

Appendix G – 2019 Recommended Plan

Matagorda Ship Channel Improvement, Port Lavaca, Texas Validation Report and Supplemental Environmental Impact Statement, Calhoun and Matagorda Counties, Texas

November 2025

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Agency has made every effort to ensure that the information in Appendix G – 2019 Recommended Plan is accessible. However, if readers have any issues accessing the information in this appendix, please contact the U.S. Army Corps of Engineers at MSC_SEIS@usace.army.mil so additional accommodations may be provided.



**US Army Corps
of Engineers**

Galveston District

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**Executive Summary from the 2019 Final Feasibility Study /
Environmental Impact Statement for the Matagorda Ship Channel
Improvement Project**

EXECUTIVE SUMMARY

STUDY DESCRIPTION

The Calhoun Port Authority, formerly known as the Calhoun County Navigation District, of Point Comfort, Texas, sent a letter of intent to the Galveston District's District Engineer in June 2015. The letter contained their desire to initiate a study partnership to address water resource opportunities. A Feasibility Cost Share Agreement (FCSA) was signed between the USACE Galveston District and the Calhoun Port Authority on 5 August 2016.

The Matagorda Ship Channel Improvement Project (MSCIP), Port Lavaca, Texas, Feasibility Report and Environmental Impact Statement (FEIS), Review of Completed Projects, Calhoun and Matagorda Counties study, hereafter called "Study," was a Section 216 – Review of Completed Projects study.

Section 216 of the Flood Control Act of 1970, PL 91-611 authorizes the Secretary of the Army to review existing the USACE constructed projects due to changes in physical and / or economic conditions. The USACE then reports to Congress with recommendations on the advisability of modifying the project or its operation, and for improving the quality of the environment in overall public interest.

CONSTRUCTION AUTHORITY

Public Law (PL) 85-500, RHA of July 3, 1958, Title 1 – Rivers and Harbors, Section 101 states:

"That the following works of improvement of rivers and harbors and other waterways for navigation...are hereby adopted and authorized to be prosecuted under the direction of the Secretary of the Army and supervision of the Chief of Engineers, in accordance with the plans and subject to the conditions recommended by the Chief of Engineers in the respective reports hereinafter designated:

"Texas. Matagorda Ship Channel Improvement Project, Port Lavaca, Texas: House Document Numbered 388, Eighty-fourth Congress, at an estimated cost of \$9,944,000"

STUDY AUTHORITY

PL 91-611; Title II - River and Harbor and Flood Control Act of 1970, Section 216, dated December 31, 1970, 33 USC. § 549a, which states:

"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of project the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest."

PURPOSE AND NEED

The purpose of the feasibility study was to evaluate Federal interest in alternative plans (including the No Action Plan) for reducing transportation costs while providing for safe, reliable navigation of the Matagorda Ship Channel (MSC). Per Engineer Regulation (ER) 1165-2-119 Modification to Completed Projects, dated 20 September 1982, Section 216 of the River and Harbor Act of 1915 (Section 5) provides an authority to increase channel dimensions, beyond those specified in project authorization documents, at entrances, bends, sidings, and turning places, as necessary, to allow for the free movement of vessels. Therefore, the study assessed the effects of two alternatives on the natural system and human environment, including the economic development effects of then-existing inefficiencies. Economic conditions had changed significantly since the construction of the MSC. An increase in throughput tonnage and a significant shift in average fleet size rendered current channel dimensions incapable of accommodating the forecasted commodity and fleet growth without significant and system-wide inefficiencies. The study evaluated and recommended measures to address then current and expected future inefficiencies.

An Environmental Impact Statement (EIS) was prepared for the MSCIP due to the unavoidable, significant, and adverse impacts to wetlands and oyster reefs. The feasibility report and environmental impact statement (FEIS) provided recommendations for the modification of the existing MSC.

SCOPE

The scope of the study area included the entire MSC, which was evaluated for current and projected vessel size and traffic. Beginning at the Gulf of America (Gulf) end of the MSC, the study examined various management measures to provide safe and efficient ship movement opportunities, including both non-structural and structural measures.

