operating Hours (hr)×Emission Factor (g/hp-hr)×(1 ton/907,185 g). An example of the emissions calculation for the dredge operations follows where the total NOx emissions from cutterhead dredge operations were calculated as: 12,400 (hp) × 8,958 (hrs of operation)×6.5 (g/hp-hr)/907,185 (g/ton)=796.24 tons. Construction emissions have been calculated identically to the method used for vessel delay emissions and are presented in Table 7-4.

**Table 7-4
Construction Emissions (tons)**

Equipment	NOx	VOCs	PM	CO	CO₂
Cutterhead Dredge	796.24	48.98	24.49	159.25	113,234
Barge-Based Crane	0.17	0.01	0.01	0.14	50.97
Bulldozer	12.33	0.41	0.41	10.28	3,806
Track Excavator	9.25	0.31	0.31	7.71	2,855
Survey Boat	0.09	0.02	0.001	1.76	8.37
Total	818	50	25	179	119,954

As shown in Table 7-4, the emissions for the proposed widening are predominated by the operation of the cutterhead dredge as approximately 97-percent of the NOx emissions (796.24/818.07) and 99-percent of the VOC emissions (48.98/49.72) are from the operations of the cutterhead dredge. The contribution to the construction-related emissions from the crane, bulldozer, track excavator, and survey boat emissions are very small relative to the contribution from the dredging. Should additional bulldozers, track excavators, or other unspecified similar equipment be necessary to accomplish the work, the addition of said equipment would result in negligible changes in emissions. Additionally, while the emissions for the dredge operations were based on Tier 2 emissions factors, dredge equipment that meet emissions standards higher than Tier 2 are increasingly available in the national fleet. This analysis (using Tier 2 emission factors) represents a conservative (i.e., likely overestimate) evaluation; if higher Tier equipment (e.g., Tier 3 or Tier 4 emission factors) was used for dredging, emissions would be further reduced.

Table 7-5 shows the 50-year predicted change in emissions with the tons of emissions generated during construction (Table 7-4), subtracted from the emissions avoided by reducing vessel delays as shown in Table 7-3. Negative values in Table 7-5 reflect the tons of emissions avoided by constructing and utilizing the proposed widening and avoiding emissions during vessel delays under the No Action/Future Without Project condition. Although construction-related emissions during the July 2028–June 2032 construction period would occur as shown in Table 7-4, the 50-year change to emissions from the constructing and using the proposed widening would result be a substantial, long-term, beneficial effect from the net reduction in emissions as shown in Table 7-5. Implementing the Recommended Plan/Proposed Action would reduce vessel delays and their associated emissions, provide a long-term beneficial effect on regional air quality, contribute to public health, and improve the quality of life for nearby residents.

**Table 7-5
Proposed Widening 50-year Emissions (TONS)**

Emissions	NOx	VOCs	PM	CO	CO₂
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Construction	818	50	25	179	119,954
Delay Avoided	-3,085	-270	-54	-1,542	-239,536
Totals	-2,267	-220	-29	-1,363	-119,582

7.9.3 Alternative 2

Construction of the widened areas under Alternative 2 would remove approximately twice the quantity of materials and take approximately twice as long (five years vs. 30 months for the Recommended Plan/Proposed Action) as described in Section 5.3. Implementing the proposed channel widening measures under Alternative 2 would be calculated in Section 7.9.2, but with approximately twice the emissions. As such, Alternative 2 would still represent a 50-year reduction in overall emissions compared to the No Action/Future Without Project condition, but would be less beneficial over the period of analysis.

7.10 Vegetation, Wetlands, and Submerged Aquatic Vegetation (SAV)

The potentially affected shorelines and adjacent land described in Section 5.2, Construction Assumptions have been highly modified by more than a century of historical use for dredge material placement adjacent to the maintained deep draft navigation channel (Wiley, 2021). Section 7.4, Land Use, describes the history of anthropogenic disturbance along the banks of the Neches River Channel as well as the creation of Pleasure Island adjacent to the Sabine-Neches Canal during the SNWW construction and subsequent maintenance dredging (USACE, 1982).

The potentially affected plant communities were investigated with vegetation habitat surveys conducted landward of the existing shoreline on the left descending bank of the Neches River and the Sabine-Neches Canal along Pleasure Island; the report is provided in Appendix H, Vegetation Habitat Assessment Survey (Wiley, 2021). The 2021 assessment was conducted before geotechnical investigations, or the project engineering had been completed. As such, the area investigated during the fieldwork was larger than the area to be affected based on the current design (SNND, 2024). Therefore, the areas examined and the acreage totals summed the Vegetation Habitat Assessment Survey are not reflective of the current proposal as described in Section 5.2.

Vegetation

The vegetation composition of the potentially affected areas reflects disturbed habitat because of the repeated and continued anthropogenic disturbance. The vegetation of the potentially affected shorelines and adjacent uplands have been altered by the placement and repeated placement of dredged material, manipulation into golf courses and dredged material placement areas, and the effects of invasive species. Invasive feral hogs (i.e., wild pigs, *Sus scrofa*) are abundant on Pleasure Island and on the left descending bank of the lower Neches River. The effect on the vegetation is readily apparent in trails, wallows, and rooting areas.

The field investigations characterized vegetation at 30 locations, identifying a total of 92 species representing 39 plant families (Wiley, 2021). The invasive alien tallow tree (*Triadica sebifera*) was the most common woody species on dry sites, closely followed by the native sugarberry (*Celtis*

laevigata). The single most dominant herbaceous species on well-drained sites was wrinkleleaf goldenrod (*Solidago rugosa*). On wet to moist sites, the invasive alien species common reedgrass (*Phragmites* sp.) and deep-rooted sedge (*Cyperus entrerianus*) were the most common (Wiley, 2021). The list of observed plants was compared to federal and state lists of rare, threatened or endangered plant species and no such listed species were observed (Wiley, 2021).

For the survey locations adjacent to the Sabine-Neches Canal (i.e., along Pleasure Island), the sites were nearly identical in terms of elevation above water, nature of recent perturbation, and the time since human disturbance ended. Areas above the steep slope to the waterline, and parallel to the water course, (i.e., the former golf course) have typical golf course features (e.g., fairway, sand traps, etc.) proceeding through oldfield succession and a meandering, paved asphalt cart path parallel to the water. The invasive alien tallow tree was the most common woody species, followed by the native sugarberry and the single most dominant herbaceous species on the former golf course was wrinkleleaf goldenrod (Wiley, 2021).

The potential footprint of disturbance from widening measures within the lower Neches River projects onto the tips of a series of discontinuous shorelines on the left descending bank as described and shown in Section 5.2. These shorelines were created by excavation of a straight federal navigation channel through the western side of the flood plain to cut off former river bends, or were formed by the placement of dredged materials during navigation channel construction and maintenance. These sites tend to range in elevation from mean sea level to approximately +4 feet elevation with the more northern sites ranging to +6 feet elevation. All of the potentially affected landside areas are the downslope sections of dredge material placement area containment dikes with varying slopes (Wiley, 2021).

A significant portion of the area is presently composed of alien species, some of which are listed as noxious weeds. At the transitional areas between uplands and the open water of the Neches River, most low marsh areas are almost entirely composed of common reedgrass, a noxious alien weed. The present-day vegetation composition along the Neches River is dominated by the invasive alien tallow tree, sugarberry, and groundsel tree (*Baccharis halimifolia*). These characteristics define ecological compositions classifiable as early successional colonizers, and this plant community occurs in instances of recent and frequent disturbance. The vegetation community of these downslope sections of dredge material placement area containment dikes reflect repeated disturbance from routine maintenance (e.g., mowing, brush removal, road/access clearing, dike raising) as well as the temporary placement and use of dredge pipelines to pump materials into placement areas during dredging. These areas continue to be characterized as degraded habitat with low habitat values (Wiley, 2021).

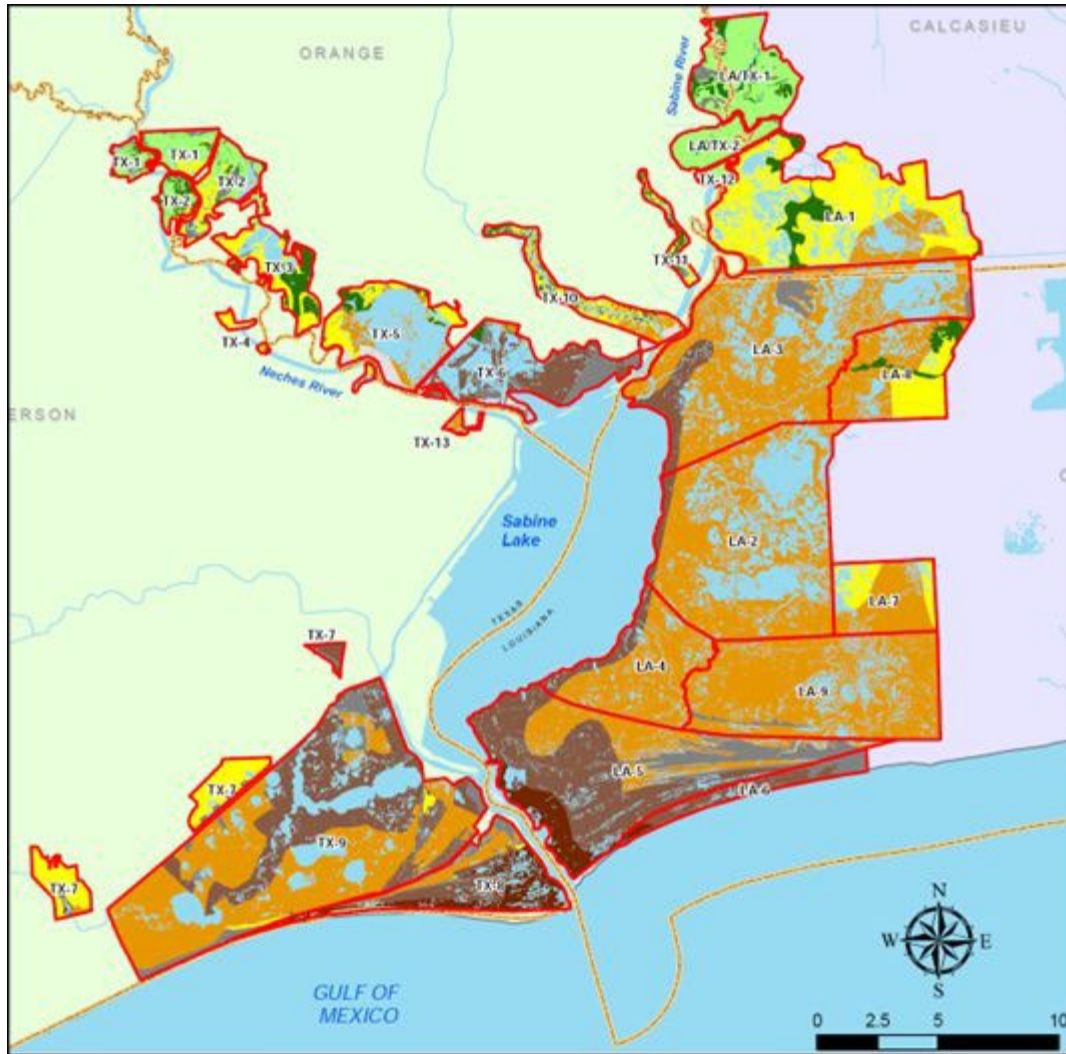
Wetlands

The 2011 FEIS included a Wetlands Value Assessment (WVA)²⁸ and ecological modeling that characterized the wetlands communities that could be potentially affected by the proposed deepening (USACE, 2011a). For that analysis, the study area was subdivided into hydrographic units (i.e., hydro-units) that could be isolated by topography and hydrology from the surrounding areas and mapped the habitat types therein for the ecological analyses (USACE, 2011a).

²⁸ The Wetlands Value Assessment was a multi-year investigation to quantify the loss of aquatic functions resulting from the proposed project and estimate the required compensation for those losses.

In establishing the hydro-units, the entire area of landside excavation for the proposed widening being evaluated in this analysis was *excluded* from the analysis of potential effects to wetlands. As shown in Figure 7-4, none of the terrestrial habitat along the Sabine-Neches Canal (i.e., along Pleasure Island) was included within a hydro-unit as the entirety of Pleasure Island (green polygon immediately to the left of the label “Sabine Lake” in the figure) was excluded from the analysis (USACE, 2011).

Figure 7-4
2011 FEIS - SNWW Hydrographic Unit Index Map



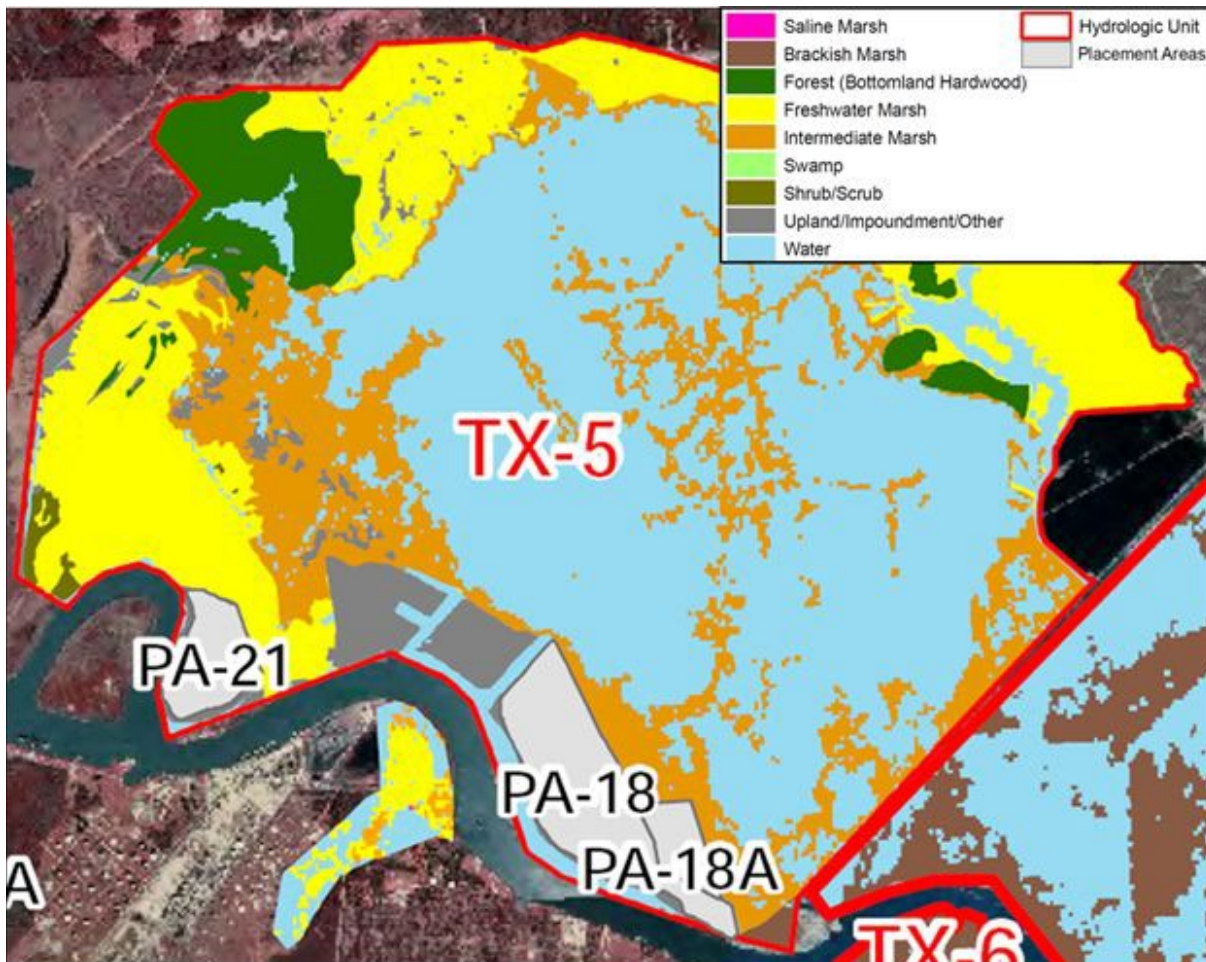
Source: (USACE, 2011a)

Similarly, none of the habitat potentially affected by the widening measures along the left descending bank of the lower Neches River were mapped as wetlands. Within Figure 7-5, the light gray polygons are Placement Areas 18/18A and 21 and the dark gray polygons are labeled “upland/impoundment/other.” The footprint of land removal along the left descending bank of the Neches River, as described in Section 5.2 and shown in Figure 5-2, are entirely within the dark gray polygons shown as “upland/impoundment/other” shown in Figure 7-5. Thus, the footprint of land removal for the proposed channel widening along bank of the Neches River falls within

these gray polygons that were excluded from the analysis of potential effects to wetlands in the WVA (USACE, 2011a).

The continued maintenance and use of areas mapped as “upland/impoundment/other” in Figure 7.5 is because the areas within and surrounding the Placement Areas along the SNWW were the subject of the USACE’s 1975 EIS for maintenance dredging and dredged material management for the SNWW (USACE, 1975). That 1975 EIS quantified the environmental effects of the continued maintenance and use of these PAs in support of the federal navigation channel (see Section 7.4, Land Use). As such, the analysis of potential effects to wetlands in the 2011 FEIS for channel deepening **excluded** the habitat within and surrounding the PAs from the evaluation of the potential effects to wetlands, because the loss of wetland habitat within and adjacent to the PAs had already been described, quantified, and accounted for in the USACE’s 1975 EIS.

Figure 7-5
2011 FEIS Habitat Designations Within Hydro-Unit TX-5



Source: (USACE, 2011a)

National Wetlands Inventory Mapping

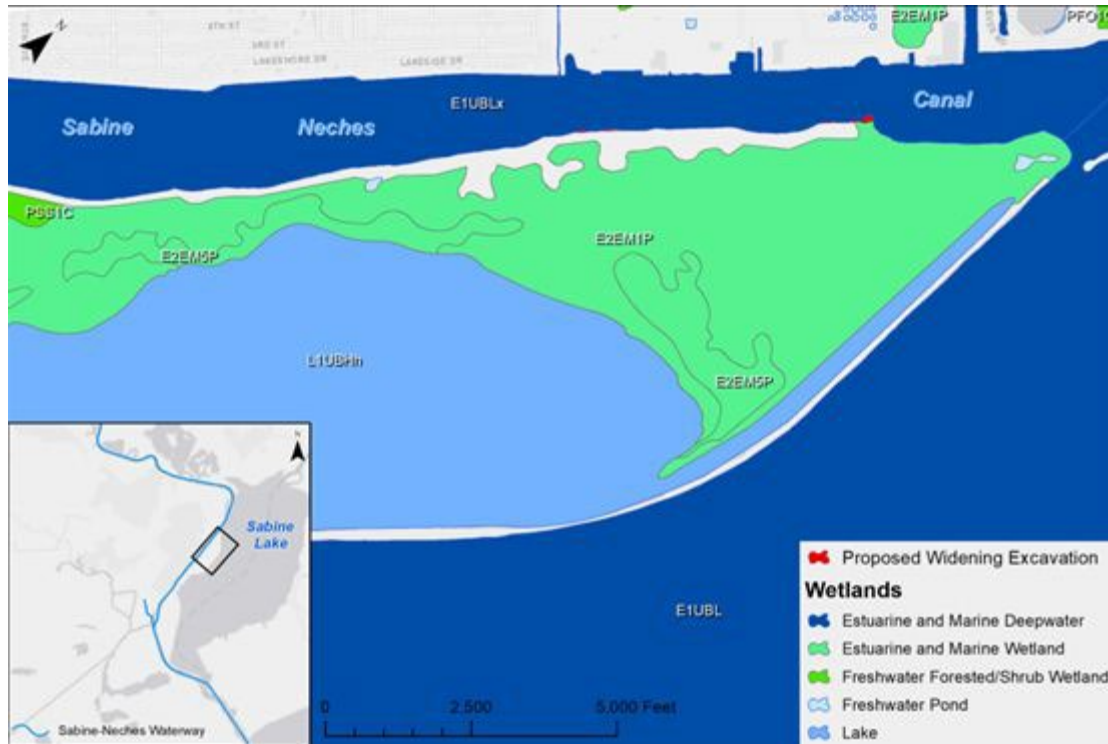
The USFWS’ National Wetland Inventory (NWI) of the Sabine-Neches Canal south segment along Pleasure Island (within the abandoned golf course) identifies no NWI-mapped wetlands within the

area to be excavated for the widening, as shown in Figure 7-6. Water hazards constructed as golf course features are designated PUBH (palustrine unconsolidated bottom wetland), but these areas are outside the area affected by construction. NWI mapping of the Sabine-Neches Canal north segment (Figure 7-7) identifies a single area (0.32 acre) that is mapped as E2EM1P that would be removed during construction. However, site elevation data shows the polygon has a benchtop of approximately +20 feet (NAVD88) and an average elevation greater than +8 feet (NAVD88) above the water line. Ground truthing at this location during the vegetation survey showed a steep, rip-rap armored slope from the waterline to uplands and no wetlands habitat (Wiley, 2021).

Figure 7-6
NWI Mapping of Sabine-Neches Canal South Segment



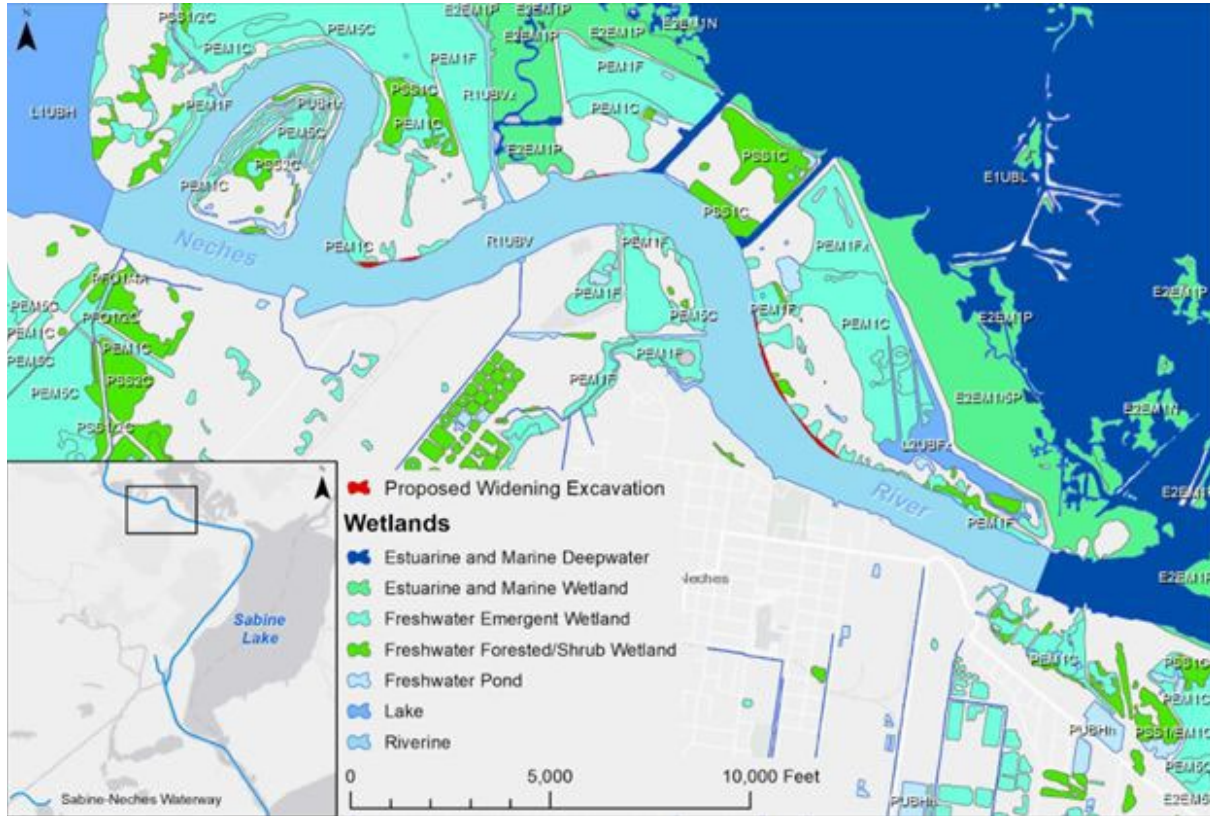
Figure 7-7
NWI Mapping of Sabine-Neches Canal North Segment



The potential footprint of landside excavation from widening measures within the lower Neches River is a narrow strip of discontinuous shorelines adjacent to dredged material PAs and along the left descending bank that cumulatively sums to 6.2 acres along 1.2 miles of shoreline as shown in Table 5-1.

Figure 7-8 shows the USFWS' NWI mapping of the Neches River Channel where the proposed widening would likely have landside effects. The mosaic of uplands and wetlands shown reflects the topographic variation from the historic deposition of dredged material, dike maintenance and construction along the placement areas, underground pipeline construction and maintenance, and other disturbances. The total area of proposed widening excavation that could intersect NWI-mapped wetlands sums to approximately 2.9 acres (1.04 ac PEM1C, and 1.9 ac PEM1F).

Figure 7-8
NWI Mapping of the Neches River Segment Habitat



Submerged Aquatic Vegetation (SAV)

Submerged aquatic vegetation (i.e., seagrass) is scarce in bays of eastern Texas where rainfall and inflows are high and salinities are lower as these areas are also more turbid, which also limits sunlight penetration for seagrass growth (USACE, 2011). These prevailing environmental conditions continue resulting in no SAV (seagrasses or other types of SAV) being present within or in proximity to the area of potential widening. An examination of mapped seagrass using the Texas Parks and Wildlife Department (TPWD) Seagrass Viewer²⁹ and email communication with Dr. Carey Gelpi, TPWD's Sabine Lake Ecosystem Leader, affirmed there is no seagrass habitat along the SNWW in the areas of the proposed widening.

7.10.1 No Action/Future Without Project Condition

The FWOP condition presumes the completion of the ongoing channel deepening with changes to areas of vegetation along Pleasure Island where landside excavation would occur as from the ongoing deepening; there are no predicted changes to the shoreline or adjacent lands on the Neches River under the FWOP. The vegetated areas of Pleasure Island that will become open water when the deepening project is completed (estimated at 4.5 acres) include no wetlands and would be of

²⁹ <https://tpwd.maps.arcgis.com/apps/webappviewer/index.html?id=af7ff35381144b97b38fe553f2e7b562>

extremely low quality dominated by the invasive alien tallow tree (*Triadica sebifera*), sugarberry (*Celtis laevigata*), and wrinkleleaf goldenrod (*Solidago rugosa*) in the former golf course.

In addition, the FWOP condition would result in the construction of a total of 2,853 acres of emergent marsh at the three different sites of the Neches River BU Feature (Rose City East, Bessie Heights East, and Old River Cove) (USACE, 2012). Of this total, actions within hydro-unit TX-5 (Figure 7-5) would result in “a net increase of 1,189 acres of intermediate marsh and 679 acres of brackish marsh, and a net benefit of 419 AAHUs” (USACE, 2011a). The 2011 FEIS continued, “in Texas, construction of the Neches River BU Feature and the Texas portion of the Gulf Shore BU Feature would produce benefits totaling 1,068 AAHUs. Therefore, there would be a net gain of 656 AAHUs [$1,068 - 412 = 656$], which more than offsets all negative [wetland] impacts that would occur in Texas.” As described in the 2011 FEIS, the Neches River BU feature more than offsets (+656 AAHUs) all direct and indirect impacts to Texas wetland habitats on the Neches and Sabine Rivers.

7.10.2 Recommended Plan/Proposed Action

Of the 19.4 miles to be widened under the Recommended Plan/Proposed Action (Figure 5-1), 16.8 miles of the channel widening (> 86-percent) would occur completely underwater and would result in no changes to the adjacent land and vegetation. Implementing the recommended plan/proposed action in the Sabine-Neches Canal (South) segment (magenta line in Figure 5-1) would not result in any changes to adjacent shoreline or land as the width could be constructed with no changes to adjacent land and vegetation. Within the Sabine-Neches Canal (North) segment (blue line in Figure 5-1), 1.3 miles of shoreline and a total of 10.9 acres of uplands in the former golf course and along Placement Area 11 would be converted to open water. Within the Neches River Channel segment (yellow line in Figure 5-1), 1.2 miles of shoreline and a total of 6.2 acres of uplands and vegetation would be converted to open water. In sum, constructing the recommended plan/proposed action would affect a total of 2.5 miles of shoreline and 17.2 acres of upland habitat as summarized in Table 5-1.

Implementing the Recommended Plan/Proposed Action would transform the 17.2 acres of existing terrestrial vegetation habitat in the affected areas to subtidal (i.e., under water) as the slope of the transition to water would be tapered and be graded to existing upland vegetation. However, the vegetation of the potentially affected shorelines and adjacent uplands have been altered by the placement and repeated placement of dredged material, manipulated into the now-derelict golf course, overrun with invasive wild pigs, and managed for dredged material placement. The vegetation community that persists is dominated by invasive alien species and of little ecological value (Wiley, 2021).

The upland areas that could be disturbed for construction would return rapidly to vegetated conditions due to the ubiquity of plant propagules, the humid subtropical climate, and the dominant species being typically invasives. The present vegetation composition of these areas has occurred and re-occurred without external assistance (i.e., planting) from original creation, through frequent re-disturbance for continued dredge material disposal, and/or other land uses (e.g., placement areas, golf courses) and subsequent abandonment. The recovery of vegetation disturbed during construction would predictably occur through natural successional processes and would be assumed as a virtual certainty (Wiley, 2021).

Within the area of landside excavation along the Neches River Channel, the area of upland disturbance includes a fringe of intermittent wetland habitat on the downslope edge of PAs 18 and 21 (see Figure 7-8). This habitat persists within the area of active placement area maintenance along the shoreline where the transition takes place from sub-tidal deep water to the PA containment dikes.

The wetlands fringe is palustrine emergent and palustrine scrub-shrub wetlands and contains a mix of non-native, invasive species including common reed (*Phragmites australis*), giant reed (*Arundo donax*), and Chinese tallow (*Sapium sebiferum*). As such, the wetland community on the fringes of these PAs evidences having been subjected to disturbance and is of low quality. During construction of the Recommended Plan/Proposed Action, these low quality, linear wetland fringes would be excavated to open water, but would be graded to provide a stable slope. After construction was completed, the lower one to three feet of elevation would likely be saturated due to tidal fluctuation (approximately one foot), wind-driven changes to the water surface elevation, and capillary rise in medium textured soils. Because of these wetting factors, the new slopes along these areas would be routinely saturated and would be expected to revegetate to marsh vegetation fringe along the transition as is currently the case. Thus, the grading to achieve stable slopes would provide hydrologic conditions similar in form and function at the toe of the slope of the new shoreline where minor elevation differences would be expected to result in a similar extent of wetlands habitat after construction.

In summary, implementing channel widening measures in the areas identified and surveyed would remove the vegetation and its use as habitat would be eliminated in the newly submerged areas. However, along the Neches River Channel sections of the widening, the disturbed areas would likely revegetate through natural successional processes to the habitat character and composition found there now (Wiley, 2021). The effects to these habitat areas from the proposed widening are **excluded** from the evaluation of the potential effects to wetlands, because the effects to wetland habitat within and adjacent to the PAs had already been described, quantified, and accounted for in the 1975 EIS for maintenance dredging and dredged material management for the SNWW (USACE, 1975). As such, no mitigation is anticipated for these effects to wetland habitat from implementing the Recommended Plan/Proposed Action.

As stated in Section 7.10.1, under the No Action/FWOP condition and as reported in the 2011 FEIS for the channel deepening, the Neches River Beneficial Use feature more than offsets (+656 AAHUs) all direct and indirect impacts to Texas wetland habitats on the Neches and Sabine Rivers (USACE, 2011). The assessment of the potential effects to wetlands from the Recommended Plan/Proposed Action assumes a slight increase in wetland impacts could occur because of the areas of landside excavation at the toe of the slope from the placement areas along the Neches River's left descending bank. However, no additional mitigation is warranted because the Neches River BU feature, into which the proposed widening would contribute up to 500,000 CY of dredged material³⁰ accelerating the habitat benefits (see Section 5.2.3), provides sufficient excess AAHUs to offset the potential, minimal temporary impacts of wetland loss from the widening.

³⁰ During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

7.10.3 Alternative 2

Under Alternative 2, widening would occur within the same segments at the Recommended Plan/Proposed Action and the materials to be removed would also be suitable for removal with a cutterhead suction (pipeline) dredge. Within the Sabine-Neches Canal (North) segment (blue line in Figure 5-1), 1.6 miles of shoreline and a total of 44.7 acres of uplands in the former golf course and along Placement Area 11 would be converted to open water. Within the Neches River Channel segment (yellow line in Figure 5-1), 3.2 miles of shoreline and a total of 46.7 acres of uplands and vegetation would be converted to open water. As shown in Table 5-3, construction of Alternative 2 would affect 4.8 miles of shoreline and would result in the conversion of 91.3 acres of upland into open water. As shown in Table 5-3, under Alternative 2, 4.8 miles of shoreline and a total of 91.3 acres of land would be excavated to open water resulting in approximately 75-percent of the length of channel widening occurring underwater (14.6 miles of the 19.4 miles).

Implementing Alternative 2 would also require removal of approximately 5,500 linear feet of the Placement Area 11 perimeter dike and would use the existing earthen berm and riprap materials to reconstruct the dike on the new alignment. Dredging the wider areas of Alternative 2 would generate approximately 31.6 MCY of new-work and add just over two million CY/YR in maintenance material (approximately twice the volume of material under the Recommended Plan/Proposed Action). The annual increase in maintenance dredging to maintain Alternative 2 would require an additional 40 days of maintenance dredging per year. The Engineering Appendix evaluated the existing placement areas and beneficial use planning and determined that, with more frequent containment dike raises to increase capacity, there would be sufficient capacity for placement of both the new-work and additional volume of dredged material for Alternative 2 without a need to develop and construct any new upland placement areas (SNND, 2024).

While implementing Alternative 2 would transform the 91.3 acres of existing terrestrial vegetation habitat into open water (i.e., subtidal) the vegetation of the potentially affected shorelines and adjacent uplands have been altered by the placement and repeated placement of dredged material, manipulated into the now-derelict golf course, overrun with invasive wild pigs, and managed for dredged material placement. While a larger area would be affected by Alternative 2, the vegetation community that would be affected is dominated by invasive alien species and of little ecological value (Wiley, 2021).

The USFWS' NWI mapping of habitat adjacent to the Neches River Channel and the Sabine-Neches Canal, where the Alternative 2 widening would have landside effects, shows a mosaic of uplands and fringe wetlands reflecting a history of anthropogenic land uses in support of deep draft navigation. The area of proposed widening excavation that could intersect NWI-mapped wetlands along the Neches River sums to approximately 17.3 acres and along the Sabine-Neches Canal sums to approximately 0.97 acres. Because the effects to wetland habitat within and adjacent to the PAs had already been described, quantified, and accounted for in the 1975 EIS for maintenance dredging and dredged material management for the SNWW (USACE, 1975), there are also no effects to wetlands for Alternative 2.

7.11 Wildlife

The richness and diversity of wildlife within and near the potentially affected areas has been, and continues to be, affected by the land use and history of terrestrial and aquatic habitat manipulation within and along the SNWW. For more than 100 years, the federal navigation channel has been maintained and improved with cutterhead and mechanical dredging, sediments within the waterway have been removed to create and maintain safe navigation, dredged material has been placed adjacent to the federal navigation channel and (more recently) within upland dredged material placement areas, flood control measures have been constructed and maintained on the right descending bank of the waterway, and property on the right descending bank has been developed with docks, bulkheads, and a nearly-continuous alignment of industrial facilities. The consequence of this creation and maintenance of deep draft navigation and the history of adjacent urban and industrial land use, is a substantially altered landscape with limited opportunity for wildlife species other than those most tolerant of human alternation and occupation.

The USFWS included an extensive Fish and Wildlife Coordination Act Report (CAR) (USFWS, 2010) for the 2011 CIP FEIS. In the intervening 10-15 years, the fish and wildlife within the affected environment are substantially similar to that which was described in the 2010 CAR. This summary relies primarily upon that reference as the USFW. The USFWS is expected to provide a Coordination Act Report in accordance with the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401), but has not provided it as of the time of this document's completion. Upon receipt of the CAR, the content of this section will be revised as appropriate, and the CAR will be appended.

In addition to the 47 species of mammals, 29 species of snakes, 10 lizards, 2 land turtles, 17 species of frog and toad, and 18 species of salamanders and newts noted in the 2011 FEIS (USACE, 2011), the nine-banded armadillo (*Dasypus novemcinctus*) and wild pigs were also observed during botanical surveys in 2021.

Wild pigs (*Sus scrofa*) are not native to North America having been introduced from Europe in the 1500s (TPWD, 2020). As of 2016, there were an estimated 2.6 million wild pigs in Texas (TPWD, 2020) and evidence of their abundance on Pleasure Island and on the left descending bank of the lower Neches River is readily apparent. Most damage to habitat caused by wild pigs is through either rooting or the direct consumption of plant and animal materials (TPWD, 2020); the mixing of soil horizons from rooting has also been shown to alter plant communities allowing for the establishment and spread of invasive plant species (TPWD, 2020). As an indication of the extent of change for this invasive species within the project area, the USACE 1975 FEIS for the maintenance dredging of the SNWW does not identify wild pigs as mammals that could occur in the project area (USACE, 1975).

As noted in the USFWS Planning Aid Letter, the USFWS administers three National Wildlife Refuges (Sabine NWR, McFaddin NWR, and Texas Point NWR) that are hydrologically connected to the Sabine Neches Waterway and are all located within six to eight miles of the proposed widening activities and dredge material placement in confined placement areas and the BU site (USFWS, 2024).

7.11.1 No Action/Future Without Project Condition

Coastal navigation channels are both routinely dredged to maintain the navigation depth, but also regularly improved with wider/deeper channels to support the ever-larger vessels that support global trade. Dredging activities for both channel maintenance and channel-altering improvement projects cause temporary perturbation within the aquatic ecosystems by: (1) direct removal of organisms; (2) localized increases in turbidity/siltation; (3) noise and vibration from cutterhead dredge operations; (4) alterations to the hydrodynamic regime and physical habitat from the dredging; and (6) disturbance to the riparian habitat. The wildlife within potentially affected area have experienced the effects of channel maintenance, channel improvement, and constant day and night vessel and barge traffic on the waterway. All these different effects have the potential to affect wildlife within the project area, but the effects to wildlife are considered inconsequential. Implementing the No Action alternative would avoid the short and long-term effects of construction and future maintenance dredging, but given the limited value of the wildlife and disturbed nature of the habitat to be affected, there would be no benefit to wildlife from the no action alternative. In addition, if the no action alternative were selected, construction would not occur making 500,000 CY of dredged material available to advance construction of the Bessie Heights East beneficial use site, thus not accelerating the benefits for wildlife from the BU site. Lastly, there would be no wildlife related economic effects or effects to the quality of life of the American people because the no action alternative was selected.

7.11.2 Recommended Plan/Proposed Action

Short- and long-term effects to wildlife from implementing the Recommended Plan/Proposed Action are related to the 30-month initial construction of the widened areas as well as the future episodic maintenance dredging to maintain the widened features. As described in Section 5.2, more than 86-percent of the length of channel widening would occur completely underwater (16.8 miles of the 19.4 miles) and would result in no changes to the adjacent shoreline or land. As such, the potential short and long-term effects to wildlife would proportionally occur underwater. While implementing the Recommended Plan/Proposed Action would result in the removal of a total of 17.2 acres of terrestrial habitat as described in Section 5.2, the habitat therein because the property is a former golf course and dredged material placement areas. The habitat that would be removed is dominated by invasive species as described in Section 7.10, is typical of disturbed landscapes, and is abundant along the waterway. All wildlife in and adjacent to the areas to be widened would have already been affected by regular maintenance dredging and the ongoing channel deepening dredging using identical pipeline/cutterhead dredges and placement of dredged material in existing PAs and the beneficial use site.

Effects on wildlife include the temporary physical disturbance to individual animals in adjacent habitats temporarily disturbed by the increase in turbidity, noise, vibration, and light from an operating dredge. Because the potential short-term effects to wildlife from dredging are virtually identical to the ongoing effects to wildlife within and adjacent to the waterway over decades of maintenance dredging and the recent improvement of the SNWW, there would be no discernible adverse effects to wildlife. The wildlife present in the area affected by constructing and maintaining the proposed widening would have acclimated to annual maintenance dredging, the recently-completed channel deepening project construction, and the vessel and barge traffic on the waterway.

The potential long-term effects to wildlife in the aquatic environment would be related to potential changes to hydrodynamics and water quality resulting from the widened portions of the federal navigation channel as well as the permanent transformation of habitat from terrestrial to aquatic. As described in Section 7.3 Hydrology and Tidal Processes and Section 7.8 Water Quality, the extensive hydrodynamic modeling and water quality modeling of the affected area do not predict any consequential changes to the salinity, water surface elevations, or water quality parameters. Therefore, absent discernible changes to hydrodynamics, salinity, or water quality, there would be no predicted long-term adverse effects to aquatic wildlife from the proposed widening and future maintenance dredging.

The USFWS encouraged “*using channel-dredged material from the proposed project and subsequent maintenance material to restore degraded wetlands near the project area*” in their Planning Aid Letter for the proposed widening (USFWS, 2024). Therein, the USFWS recommended marsh creation within the Bessie Heights marsh noting that “*in addition to marsh creation, shallow water area (< 1 ft deep) habitat would be increased, and existing (currently stressed) marsh would be nourished by spillover from the marsh creation area*” (USFWS, 2024). As described in Section 5.2.3, under the Recommended Plan/Proposed Action, 500,000 CY of dredged material available for beneficial use in Bessie Heights East. Because Bessie Heights East was designed and will be constructed using dredged material over a 28-year construction period, providing the 500,000 CY from the widening construction would accelerate the marsh restoration versus the no action alternative. The area of restored marsh that received material from the widening construction would be accelerated with the additional dredged material, increasing available habitat for wildlife. Beneficial long-term effects include improving the conditions for the growth of shallow-water vegetation and submerged vegetation, thus providing additional nursery areas for juvenile fishes, habitat for birds, and nutrients for aquatic organisms.

Because of the relatively long distance between the areas of proposed widening and material placement under the Recommended Plan/Proposed Action and the nearby National Wildlife Refuges (> six miles), as well as the lack of changes predicted to hydrodynamics, salinity, or water quality (see Sections 7.3 and 7.8), there would be no predicted short or long-term adverse effects upon the habitat or wildlife of the nearby National Wildlife Refuges.

7.11.3 Alternative 2

Under Alternative 2, the short- and long-term effects to wildlife would be similar to those described for the Recommended Plan/Proposed Action, but would occur over a longer period of construction (5-years), would generate more dredged material, would result in more shoreline and upland areas converted to open water, and would generate more dredge material during future maintenance dredging. As shown in Table 5-3, under Alternative 2, 4.8 miles of shoreline and a total of 91.3 acres of land would be excavated to open water resulting in approximately 75-percent of the length of channel widening occurring underwater (14.6 miles of the 19.4 miles).

Although the magnitude of changes to the environment would be roughly twice the adverse effects to wildlife from the Recommended Plan/Proposed Action, the affected environment is of such poor quality wildlife habitat that the short- and long-term effects to wildlife from implementing Alternative 2 would be similarly inconsequential. Aquatic and terrestrial wildlife in and adjacent to the areas to be widened would have already been affected by decades of land use activities that

degrade wildlife habitat, cutterhead dredging adjacent to the proposed widening, and placement of dredged material in existing PAs and the beneficial use site.

7.12 Benthic Fauna

The benthic community project area is strongly influenced by the dynamism of the tidal and wind-driven saltwater and tributary freshwater inputs; the river bottom of predominantly soft muds and clay; ambient water quality as described in Section 7.8; river bottom disturbance from federal navigation channel construction and maintenance; and the tens of thousands of barge and deep draft vessel transits on the waterway per year. There are also no special aquatic sites regulated under 40 CFR§230³¹ such as sanctuaries and refuges, coral reefs, mudflats, vegetated shallows, or riffle and pool complexes present within the project footprint.

Sabine-Neches Canal

The USFWS' NWI maps the entire open water area of the Sabine-Neches Canal as Estuarine and Marine Deepwater habitat (E1UBLx) where the habitat is continuously covered with tidal water (i.e., below extreme low water), deepwater habitat with at least 25-percent cover of particles smaller than stones, is tidal, and is in an area where channels have been excavated by humans.

The saltwater intrusion into the Sabine-Neches Canal from the Gulf and seasonally high salinities during times of low freshwater inflows, support a mix of species adapted to seasonal and episodic changes in salinity. These environmental pressures (e.g., changes to salinity, soft substrate, relatively warm and turbid water, as well as extensive vessel traffic and dredging actions) favor hardy, disturbance-tolerant species. This includes a mix of polychaete and oligochaete worms, clams (e.g., *Rangia cuneata*), crustaceans (e.g., amphipods, isopods, blue crabs (*Callinectes sapidus*), and box crab (*Calappa sulcata*)) as well as shrimp species (e.g., brown shrimp (*Farfantepenaeus aztecus*) white shrimp (*Penaeus setiferus*), and pink shrimp (*Penaeus duorarum*)).

Neches River Tidal

The USFWS' NWI maps the open water area of the Neches River as a tidal, riverine, deepwater habitat with an unconsolidated bottom of mud, silt, and sand where at least 25-percent of the substrate is smaller than stones (R1UBv). The river bottom is mainly mud with occasional patches of sand; the floodplain is typically well developed with industry along the right descending bank and actively use dredged material placement areas along the left descending bank.

The benthic community in the tidal section of the Neches River, near its confluence with Sabine Lake is a complex ecosystem of bottom-dwelling organisms within the highly modified ecosystem. As with the Sabine-Neches Canal, the macroinvertebrates show a mix of brackish species, most notably influenced by large variations in salinity, the soft-bottomed substrate, and the routine disturbances maintenance dredging of the navigation channel and vessel transits. Like the Sabine-Neches Canal, the benthic community of the Neches River tidal section reflects environmental pressures (e.g., changes to salinity, soft substrate, relatively warm and turbid water, as well as extensive vessel traffic and dredging actions) that favor hardy, disturbance-tolerant benthic species

³¹ <https://www.law.cornell.edu/cfr/text/40/part-230>

including polychaete and oligochaete worms, clams, crustaceans (e.g., shrimp, crabs), and mollusks.

7.12.1 No Action/Future Without Project Condition

Under the No Action/Future Without Project condition, the ongoing construction of the SNWW deepening would be completed and the annual maintenance dredging and material placement would continue. Under the FWOP alternative, deepening the channel within the Sabine-Neches Canal reach will widen the side-slopes (at 2:1 slope) resulting in the removal of approximately 4,470 linear feet of existing, non-engineered shoreline protection materials, the removal of approximately 0.7 miles of shoreline within the areas of proposed widening, and the complete removal of the benthic infauna within this footprint of disturbance (SNND, 2024). Within the footprint of the ongoing deepening dredging would be assumed to result in 100-percent mortality to benthic infaunal communities. However, this effect on the benthic infauna would be a short-term, localized adverse effect with the hardy, disturbance-tolerant species found in the areas to be dredged expected to recover in less than two years after the deepening is completed.

7.12.2 Recommended Plan/Proposed Action

Short-term negative impacts to the benthic community in the areas of active dredging and immediate project vicinity would be similar to what will have occurred during the channel deepening and ongoing channel maintenance dredging because of increased turbidity, sedimentation, noise, light, and vessel activity during the construction period. Dredging the widened areas would result in an assumed 100-percent mortality to benthic infaunal communities present in the dredged material footprint; however, the hardy, disturbance-tolerant species found throughout the area to be dredged would be expected to recover quickly (less than two years) after dredging ceases.

Given the enormity of similar habitat throughout the entire waterway, the abundance of the benthic community therein, their ability to recolonize the dredged areas after construction, and the lack of special aquatic sites in the areas to be dredged, the adverse effects to the benthic environment would be short-term, localized, and negligible. Temporary, localized adverse effects to areas adjacent to active dredging could occur down-current from the directly impacted areas (from turbidity and sedimentation), but would be minimal given the waterway's history of cutterhead dredging and the benthic community of hardy, disturbance-tolerant benthic species.

7.12.3 Alternative 2

The areas to be widened under Alternative 2 would affect a similar footprint of existing benthic community because the additional 100 feet to be widened for Alternative 2 predominantly affects areas of existing upland habitat, not larger areas that are presently submerged. Therefore, the footprint of dredging to widen the federal navigation channel by 200 feet under Alternative 2 would result in approximately the same effects to the benthic community as the Recommended Plan/Proposed Action.

7.13 Fishery Resources and Essential Fish Habitat

Existing water quality and habitat diversity in the lower Neches River system supports a productive and substantial fish community that occupies a wide range of trophic levels, including herbivores, invertebrate-feeders (including many bottom fishes), and top predators (USDOT, 2010). Many species are recreationally and commercially important, particularly in southeast Texas, where fishing provides recreational opportunities (USACE, 2011). The lower segment of the Neches River, like all estuaries, is a dynamic system with variable flows, salinity and local fish assemblages comprising freshwater, estuarine, and marine species that use different channel reaches during different seasons, under different conditions, for different purposes (USACE, 2011). Freshwater fish are typical in the Neches River although the navigational channel maintains a deepwater saltwater wedge that underlies the freshwater inflows owing to saltwater's greater density (USACE, 2011).

The species of fish found in the lower Neches River include both freshwater and estuarine species found throughout the inland and coastal waters of the northwestern region of the Gulf (USACE, 2011). Common fish species include redbfish (*Sciaenops ocellatus*), southern flounder (*Paralichthys lethostigma*), spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), sheepshead (*Archosargus probatocephalus*), largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), crappie (*Pomoxis spp.*), and sunfish (*Lepomis spp.*) (USDOT, 2010).

Sabine Lake supports a diverse population that includes fish, shrimp, and crabs (USACE, 2011). Some of these are resident species, spending their entire life in the bay, whereas others are migrant species spending only a portion of their life cycle in the estuary (USACE, 2011). Dominant species inhabiting Sabine-Neches Canal include species mentioned in the previous paragraph (e.g., redbfish, southern flounder, black drum, sheepshead, and spotted seatrout) as well as species more typically found in areas of higher salinity (e.g., Atlantic croaker (*Micropogonias undulatus*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), Gulf menhaden (*Brevoortia patronus*), bay anchovy (*Anchoa mitchilli*), blue crab (*Callinectes sapidus*), and striped mullet (*Mugil cephalus*)) (USACE, 2011).

Outside of the maintained federal navigation channel and immediate vicinity, nearby marshes provide important habitat (i.e., nursery, escape cover, feeding grounds) for a variety of freshwater and estuarine-dependent fish and shellfish (USFWS, 2010). Aquatic fish community diversity peaks in the spring and summer, and is typically low in the winter. Some marine species which use estuaries as nursery habitat also have estuarine dependent life stages, typically larvae, and juveniles; in addition, larvae or juveniles immigrate into the project area during incoming tides and take advantage of the high productivity of the estuary (USFWS, 2010).

Essential fish habitat (EFH) consists of those habitats necessary for spawning, breeding, feeding, or growth to maturity of species managed by Regional Fishery Management Councils, as described in a series of Fishery Management Plans, pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Fisheries and the Gulf Fishery Management Council (GFMC) have identified the SNWW as EFH for multiple recreational and commercial marine species (NOAA Fisheries, 2025).

The proposed project area is located within Eco-region 4 (eastern Texas to western Louisiana) as identified by the GFMC (2004). The categories of EFH in the project area include estuarine water column and estuarine soft bottoms (predominantly mud-clay-silt) substrate (GFMC and NMFS, 2016). There are no areas of submerged aquatic vegetation (SAV), sand/shell bottoms, or oyster reefs and the project is immediately adjacent to the dredged/maintained federal navigation channel.

The EFH regulations encourage NMFS and fishery management councils to consider a second, more limited habitat designation for each species, in addition to EFH. Essential fish habitat – habitat areas of particular concern (EFH-HAPC) are described as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. EFH-HAPCs are not afforded any additional regulatory protection under the Magnuson-Stevens Act; however, federal actions with potential adverse impacts to EFH-HAPCs will be more scrutinized during the EFH consultation process. There are no habitat areas of particular concern identified in the project area (NOAA Fisheries, 2025).

The following species have EFH that are applicable to the project area based on a list of species-specific information provided in the NOAA Fisheries Inland EFH Mapper (<https://efhtools.github.io/InlandEFH/Mapper.html>).

- Brown shrimp: post-larval, juvenile, and subadult EFH
- Pink shrimp: juvenile and subadult EFH
- White shrimp: post-larval, juvenile, subadult, adult, and spawning adult EFH
- Red drum: eggs, larvae, post-larvae, juvenile, and adult EFH
- Spanish mackerel (*Scomberomorus maculatus*): early and late juvenile and adult EFH
- Red grouper (*Epinephelus morio*): early juvenile EFH
- Goliath grouper (*Epinephelus itajara*): juveniles EFH
- Gray snapper (*Lutjanus griseus*): adult EFH
- Cobia (*Rachycentron canadum*): eggs and larvae EFH
- Lane snapper (*Lutjanus synagris*): larvae, post-larvae, and juvenile EFH
- Yellowmouth grouper (*Mycteroperca interstitialis*): juvenile EFH
- Bull shark (*Carcharhinus leucas*) neonate, young-of-year, juvenile, and adult EFH
- Spinner shark (*Carcharhinus brevipinna*) neonate and young-of-year EFH

Each of these species, including summaries of their life history parameters are addressed in the Appendix G, Essential Fish Habitat Assessment. This FR/EA initiates EFH consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

7.13.1 No Action/Future Without Project Condition

Under the No Action/Future Without Project condition, ongoing deepening was described in the FEIS as temporarily adversely affecting fishery resources due to physical disruption and increased turbidity during dredging, as well as potentially causing secondary impacts to essential fish habitats from slightly increasing salinities in some areas of the Sabine Lake watershed (USDOC, 2010).

In addition to the dredging to construct the deepening, the No Action/Future Without Project condition presumes the construction of 4,958 acres of restored emergent marsh, improved shallow-water habitat, and nourished existing marsh in the Neches River BU Feature (Rose City, Bessie Heights East, and Old River Cove marshes) as described in Section 5.2.3. The placement of dredged material into the open water of these areas results in short-term (negative effects from marsh construction) and long-term effects (beneficial effects from habitat restoration) within the existing open-water communities. Because such a large area of open water will be converted to shallow marsh with emergent vegetation, the areas of quiescent water surrounding the marsh habitat will allow SAV to flourish quickly after construction (USACE, 2011). The construction of the BU site would create long-term beneficial effects for fisheries by improving the complexity and diversity of marsh habitats as described in the 2011 FEIS (USACE, 2011).

NOAA's National Marine Fisheries Service (NMFS) reviewed the 2011 FEIS selected alternative and associated essential fish habitat assessment and concurred that the proposed BU features and mitigation will offset the adverse impacts to EFH and provide a net-benefit to federally managed fisheries (USDOC, 2010).

7.13.2 Recommended Plan/Proposed Action

Under the Recommended Plan/Proposed Action, the SNWW would be widened by 100 feet over three discontinuous segments totaling approximately 19.4 miles of the navigation channel generating approximately 11.6 MCY of dredged material over a 30-month construction period. The potential effects to fisheries considers both the short-term (i.e., construction related) effects and the long-term effects that result from changes to the federal navigation channel bathymetry and the placement of up to 500,000 CY of dredged material into the Bessie Heights East portion of the Neches River BU feature.³²

The potential short-term effects are construction related and would be typical of any dredging work within and adjacent to a maintained federal navigation channel. The short-term effects include localized disturbance to fish from the degradation of water quality from dredging and material placement in adjacent upland placement sites and the Bessie Heights East BU site. Following initial construction, the annual maintenance of the widened portions of the SNWW would similarly result in short-term, localized disturbance to fish and the slight degradation of water quality for approximately 20 additional days of maintenance dredging per year in addition to the estimated 130 days per year to maintain the deepened Sabine-Neches Canal and Neches River Channel reaches under the FWOP (see Section 5.2, Construction Assumptions for the Recommended Plan/Proposed Action).

The localized temporary decrease in water quality would result from an increase in turbidity and suspended sediments, a mobilization of nutrients and detritus from the bottom, potentially leading to a localized minor reduction in dissolved oxygen. The overall temporary, localized negative effects to fish from the degradation of water quality would be short-term and minor as the methods for construction and maintenance dredging do not unacceptably degrade water quality during routine maintenance dredging or during new-work dredging of the very same segments of the

³² During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

waterway for the ongoing deepening. The fish communities present in the areas to be widened in the Sabine-Neches Canal and Neches River are accustomed to the effects of dredging having been subjected to routine maintenance dredging and the effects of the ongoing channel deepening. Dredged material placement within the existing confined upland placement areas would not be expected to affect the resident fish community as the new-work and maintenance material would be placed into existing confined upland placement areas with the dewatering taking place through monitored outfalls.

Where dredged material would be used to accelerate the development of the Bessie Heights East beneficial use site (See Section 5.2.3), there would be localized, temporary increase in turbidity and a potential lowering of dissolved oxygen in areas of active placement, but placement into the shallow water areas would allow for the beneficial effects of the marsh restoration. Long-term beneficial effects from the addition of up to 500,000 CY of material to the Bessie Heights East BU area would occur because use of this material would accelerate the creation of habitat relative to the pace of habitat restoration under the No Action/Future Without Project alternative.

Implementing the proposed widening would not change freshwater inputs into the system, so potential long-term negative effects to the fish community would need to result from changes salinity and water quality in the affected areas. Details of the predicted changes to water quality parameters based on extensive modeling are discussed in Section 7.8 with no discernible changes in water quality predicted. Because the proposed widening begins more than 12 miles upstream from the confluence with the Gulf and the modeling results identify no discernible changes to the water quality of the affected area, there would be no predicted long-term negative effects to the fish community as a result of implementing the Recommended Plan/Proposed Action.

EFH exists throughout the project area for several species and species-groups as detailed in Appendix G, Essential Fish Habitat Assessment. Construction-related short-term negative effects to the water column (e.g., increased turbidity, downstream sedimentation) are not expected to be substantial due to the mobility of most federally managed species that may occur within the Sabine-Neches Canal and the lower Neches River. In addition, there are no hydrological constraints within the Sabine Neches Waterway that would limit federally managed species movement away from areas being actively dredged. Benthic infaunal organisms and sessile organisms that serve as prey or provide microhabitats to managed species are expected to be negatively affected over the short-term by construction and dredged material placement activities (as described in Section 7.12). The overall negative effects on EFH in the area are expected to be short-term and minimal.

EFH for several federally managed species occurs within the waters of the Sabine Neches Waterway. However, because the large species are highly mobile, they would be expected to easily avoid the short-term negative effects of active dredging. Throughout the areas for the proposed widening, there is no submerged aquatic vegetation, and the salinity is too low for corals or oysters. During the placement of dredged material into the Bessie Heights East BU site, there would be short-term negative effects to any larval fishes present during active construction, but there would be long-term beneficial effects from habitat creation for juvenile fishes from the marsh created with the beneficially used dredge material. Providing up to 500,000 CY of dredged

material to Bessie Heights East would accelerate the completion of the BU site construction, the accrual of ecosystem benefits from the marsh restoration, and the benefits for EFH.³³

7.13.3 Alternative 2

The areas to be widened under Alternative 2 would affect a similar footprint of existing aquatic habitat because the additional 100 feet to be widened for Alternative 2 predominantly affects areas of existing upland habitat, not larger areas that are presently submerged. Therefore, the footprint of dredging to widen the federal navigation channel by 200 feet under Alternative 2 would result in approximately the same localized, short-term, negligible effects to the fisheries and EFH as the Recommended Plan/Proposed Action.

7.14 Threatened and Endangered Species

Section 7(a)(2) of the Endangered Species Act (ESA) provides for specific coordination and consultation with the United States Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) to ensure federal actions will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats. Federal agencies must follow ESA compliance requirements under Section 7 when their activities, funding, or permits may affect federally protected species in Texas's coastal estuaries. The process is carried out in consultation with the U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries with the USFWS responsible for birds, terrestrial and freshwater species and NMFS responsible for non-bird marine species.

Upon formal request for NMFS' official species list of identified threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under their jurisdiction that may occur within the widening project action area, NMFS responded that *"It is the opinion of NMFS Protected Resources Division, who oversees compliance with the Endangered Species Act, that the Biological Opinion for the Sabine deepening [SERO-2023-00049] will directly apply to the current project to widen the channel. Therefore, when issues arise regarding the ESA, please refer to the completed Section 7 consultation"* (NMFS, 2024a). As such, NMFS has asserted that their March 2024 BO (NMFS, 2024) applies to all actions proposed under this Section 203 Navigation Improvement Project. Therefore, the attached BA and the remainder of this section only address species within the jurisdiction of the USFWS.

Upon request by the USACE, the USFWS provided a species list of threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed widening and/or that may be affected by the proposed widening (USFWS, 2024a). The USFWS' list of potentially affected species is shown in Table 7-6. The USFWS correspondence also asserted that *"...there are no critical habitats within your project area under this office's jurisdiction"* (USFWS, 2024a). A more recent re-examination using the USFWS' IPaC site indicated there were no changes to the listed species and there continue to be no critical habitats within the project area (USFWS, 2025).

³³ During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

**Table 7-6
Proposed, Listed Species, and Critical Habitat in the Action Area**

Common Name	Scientific Name	Listing Status	Critical Habitat in the Action Area
BIRDS			
piping plover	<i>Charadrius melodus</i>	threatened	No
rufa red knot	<i>Calidris canutus rufa</i>	threatened	No
Eastern black rail	<i>Laterallus jamaicensis jamaicensis</i>	threatened	No
whooping crane	<i>Grus americana</i>	endangered	No
MAMMALS			
West Indian manatee	<i>Trichechus manatus</i>	endangered	No
tricolored bat	<i>Perimyotis subflavus</i>	proposed endangered	No
REPTILES			
alligator snapping turtle	<i>Macrochelys temminckii</i>	proposed threatened	No
green sea turtle	<i>Chelonia mydas</i>	threatened	No
Kemps' ridley sea turtle	<i>Eretmochelys imbricata</i>	endangered	No
loggerhead sea turtle	<i>Lepidochelys kempii</i>	threatened	No
hawksbill sea turtle	<i>Dermochelys coriacea</i>	endangered	No
leatherback sea turtle	<i>Caretta caretta</i>	endangered	No
INSECTS			
monarch butterfly	<i>Danaus plexippus</i>	proposed threatened	No
MOLLUSKS			
Louisiana pigtoe	<i>Pleurobema riddellii</i>	proposed threatened	No
Texas heelsplitter	<i>Potamilus amphichaenus</i>	proposed endangered	No

Table 7-6 lists five federally listed sea turtle species identified with the potential to occur within the Action Area (USFWS, 2024a). Under the ESA, the NMFS and USFWS, together, share responsibility to conserve sea turtles as described in the 2015 revision of the memorandum of understanding (MOU) Defining the Roles of USFWS and NMFS in Joint Administration of the Endangered Species Act of 1973 as to Sea Turtles (NMFS and USFWS, 2015). Under the MOU, the USFWS is responsible for all consultations for activities affecting sea turtles and their habitat in the terrestrial environment (i.e., nesting habitat) and NMFS is responsible for all consultations

for activities affecting sea turtles and their habitat in the marine environment (NMFS and USFWS, 2015).

Because NMFS has indicated that their March 2024 BO (NMFS, 2024) applies to all actions proposed under this Section 203 Navigation Improvement Project, and (as stated above) this evaluation is exclusively directed to the species under the USFWS' jurisdiction, the consideration of the potential effects to sea turtles is limited to the USFWS' consideration of activities potentially affecting sea turtle nesting habitat. Because there is no suitable nesting habitat anywhere within the Action Area, all five sea turtles were eliminated from further consideration in the analysis.

7.14.1 No Action/Future Without Project Condition

The evaluation of the potential effects to listed species from construction and maintenance of the CIP in the Sabine-Neches Canal and the Neches River Channel (2011 FFR/FEIS' Alternative Comparison Table 2.3-1) concluded there were no threats to threatened and endangered vertebrates, invertebrates, or plants (USACE, 2011). Ongoing coordination with NMFS (2024) has ensured compliance with the ESA from USACE actions during the construction of the ongoing channel deepening. Failing to implement the proposed widening would not result in any change to the existing threats to listed or candidate species or their critical habitat within or nearby the SNWW.

7.14.2 Recommended Plan/Proposed Action

In May 2025, the Galveston District submitted a draft Biological Assessment (BA) (USACE, 2025) (Appendix E, USFWS Correspondence and draft Biological Assessment) including detailed species accounts and an assessment of the potential effects on listed, proposed, and candidate species, and their critical habitat. The draft BA initiated consultation with the USFWS for the Sabine Neches Navigation Improvement Project - Section 203 Feasibility Study (Project Code Number: 2024-0081207). Based on the findings in the BA, and informal consultation with the USFWS, the USACE made the following effects determinations for species listed in Table 7-7.

The USACE determined the project would have “*no effect*” on the green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle due to lack of suitable habitat (nesting) in the proposed project area. The USACE also determined that the proposed project “*is not likely to jeopardize*” the tricolored bat, alligator snapping turtle, Louisiana pigtoe, Texas heelsplitter, and monarch butterfly. Lastly, the USACE determined that the proposed project “*may affect, not likely to adversely affect*” the eastern black rail, West Indian manatee, piping plover, red knot, and whooping crane.

In their response to the draft BA (USFWS, 2025b), the USFWS concurred with the USACE's determinations, “*based on the implementation of avoidance and minimization measures, and the minimal amount of suitable habitat for each species in the project action area.*” The Service asserted (USFWS, 2025b) “*While consultations are required only when the proposed action may affect listed species, a conference is required only when the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. Therefore, conferencing under Section 7 of the Act is not required for this project.*” The avoidance and minimization measures are listed below.

General Measures

- All personnel (contractors, workers, etc.) will attend training sessions prior to the initiation of, or their participation in, project work activities. Training will include: 1. Recognition of piping plovers, rufa red knot, whooping crane, eastern black rail, West Indian manatee, and sea turtles, and each species' habitat, and signs of presence; 2. Impact avoidance measures; 3. Reporting criteria, 4. Contact information for rescue agencies in the area; and 5. Penalties of violating the Act.
- Use of construction lighting at night shall be minimized, directed toward the construction activity area, and shielded from view outside of the project area.
- Because dredging would occur 24 hours a day, designated monitor(s) will be identified who will act as a single point of contact responsible for communicating and reporting any endangered species issues throughout the construction period.

Measures at the Beneficial Use (BU) Site

- Project equipment and vehicles transiting between the dredging area and the BU site will be minimized, including but not limited to using designated routes and confining vehicle access to the immediate needs of the project.
- Use of construction lighting at night shall be minimized, directed toward the construction activity area, and shielded from view outside of the project area. This will help reduce confusion to night-flying or crepuscular bird species and prevent collisions with equipment due to excessive lighting.
- Construction crews should avoid working in important shorebird habitats when winter winds above 20 miles per hour co-occur with temperatures below 40-degrees Fahrenheit. These conditions can cause the birds to roost for energy conservation, often in available ruts. If placement of dredged material is not able to be avoided during nesting season, all efforts will be made to avoid placement of material within emergent shell hash areas along the shoreline to the best extent practicable, and
- Material should be placed from the back of the marsh area first, working towards open water, to allow for birds and other species to seek refuge or vacate the area prior to dredged material placement within the open-water area.

Eastern Black Rail

- Avoid clearing the terrestrial habitat on the left descending bank of the Neches River and avoid marsh construction activities (i.e. the placement of dredged materials into the beneficial use site), during the breeding season (March – September). If this is unavoidable, the following will occur:
 - Acoustic surveys and biological monitors will be used to ensure any potential impact to eastern black rail is minimized. In addition, vegetation field surveys will be conducted to detect any potential eastern black rail habitat.

- The contractor will minimize traffic in temporary access routes, pipeline routes, and/or staging areas that occur within identified eastern black rail habitat.
- Identified areas of high marsh habitat will be left intact to provide refugia for the eastern black rail to ensure escape access routes. The USACE will work with the Service to identify refugia areas.
- Efforts will be made to mitigate noise and vibration within and adjacent to eastern black rail habitat to include planning and performing work outside of peak breeding call times (i.e., one hour before and after dawn and one hour before and after dusk).
- A biological monitor may be required to maintain a sufficiently slow pace of equipment moving through potential habitat, which allows for the escape of the birds ahead. Biological monitors should be aware that the species will run to escape oncoming disturbances and are highly unlikely to fly during daylight.
- The biological monitor will have stop work authority if an eastern black rail, chicks, or eggs are observed in the project area. The point of contact will contact the Texas Coastal and Central Plains Ecological Services Field Office – Houston at (281) 286-8282. The need for a biological monitor will be determined based on the results of surveys for eastern black rail habitat and time of year the work is completed.
- In the rare instance that equipment is left idle within eastern black rail habitat (e.g. mechanical failure, temporary stoppage), a complete inspection of the equipment surroundings will take place prior to moving it to ensure that no birds have settled around the equipment.
- Biological monitors are required to assist construction crews with avoidance and minimization of Eastern black rail habitats once work begins.

West Indian Manatee

- All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act and the Endangered Species Act.
- All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.
- Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

- All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
- Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Houston (1-281-286-8282).
- Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads Caution: Boaters must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

Whooping Crane

Project activities during the seasonal timing restriction for whooping crane migration, January 15 - June 15, is not ideal. Because the seasonal timing restriction cannot be avoided the following conservation measures will be implemented.

- A biological monitor qualified in identifying whooping cranes and with stop work authority will be on site when any work is being done in suitable habitat if the work is performed during the breeding/nesting season (January-June) or the wintering season (October-April).
- Prior to the start of work each day, the project area will be surveyed for the presence of whooping cranes within 1,000 feet of the project area. If whooping cranes are observed, no work will be performed until the birds have moved-away from the project area. If birds move into the project area during project construction implementation, all mechanized equipment actions will cease until the birds vacate the project area.
- If construction equipment is over 15 feet tall, the equipment must be marked with visual flagging as bird avoidance measures when equipment is in use and laid horizontally on the ground when not in use; and contractors are to ensure equipment is placed horizontally on the ground when not in use to the maximum extent practicable during fog or inclement weather, and at dusk and overnight to avoid whooping crane strikes during low visibility conditions.
- All whooping crane sightings should be immediately reported to the Texas Coastal and Central Plains Ecological Services Field Office at 281-286-8282.

The letter concludes (USFWS, 2025b), "No further endangered species consultation will be required unless: 1) the proposed action is subsequently modified in a manner that causes an effect

on a listed species or designated critical habitat; 2) new information reveals the proposed action may affect federally listed species or designated critical habitat in a manner or to an extent not previously considered; or 3) if a new species is listed or a critical habitat is designated under the Act that may be affected by the proposed action.”

7.14.3 Alternative 2

The areas to be widened under Alternative 2 would affect a similar footprint of existing aquatic habitat, and a larger area of terrestrial habitat, because the additional 100 feet to be widened for Alternative 2 predominantly affects areas of existing uplands. However, the habitat within these areas is substantially disturbed and of limited ecological value with no designated critical habitat. As such, based on the implementation of the same avoidance and minimization measures described for the proposed action, and minimal amount of suitable habitat for each species in the project action area the effects to listed or candidate species from implementing Alternative 2 would be the same as for the Recommended Plan/Proposed Action.

7.15 Cultural Resources

Cultural resources found along the SNWW are typically terrestrial prehistoric sites consisting of eroded or partially eroded prehistoric shell midden sites located along the main waterways, oxbows, and near the coast (USACE, 2011). Approximately 80-percent of these sites are comprised primarily of shells from the brackish-water clam (*Rangia cuneata*) mixed with sparse pottery sherds and faunal food remains (USACE, 2011). Historic terrestrial sites are related primarily to Civil War military forts and outposts, although a few National Register structures such as the Sabine Pass Lighthouse and the Rainbow Bridge, are also present (USACE, 2011). Typical marine sites in waterway are Civil War shipwrecks (USACE, 2011). As described in Section 7.4 Land Use, the entire footprint of upland areas that would be disturbed during construction are areas of made land where dredged material has been placed to create uplands for the benefit of navigational efficiencies.

As of the time of completion of the 2011 FFR/FEIS, the 48-foot deepening was determined not to have effects upon any properties listed or eligible for listing on the National Register of Historic Places (USACE, 2011). However, not all areas that would be impacted by the deepening were assessed for their potential to contain properties eligible for the National Register in accordance with the National Historic Preservation Act (NHPA) and it was determined that implementing the deepening “...may potentially adversely impact terrestrial and marine historic properties eligible for listing in the NRHP” (USACE, 2011). While there are no known terrestrial or marine historic resources within the area of physical disturbance for the proposed widening measures, the widening measures have the potential to adversely affect previously-unidentified prehistoric and historic sites, structures, and shipwrecks.

For especially large and complex projects, where multiple undertakings are similar in nature, agencies can develop a Programmatic Agreement (PA) pursuant to 36 CFR §800.14(b), to establish the process for evaluating potential effects on historic resources. In 2023, USACE Galveston District, in cooperation with the SNND and the respective Texas and Louisiana SHPOs executed a PA that was signed in November 2023 (USACE, 2023). Therein, in describing the Scope of the Undertaking, the PA asserts “*This PA shall be applicable to all construction activities related to the*

SNWW channel improvement project [the ongoing deepening], activities related to maintenance dredging, and additional navigation improvements to the SNWW, Texas and Louisiana, under the authority of Section 203 of WRDA, as amended by Section 101 of WRDA 2020" (USACE, 2023). The PA outlines the process for addressing the potential effects on historic properties from the ongoing construction activities, potential effects during operation and maintenance of the existing SNWW, as well as potential effects from this proposed widening action under the Section 203 Authority. The PA remains in effect for a period of 10 years after 2023 and can be extended for an additional 10 year period; a copy of the signed PA is provided in Appendix L, Section 106 Programmatic Agreement.

As part of the process of developing the PA, the USACE sent letters requesting comment on the PA to the Apache Tribe of Oklahoma, the Alabama-Coushatta Tribe of Texas, the Alabama-Quassarte Tribal Town, the Coushatta Tribe of Louisiana, the Caddo Tribe of Oklahoma, the Choctaw Nation, the Eastern Shawnee Tribe of Oklahoma, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Tonkawa Tribe of Indians of Oklahoma, the Tunica-Biloxi Tribe of Louisiana, and the Wichita and Affiliated Tribes from which no commentary was received. The PA was also reviewed by the Advisory Council on Historic Preservation (ACHP) pursuant to 36 CFR§800.2 (b) and the ACHP decided not to participate in the PA.

Through the public review of the completed FR/EA, the Recommended Plan/Proposed Action will also be coordinated with the Texas SHPO (Texas Historical Commission) and the Tribal Nations.

7.15.1 No Action/Future Without Project Condition

Under the No-Action/Future Without Project Condition, unknown marine and terrestrial archeological sites along the SNWW navigation channel could be affected by the ongoing channel deepening construction and ongoing maintenance dredging as there is always the potential to affect unidentified shipwrecks in or alongside the existing channel. Marine archeology surveys prior to channel deepening actions have not identified any unknown shipwrecks, archeological sites, or historic resources, so the potential for this to occur is low.

7.15.2 Recommended Plan/Proposed Action

As under the No Action Alternative, implementing the proposed widening has the potential to adversely affect unknown marine and terrestrial archeological sites along the SNWW navigation channel that may be eligible for listing on the National Register of Historic Places. However, the PA (USACE, 2023) establishes the process that governs subsequent investigations that would occur during the pre-construction, engineering, and design phase (PED) (including coordinating surveys of impact areas, testing potentially eligible sites, and managing data recovery or avoidance measures as necessary). These additional investigations to survey areas affected by the proposed widening would be undertaken as specified in the PA and in coordination with the Texas Historical Commission (THC) and the Texas SHPO. Placement of dredged material in the Neches River BU feature would not require separate coordination as that BU feature will have been cleared by the TX SHPO and be under construction already, as described in Section 5.2.3.

7.15.3 Alternative 2

The potential effects of implementing Alternative 2 would be about the same as the Recommended Plan/Proposed Action.

7.16 Summary of Estimated Environmental Effects

For more than 100 years, the land use and habitat manipulation along the waterway has been for the benefit of commercial and military navigation, evidenced by the extent of industrialization, urbanization, and adjacent land dedicated to placement of dredged material. Within the project area, the waterway's entire left descending bank was built by dredged material placement.

Within the Sabine-Neches Canal, 1.3 miles of shoreline and a total of 10.9 acres of uplands (in the former golf course and along Placement Area 11) would be converted to open water. Within the Neches River Channel, 1.2 miles of shoreline and a total of 6.2 acres of uplands would be converted to open water. In sum, a total of 2.5 miles of shoreline and 17.2 acres of upland habitat would be converted to sub-tidal habitat. The vegetation along these shorelines and adjacent uplands have been altered by the repeated placement of dredged material, manipulated into the abandoned golf course, overrun with invasive wild pigs, and managed for dredged material placement.

There are no wetlands in the affected habitat along the Sabine-Neches Canal. Within the area of landside excavation along the Neches River Channel, the area of upland disturbance includes a fringe of nine areas of intermittent wetland habitat areas that sum to a total of 2.9 acres. This habitat persists within the area of active PA maintenance along the shoreline where the transition takes place from sub-tidal deep water to the PA containment dikes. The effects to these habitat areas are excluded from the evaluation of the potential effects to wetlands, because the effects to wetland habitat within and adjacent to these PAs have already been described, quantified, and accounted for in the 1975 EIS for maintenance dredging and dredged material management for the Sabine Neches Waterway (USACE, 1975). As such, no mitigation would be required for these effects to wetland habitat.

The proposed action would not affect any Coastal Critical Areas including oyster reefs, hard substrate reefs, submerged aquatic vegetation, or tidal sand or mud flats. Additionally, there would be no predicted short or long-term adverse effects upon the habitat or wildlife at National Wildlife Refuges as the nearest is more than six miles away. Lands dedicated to dredged material management and marsh creation in the Bessie Heights East Beneficial Use site would receive dredged material, accelerating marsh restoration.

Construction would result in construction related disturbances (*e.g.*, noise, vibration, etc.) and temporary water quality deterioration (*e.g.*, localized increase in turbidity) typical of pipeline dredge work within and adjacent to a maintained federal navigation channel. Future maintenance dredging of the widened portions of the federal navigation channel would similarly result in short-term, localized degradation of water quality. The overall degradation of water quality would be minor as methods for dredging and placement in confined upland PAs have been proven to be effective and not unacceptably degrade water quality. Dewatering from the existing confined upland PAs takes place through monitored outfalls.

The potential long-term water quality effects due to the proposed channel geometry changes were modeled and predicted negligible changes in salinity, temperature, dissolved oxygen saturation concentrations, oxygen consumption, and residence time. The tidal circulation modeling predicted small current speed differences that were less than the model uncertainty bounds and the small, predicted changes to water surface elevation were also less than the reported model error. These predicted changes in current speed and water surface elevation would not discernibly affect drawdown, return currents, bank erosion, navigation, or shoaling rates.

Absent discernible changes to hydrodynamics, salinity, or water quality, there would be no predicted long-term adverse effects to aquatic wildlife. Dredging the widened areas would result in an assumed 100-percent mortality to sessile benthic infaunal communities present in the dredged material footprint; however, the hardy, disturbance-tolerant species found throughout the project area to be dredged would recover quickly after dredging ceases.

The overall temporary, localized negative effects to fish from the degradation of water quality would be short-term and minor as the methods for construction and maintenance dredging do not unacceptably degrade water quality. Essential Fish Habitat for several federally managed species occurs within the waters of the Sabine Neches Waterway. The overall negative effects on EFH in the area are expected to be short-term and minimal. Throughout the areas for the proposed widening, there is no submerged aquatic vegetation and there are no corals or oysters.

Compliance with the requirements of the Endangered Species Act is complete for the proposed widening. When the USACE initiated coordination with NMFS for the proposed widening, NMFS responded that *“It is the opinion of NMFS Protected Resources Division, who oversees compliance with the Endangered Species Act, that the Biological Opinion for the Sabine deepening [SERO-2023-00049] will directly apply to the current project to widen the channel. Therefore, when issues arise regarding the ESA, please refer to the completed Section 7 consultation”* As such, NMFS’ March 2024 Biological Opinion applies to all actions proposed under this Section 203 Navigation Improvement Project and no additional coordination with NMFS was required.

Because NMFS directed the project to fall under the existing BO with the USACE, the draft Biological Assessment focused exclusively on the resources within the purview of the USFWS (Project Code Number: 2024-0081207). Within the draft BA, USACE determined the project would have *“no effect”* on the green sea turtle, hawksbill sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle due to lack of suitable habitat in the proposed project area. The USACE also determined that the proposed project *“is not likely to jeopardize”* the tricolored bat, alligator snapping turtle, Louisiana pigtoe, Texas heelsplitter, and monarch butterfly and that the proposed project *“may affect, not likely to adversely affect”* the eastern black rail, West Indian manatee, piping plover, red knot, and whooping crane.

In their response to the BA, the USFWS concurred with the USACE’s effects determinations, *“based on the implementation of avoidance and minimization measures, and the minimal amount of suitable habitat for each species in the project action area.”* The Service asserted, *“No further endangered species consultation will be required unless: 1) the proposed action is subsequently modified in a manner that causes an effect on a listed species or designated critical habitat; 2) new information reveals the proposed action may affect federally listed species or designated*

critical habitat in a manner or to an extent not previously considered; or 3) if a new species is listed or a critical habitat is designated under the Act that may be affected by the proposed action.”

The navigational efficiencies that would be provided by the proposed widening would not change the number or size of vessels using the SNWW, but would simply reduce vessel delays (i.e., relieve vessel congestion) allowing the same vessels to move through the waterway more efficiently.

Because the proposed widening would occur in areas considered in attainment of the National Ambient Air Quality Standards, neither a General Conformity applicability analysis nor a conformity determination is required. Although construction-related emissions during the July 2028–June 2032 construction period would occur, the 50-year change to emissions from the reduction in vessel delays would result be a substantial, long-term, beneficial effect from the net reduction in emissions.

Review of the regulated facilities and current USEPA and TCEQ database reviews for events (i.e., spills and releases) do not identify any recognized environmental conditions that would affect project alternatives and confirmed the minimal risk of encountering contaminated material, giving no cause for concern that dredging would mobilize contamination during construction.

In 2023, the USACE executed a Programmatic Agreement (PA) that is applicable to “...*additional navigation improvements to the SNWW, Texas and Louisiana, under the authority of Section 203 of WRDA, as amended by Section 101 of WRDA 2020.*” The PA specifies investigations to survey areas affected by the proposed widening would be undertaken in coordination with the Texas Historical Commission (THC) and the Texas SHPO prior to construction. Placement of dredged material in the Bessie Heights East Beneficial Use site would not require separate coordination as that BU feature will have been cleared by the TX SHPO and be under construction.

As part of the process of developing the PA, the USACE sent letters requesting comment on the PA to the Apache Tribe of Oklahoma, the Alabama-Coushatta Tribe of Texas, the Alabama-Quassarte Tribal Town, the Coushatta Tribe of Louisiana, the Caddo Tribe of Oklahoma, the Choctaw Nation, the Eastern Shawnee Tribe of Oklahoma, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Tonkawa Tribe of Indians of Oklahoma, the Tunica-Biloxi Tribe of Louisiana, and the Wichita and Affiliated Tribes. No commentary was received.

This work does not represent a novel or unprecedented activity; on the contrary, widening the navigation channel and maintaining the waterway in the future are actions that the USACE, Galveston District and the Sabine Neches Navigation District have a proven record of executing while being protective of public health and safety and not violating federal, state, Tribal, or local laws.

8 Mitigation Planning and Best Management Practices

Federal agencies rely on mitigation to reduce adverse environmental impacts as part of the planning process for a project, incorporating mitigation as integral components of a proposed project design before deciding about the significance of the project's environmental impacts. It is the policy of the USACE to demonstrate that impacts to all significant ecological resources, both terrestrial and aquatic, have been avoided and minimized to the extent practicable, and that any remaining unavoidable impacts have been compensated to the extent possible by: (USACE, 2019b). Avoiding the impact altogether by not taking a certain action or parts of an action;

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Rectifying an impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating an impact over time by preservation and maintenance operations during the life of the action; and
- Compensating for an impact by replacing or providing substitute resources or environments (i.e., compensatory mitigation).

In executing the Recommended Plan/Proposed Action, the dredging contractor must comply with requirements (i.e., specifications) that are included in each USACE, Galveston District dredging contract on the Sabine Neches Waterway. The requirements listed in Sections 8.1 through 8.4 are extracted from the standard contract specifications in a recent pipeline dredging contract on the Sabine Neches Waterway (USACE, 2019a). These specifications are contractually required actions for avoiding, minimizing, rectifying, and reducing or eliminating over time, the environmental and human health effects of a dredging project in the waterway and would be required. These contractually-required best management practices meet the intended goal of mitigation to reduce adverse environmental effects.

8.1 Planning Actions for the Avoidance of Impacts

In accomplishing the proposed dredging work, the contractor would be required to take other planning actions for the avoidance of impacts as follows:

- use the available upland dredged material placement areas so that the placement of dredged material to avoid effects to existing areas of marsh habitat by avoiding the need to establish new upland placement areas;
- perform construction and dredging operations using a method that reduces turbidity to the lowest practicable level using the normal accepted dredging practices and placement shall be controlled to confine material within the placement areas specified;
- have 24-hour a day monitoring of the placement areas during placement operations and the personnel monitoring the dikes shall be in radio contact with the dredge;
- develop a project-specific accident prevention plan including an activity hazard analyses with the focus of accident prevention (i.e., avoidance);

- conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate activity hazard analysis, establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health training and motivation;
- develop and implement a Fall Protection and Prevention Plan;
- provide and maintain minimum field-type sanitary facilities and periodically empty wastes into a municipal, district, or station sanitary sewage system, or remove waste to a commercial facility. Must also obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system;
- abide by the avoidance measures to minimize potential effects to listed species as provided by the USFWS (USFWS, 2025b) and described in detail in Section 7.14.2;
- obtain an updated IPaC report from the U.S. Fish and Wildlife Service at the time of construction to provide an updated list of the threatened and endangered species and any critical habitat that has been designated within the potentially affected area to verify there have been no changes since the completion of the environmental coordination;
- comply with applicable federal laws, rules and regulations governing the placement of materials and wastes in navigable waters including approval of the appropriate Texas Commission on Environmental Quality for the discharge of materials and wastes in the navigable waters within its jurisdiction, and including the provisions of 33 USC 1342 (National Pollutant Discharge Elimination System);
- exercise precaution to prevent dredged material and dredge effluent from flowing into areas or waterways and ditches not designed for the deposit of dredged material or the flow of effluent runoff; and
- exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR§300.³⁴

The contractor is also not allowed to enter, disturb, destroy, or allow discharge of contaminants into waters of the United States. Authorization to enter specific waters of the United States identified does not relieve the contractor from any obligation to protect other waters of the United States within, adjacent to, or in the vicinity of the construction site and associated boundaries.

8.2 Planning Actions for Minimization of Impacts

The contractor is required to appoint an Environmental Manager who is responsible for managing and implementing the environmental program as described in the contract. Contract specifications also require that the contractor execute the work within all federal, state, and local laws and regulations. Contract specifications for dredging in the Sabine Neches Waterway include planning actions that are standard requirements to minimize the environmental effects of construction.

The contractor must provide a rescue and evacuation plan that must include a detailed discussion of the methods of rescue, methods of self-rescue, equipment used, training requirement,

³⁴ <https://ecfr.io/Title-40/Part-300>

specialized training for the rescuers, procedures for requesting rescue and medical assistance, and transportation routes to a medical facility.

The contractor must abide by the minimization measures to minimize potential effects to listed species while carrying out the project as required by the USFWS (USFWS, 2025b) and described in detail in Section 7.14.2.

Each dredging contract includes the requirement for a contractor to prepare and submit an environmental protection plan (EPP) to present an overview of known or potential environmental issues that must be considered and addressed during construction. The EPP includes:

- a project-specific stormwater pollution prevention plan (SWPPP) that meets the requirements of 40 CFR§122.26 and the Texas State General Permit for stormwater discharges from construction sites prior to the commencement of work;
- a construction site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage areas (on-site and off-site)), access and haul routes, avenues of ingress/egress, locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking;
- the contractor's dredge spill contingency plan including procedures to be followed in the event of a spill where (1) the dredge shall cease operations in a placement area, (2) immediately notify the Contracting Officer who in turn will notify U.S. Fish and Wildlife Service, Texas Parks and Wildlife, and Texas General Land Office, (3) submit a specific clean-up plan for approval, and (4) no clean-up actions will commence until the plan has been approved;
- requirements to maintain spill cleanup equipment and materials at the work site so that, in the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Fire Department, the Command Duty Officer, the Environmental Office, the Contracting Officer and the Texas Commission on Environmental Quality;
- drawings that identify features for environmental consideration (e.g., proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil);
- construction related objectives, targets, and measures for protecting natural and cultural resources as well as the measures the contractor must implement for protecting these resources;
- a work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse;
- requirements for depositing material in confined areas using methods that reduce conditions conducive to breeding of mosquitoes, flies, and other disease-bearing insects and pests and will prevent or control the release of obnoxious odors and gasses deleterious to human life and property; and

- measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control.

Additionally, monitoring of discharge effluent from each placement area spillway and the corresponding receiving body of water shall be sampled at least twice daily. If the effluent density exceeds eight (8) grams per liter for total suspended solids (TSS) more than the corresponding density of the receiving body of water, the contractor may either: add ponding capacity by raising the spillway invert within the placement area or discontinue dredge placement into the placement area until the effluent density returns to an acceptable eight (8) grams per liter differential or less. The minimum frequency of sampling at the weir shall be increased when the effluent density increases or nears the maximum specified limit. Samples of the receiving body of water shall be taken upstream or opposite to the direction of tidal flow where the discharge effluent enters the channel.

The dredge contractor must provide written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. This notification must include the locations where various types of waste would plan to be disposed or recycled and include letters of acceptance from the receiving location(s) demonstrating the disposal plan before transporting wastes.

8.3 Rectifying by Repairing, Rehabilitating, or Restoring the Affected Environment

The construction contractor would be required to:

- mark the areas that need not be disturbed for the construction prior to commencing construction activities;
- mark or fence any isolated areas within the general work area that are not to be disturbed;
- protect the markers before construction operations commence and where construction operations are to be conducted at night, ensure that markers are visible in the dark;
- minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats and to preserve the natural resources within the project boundaries and outside the limits of permanent work; and
- restore the disturbed area to an equivalent or improved condition upon completion of work.

8.4 Reducing or Eliminating Impact Over Time Through Preservation and Maintenance

As described in Section 5.2.3, implementing the proposed action would include providing up to 500,000 CY of dredged material to Bessie Heights East BU site for the creation/improvement of marsh habitat and accelerate the ecosystem benefits. By providing these materials decades sooner than had been previously planned (USACE, 2011), the marsh habitat will be restored earlier than planned and additional material will be available to maintain the restored marsh in the future. During PED, additional opportunities to use dredged material beneficially will be considered if it is economically feasible and environmentally acceptable.

8.5 Compensatory Mitigation

If an impact to a resource is determined to be significant, compensatory mitigation is required, but the significance of the ecological resources potentially affected is established, in part, by the scarcity or uniqueness of the resource from a national, regional, and state perspective (USACE, 2019b). With the comprehensive consideration of the affected environment and environmental consequences in Section 7, as well as the description of the measures to minimize the effects described in Sections 8.1 through 8.3, there are no significant environmental resources that would require replacing or providing substitute resources or environments. As such, the significance of adverse impacts to these resources has been evaluated and determined to not need separable compensatory mitigation features (USACE, 2019b). After the preceding actions are taken to avoid and minimize impacts to ecological resources, the proposed widening action would have negligible adverse impact on ecological resources and fish and wildlife resources such that there remains no unavoidable environmental effects to significant ecological resources by carrying out the recommended plan/proposed action.

9 Environmental Compliance*

This integrated Feasibility Report and Environmental Assessment (FR/EA) has been prepared to satisfy the requirements of all applicable environmental laws and regulations. The USACE will follow provisions of all applicable laws, regulations, and policies related to the proposed actions, including those for which applicability, review, and enforcement are their responsibility.

Making the decision to implement the proposed channel widening measures and the subsequent construction would not commence until the proposed action achieves environmental compliance with all applicable laws and regulations, as described below. Environmental compliance for the proposed action would be achieved upon final coordination of this FR/EA with appropriate agencies, organizations, and individuals.

9.1 Sections 404 and 401 of the Clean Water Act of 1977

In process.

The Texas Commission on Environmental Quality (TCEQ) conducts Federal Clean Water Act (CWA), §401 state water quality certification reviews in accordance with 30 Texas Administrative Code §279 that establishes the procedures and criteria for applying for, processing, and reviewing state certifications. The USEPA published its Clean Water Act Section 401 Certification Rule in the Federal Register on July 13, 2020 and the new rule took effect on September 11, 2020. The federal rule requires all project applicants to submit a Pre-filing Meeting Request to the state certifying authority (Texas Commission on Environmental Quality -TCEQ), at least 30 days prior to submitting a Section 401 Water Quality Certification Request (Certification Request), and the Pre-filing Meeting Request was submitted 19 September 2025.

Draft request for state water quality certification and a draft §404(b)(1) evaluation of the proposed channel widening are provided as Appendix J and Appendix I respectively. Coordination with TCEQ will occur prior to and as part of the TCEQ review of the draft FR/EA and appendices.

9.2 Clean Air Act

In compliance.

The purpose of the Clean Air Act is to protect public health and welfare by the control of air pollution at its source, and to set forth primary and secondary National Ambient Air Quality Standards to establish criteria for states to attain, or maintain. If one or more of the priority pollutants was not in attainment, then the proposed action would be subject to detailed conformity determinations unless these actions are clearly considered *de minimus* emissions.

The purpose of the conformity evaluation is to (1) ensure federal activities do not interfere with the air quality budgets in the State Implementation Plans; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQSAs such that air quality would not be affected to any measurable degree. Federal agencies make this demonstration by performing a conformity review when the actions they are planning to carry out

will be conducted in an area designated as a non-attainment or maintenance area for one of the criteria pollutants.

Jefferson and Orange Counties (TX) and the Southern Louisiana-Southeast Texas Interstate AQCR 106 (Air Quality Control Region) are classified as “in attainment” for all criteria pollutants (USEPA, 2021). Because the proposed widening would occur in areas considered in attainment of the National Ambient Air Quality Standards, neither a General Conformity applicability analysis nor a conformity determination is required. Although construction-related emissions during the July 2028–June 2032 construction period would occur, the 50-year change to emissions from the reduction in vessel delays would result be a substantial, long-term, beneficial effect from the net reduction in emissions.

9.3 Magnuson-Stevens Fishery Conservation and Management Act, as amended.

In process.

The MSFCMA, 16 U.S.C. 1801 et seq., provides for management and conservation of marine fisheries in U.S. federal waters through Regional Fishery Management Councils. The Act requires a federal agency to consult with the Secretary of Commerce if an action may adversely affect any Essential Fish Habitat (EFH) identified under the Act. Coordination and consultation regarding EFH will be conducted with the National Oceanic Atmospheric Administration, National Marine Fisheries Service (NMFS).

A draft EFH evaluation is attached as Appendix G, Essential Fish Habitat Assessment and is being coordinated with NMFS during the draft FR/EA review process.

9.4 Fish and Wildlife Coordination Act (FWCA) of 1958

In process.

The purpose of the FWCA consultation is to consider a view to the conservation of wildlife resources by preventing loss of, and damage to, such resources as well as providing for the development and improvement thereof in connection with such water-resource development (16 U.S.C. 662(a)). The FWCA requires consultation with the USFWS, NMFS, and state fish and wildlife agencies where the *"waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified"* by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of *"preventing loss of and damage to wildlife resources."* The USFWS has provided a Planning Aid Letter (Appendix F) for the proposed widening (USFWS, 2024), but has not yet provided a draft Coordination Act Report in accordance with the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401). In December, 2025, the USFWS provided the USFWS Position and Recommendations relative to the proposed widening stating *"The Service does not object to the Proposed Action on the condition that the following recommendations are considered and implemented to the extent that is satisfactory to fulfill Service responsibilities under the Fish and Wildlife Coordination Act."* This correspondence is included in the FR/EA, Appendix F, Fish and Wildlife Coordination Act Correspondence.

9.5 Endangered Species Act of 1973

In compliance.

Section 7(a)(2) of the ESA provides for specific coordination and consultation with the USFWS and/or NMFS (collectively “the Services”) to ensure federal actions will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

Compliance with the requirements of the Endangered Species Act is complete for the proposed widening. When the USACE initiated coordination with NMFS for the proposed widening, NMFS responded that “*It is the opinion of NMFS Protected Resources Division, who oversees compliance with the Endangered Species Act, that the Biological Opinion for the Sabine deepening [SERO-2023-00049] will directly apply to the current project to widen the channel. Therefore, when issues arise regarding the ESA, please refer to the completed Section 7 consultation*” As such, NMFS’ March 2024 Biological Opinion applies to all actions proposed under this Section 203 Navigation Improvement Project and no additional coordination with NMFS was required.

Because NMFS directed the project to fall under the existing BO with the USACE, the draft Biological Assessment focused exclusively on the resources within the purview of the USFWS (Project Code Number: 2024-0081207). Within the draft BA (Appendix E), USACE determined the project would have “*no effect*” on the green sea turtle, hawksbill sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle due to lack of suitable habitat in the proposed project area. The USACE also determined that the proposed project “*is not likely to jeopardize*” the tricolored bat, alligator snapping turtle, Louisiana pigtoe, Texas heelsplitter, and monarch butterfly and that the proposed project “*may affect, not likely to adversely affect*” the eastern black rail, West Indian manatee, piping plover, red knot, and whooping crane.

In their response to the BA, the USFWS concurred with the USACE’s effects determinations, “*based on the implementation of avoidance and minimization measures, and the minimal amount of suitable habitat for each species in the project action area.*” The Service asserted, “*No further endangered species consultation will be required unless: 1) the proposed action is subsequently modified in a manner that causes an effect on a listed species or designated critical habitat; 2) new information reveals the proposed action may affect federally listed species or designated critical habitat in a manner or to an extent not previously considered; or 3) if a new species is listed or a critical habitat is designated under the Act that may be affected by the proposed action.*”

9.6 Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 et seq.)

In process.

The MMPA prohibits take, including the harassment, of any marine mammal. Typically, coordination with the USFWS and NMFS, for species under their respective purview, will include the discussion of potential impacts to any species covered by the MMPA. The USFWS and NMFS typically provide their comments in the form of a letter or through the FWCA Report. With the receipt of a draft FWCA Report, this section will be updated.

9.7 Migratory Bird Treaty Act of 1918

In process.

The Migratory Bird Treaty Act of 1918 (MBTA) governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent over utilization. Executive Order 13186 (2001) directs executive agencies to take certain actions to implement the act.

The Migratory Bird Treaty Act (MBTA) and Executive Order 13186 (EO)(EO, 2001) require federal agencies to protect and conserve migratory birds and their habitats. Any activity that results in the take of migratory birds protected under the MBTA or eagles is prohibited unless authorized by the USFWS. (USFWS IPaC, June 2016). USFWS regulations include most native birds found in the United States as species protected by the MBTA – including species that do not migrate internationally, and even species that do not migrate at all (Lundquist et al., 2015). In accordance with the Migratory Bird Treaty Reform Act of 2004, the USFWS has published a final list of the nonnative bird species that have been introduced by humans into the United States or its territories and to which the Migratory Bird Treaty Act (MBTA) does not apply; all North American birds not listed therein are covered by the MBTA (USFWS, 2005). The MBTA allows the USFWS to adopt regulations to permit some types of migratory bird “take” and this supplies the legal authority for rules like migratory bird hunting regulations (Lundquist et al., 2015).

Executive Order 13186 directs executive departments and federal agencies to take certain actions to further implement the MBTA (EO, 2001). Under the EO, each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within two years, a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of migratory bird populations (EO, 2001). Additionally, federal agencies are to “ensure that environmental analyses of federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.”

With the receipt of a draft FWCA Report from the USFWS, this section will be updated.

9.8 Marine Protection, Research, and Sanctuaries Act

Not applicable.

In 1972, Congress enacted the Marine Protection, Research and Sanctuaries Act (MPRSA) regulating the disposal at sea of all materials that would adversely affect major components including aquatic organisms, habitat, and people. The MPRSA is the legislative authority regulating the disposal of dredged sediment into ocean waters, including territorial seas.

Because the proposed widening activities would occur more than 12 miles from the confluence with the Gulf of America (within the inland channels of the SNWW) and would not result in the placement of dredged material offshore, the provisions of the MPRSA are not applicable to the proposed action.

9.9 National Historic Preservation Act of 1966

In compliance.

Compliance with the NHPA of 1966, as amended, requires identification of all NRHP-listed or NRHP-eligible properties in the project area and development of mitigation measures for those adversely affected in coordination with the Texas Historical Commission (THC) and the Advisory Council on Historic Preservation.

In 2023, the USACE executed a Programmatic Agreement (PA) that is applicable to “...*additional navigation improvements to the SNWW, Texas and Louisiana, under the authority of Section 203 of WRDA, as amended by Section 101 of WRDA 2020.*” Included as Appendix L, the PA specifies investigations to survey areas affected by the proposed widening would be undertaken in coordination with the Texas Historical Commission (THC) and the Texas SHPO prior to construction. Placement of dredged material in the Bessie Heights East Beneficial Use site would not require separate coordination as that BU feature will have been cleared by the TX SHPO and be under construction.

As part of the process of developing the PA, the USACE sent letters requesting comment on the PA to the Apache Tribe of Oklahoma, the Alabama-Coushatta Tribe of Texas, the Alabama-Quassarte Tribal Town, the Coushatta Tribe of Louisiana, the Caddo Tribe of Oklahoma, the Choctaw Nation, the Eastern Shawnee Tribe of Oklahoma, the Jena Band of Choctaw Indians, the Mississippi Band of Choctaw Indians, the Tonkawa Tribe of Indians of Oklahoma, the Tunica-Biloxi Tribe of Louisiana, and the Wichita and Affiliated Tribes. No commentary was received.

9.10 Coastal Zone Management Act of 1972

In process.

Coastal Zone Management Act of 1972: This act established the Federal Coastal Zone Management Program (CZMP; Public Law 92-583, 86 Stat. 1280, 16 USC §§ 1451-1464, Chapter 33). The CZMP is a federal-state partnership that provides a basis for protecting, restoring, and responsibly developing coastal resources. The CZMA defines coastal zones wherein development must be managed to protect areas of natural resources unique to coastal regions.

Under the Texas Coastal Management Program (TCMP), enacted under the Coastal Zone Management Act in 1972, the GLO reviews federal activities to determine whether they are consistent with the policies of the TCMP. A draft Consistency Determination that evaluated the Recommended Plan/Proposed Action for consistency with the TCMP and concluded that it was fully consistent to the maximum extent practicable with the enforceable policies of the Texas program has been prepared and is attached as Appendix K, Coastal Zone Management Plan Consistency Determination and is being coordinated with GLO during the draft FR/EA review process.

9.11 Rivers and Harbors Act

In process.

The Rivers and Harbors Act of 1899 (33 U.S.C. Sec. 401 et seq.) is the initial authority for the USACE regulatory permit program to protect navigable waters in the development of harbors and other construction and excavation. Section 10 of the Act (33 U.S.C. Sec. 403) prohibits the unauthorized obstruction or alteration of any navigable water of the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army.

Although the FR/EA is prepared by the non-federal interest under the Section 203 authority, the FR/EA will be a USACE NEPA document and submitted to the Assistant Secretary of the Army for Civil Works (ASA(CW)) for potential approval and recommendation to Congress.

9.12 Executive Order 11988 (Floodplain Management)

In process.

Executive Orders Concerning Floodplain Management: EO 13690 was enacted on January 30, 2015 to amend EO 11988, enacted May 24, 1977, in furtherance of the NEPA of 1969, as amended (42 USC 4321 et seq.), the National Flood Insurance Act of 1968, as amended (42 USC 4001 et seq.), and the Flood Disaster Protection Act of 1973 (PL 93-234, 87 Stat.975). The purpose of the EO 11988 was to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. EO 13690 builds on EO 11988 by adding climate change criteria into the analysis. However, EO 13690 was partially repealed by EO 13807, Presidential Executive Order on Establishing Discipline and Accountability in Environmental Review and Permitting Process for Infrastructure to increase infrastructure investment.

The EOs state that each agency shall provide and shall take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for: acquiring, managing, and disposing of federal lands and facilities; providing federally undertaken, financed, or assisted construction and improvements; and conducting federal activities and programs affecting land use, including, but not limited to, water and related land resources planning, regulation, and licensing activities.

Federal agencies are required to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, *"each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare,*

and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities."

9.13 Executive Order 11990 (Protection of Wetlands)

In compliance.

This EO is to "*minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.*" To meet these objectives, the EO requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The EO applies to:

- Acquisition, management and disposition of federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by federal agencies; and
- Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

There are no wetlands in the affected habitat along the Sabine-Neches Canal. Within the area of landside excavation along the Neches River Channel, the area of upland disturbance includes a fringe of nine areas of intermittent wetland habitat areas that sum to a total of 2.9 acres. This habitat persists within the area of active PA maintenance along the shoreline where the transition takes place from sub-tidal deep water to the PA containment dikes. The effects to these habitat areas are excluded from the evaluation of the potential effects to wetlands, because the effects to wetland habitat within and adjacent to these PAs have already been described, quantified, and accounted for in the 1975 EIS for maintenance dredging and dredged material management for the Sabine Neches Waterway (USACE, 1975). As such, no mitigation would be required for these effects to wetland habitat.

9.14 Executive Orders 13112, and 13751 (Invasive Species)

In compliance.

Executive Order 13112 of February 3, 1999 (Invasive Species), called upon federal agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that have been established. EO 13112 also created the National Invasive Species Council (Council) to oversee implementation of the order, encourage proactive planning and action, develop recommendations for international cooperation, and take other steps to improve the federal response to invasive species.

EO 13751 directs federal agencies to continue prevention and control efforts related to invasive species; maintains and clarifies the operations of the Council; incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species; and strengthens coordinated, cost-efficient, federal action.

10 Public and Agency Participation and Comments

After receipt of agency and public review of the draft FR/EA during the 30-day review period, a summary of the public and comments will be included here in the final FR/EA.

11 Recommendations

The Sabine Neches Navigation District recommends that the Assistant Secretary of the Army (Civil Works) transmit a favorable assessment of this feasibility study to Congress. This feasibility report recommends that the existing project for deep draft navigation at the Sabine Neches Waterway, authorized by the Water Resources Reform and Development Act of 2014, be modified through the implementation of a federal project to widen selected reaches of the Federal channel, as described herein, at a first cost to the United States presently estimated at \$200,739,000; with an annual incremental operations and maintenance cost to the United States presently estimated at \$2,456,000.

The recommended plan is the plan that reasonably maximizes total net NED benefits (the NED Plan) and is the least environmentally damaging practicable alternative. The recommended plan is also the plan that reasonably maximizes total net benefits across all benefit categories including monetized (NED) and non-monetized (ecosystem restoration) benefits. The recommended plan will provide \$33,388,000 in average annual equivalent net NED benefits and up to 500,000 CY³⁵ of new work dredged material would be utilized to build marsh in the Bessie Heights East site, decreasing the BU feature construction duration and achieving the ecosystem benefits of the restored marsh habitat more quickly.

³⁵ During PED, opportunities for additional beneficial use placement will be considered if economically feasible and environmentally acceptable.

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13 Glossary of Terms

advance maintenance

Advance maintenance is dredging to a specified depth and/or width beyond the authorized channel dimensions in critical and fast-shoaling areas to avoid frequent re-dredging and ensure the reliability and least overall cost of operating and maintaining the project authorized dimensions (USACE, 2006).

acoustic Doppler current profiler (ADCP)

A current measuring instrument employing the transmission of high frequency acoustic signals in the water. The current is determined by a Doppler shift in the backscatter echo from plankton, suspended sediment, and bubbles, all assumed to be moving with the mean speed of the water.

aids to navigation (ATON)

Federal Aids to Navigation (ATON) are any marine aid to navigation installed and maintained by the U.S. Coast Guard. ATON includes lighted and unlighted buoys, lighted and unlighted fixed structures such as day beacons and lights, ranges and lighthouses.

bathymetry

the underwater topography or the depths and shapes of the underwater terrain.

datum (vertical)

For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks.

ebb current (ebb)

The movement of a tidal current away from shore or down a tidal river or estuary.

estuary

An embayment of the coast in which fresh river water entering at its head mixes with the relatively saline ocean water. When tidal action is the dominant mixing agent it is usually termed a tidal estuary. Also, the lower reaches and mouth of a river emptying directly into the sea where tidal mixing takes place.

eustatic sea level rate

The worldwide change of sea level elevation with time. The changes are due to such causes as glacial melting or formation, thermal expansion or contraction of sea water, etc.

fecal coliform

Coliform bacteria that are found in the intestines of warm-blooded animals. Fecal coliform is a portion of the total coliform bacteria population.

flood current (flood)

The movement of a tidal current toward the shore or up a tidal river or estuary.

mean lower low water (MLLW)

A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch.

mean sea level (MSL)

A tidal datum. The arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name (e.g., monthly mean sea level and yearly mean sea level).

non-federal interest(s)

A non-federal interest is any public body (e.g., a state, county, or Tribe, or a nonprofit entity with local government consent) that partners with the USACE on a water resources project.

North American Vertical Datum of 1988 [NAVD 1988]

A fixed reference for elevations determined by geodetic leveling.

salinity (S)

Ocean salinity is the salt concentration (e.g., sodium and chlorine) in sea water. It is measured in unit of PSUs (Practical Salinity Units), which is a unit based on the properties of sea water conductivity and is equivalent the grams of salt per 1000 grams of water. Ocean water in the Gulf of America near the mouth of the Sabine Neches Waterway is typically about 35 PSU.

tide

The periodic rise and fall of a body of water resulting from gravitational interactions between the sun, moon, and earth.

14 List of Acronyms

AC – acres
AdH – Adaptive Hydraulics Model System
APE – area of potential effect
AQCR – air quality control region
ATON – aids to navigation
BU – beneficial use
CAA – Clean Air Act
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CFS – cubic feet per second
CIP – Channel Improvement Project (i.e., the 48-foot deepening)
CWA – Clean Water Act
CY – cubic yards
CY/DY – cubic yards per day
CY/YR – cubic yards per year
CZMA – Coastal Zone Management Act
DMMP – dredged material management plan
DO – dissolved oxygen
EA – environmental assessment
EJ – environmental justice
EFH – essential fish habitat
EO – executive order
EPP – environmental protection plan
ESA – Endangered Species Act
FEIS – final environmental impact statement
FERC – Federal Energy Regulatory Commission
FFR/FEIS – final feasibility report and final environmental impact statement
FONSI – finding of no significant impact
FR/EA – feasibility report and environmental assessment
FWCA – Fish and Wildlife Coordination Act
FWOP – future without project condition; same as the no action alternative
HTRW – hazardous, toxic, and radioactive waste
ICT – Interagency Coordination Team
IPaC – Information for Planning and Consultation (USFWS)
LDEQ – Louisiana Department of Environmental Quality
LNVA – Lower Neches Valley Authority
MCY – million cubic yards
MI – miles
MLLW – mean lower low water
MMPA – Marine Mammal Protection Act
NAAQS – National Ambient Air Quality Standards
NAIP – National Agricultural Imagery Program
NED – national economic development
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act

NMFS – National Marine Fisheries Service
NOAA – National Oceanic and Atmospheric Administration
NRHP – National Register of Historic Places
PA – Placement Area
PCB – polychlorinated biphenyls
PED – Preconstruction Engineering and Design
PPT – parts per thousand
PSU – probable salinity unit
ROD – record of decision
ROW – right of way
RSLC - relative sea level change
SHPO – state historic preservation officer
SNND – Sabine Neches Navigation District
SNNW – Sabine Neches Waterway
SWPPP – stormwater pollution prevention plan
TCEQ – Texas Commission on Environmental Quality
THC – Texas Historical Commission
TPWD – Texas Parks and Wildlife Department
TSS – total suspended solids
TX GLO – Texas Government Land Office
USACE – U.S. Army Corps of Engineers
USDOT – U.S. Department of Transportation
USEPA – U.S. Environmental Protection Agency
USFWS – U.S. Fish and Wildlife Service
WQC – water quality criteria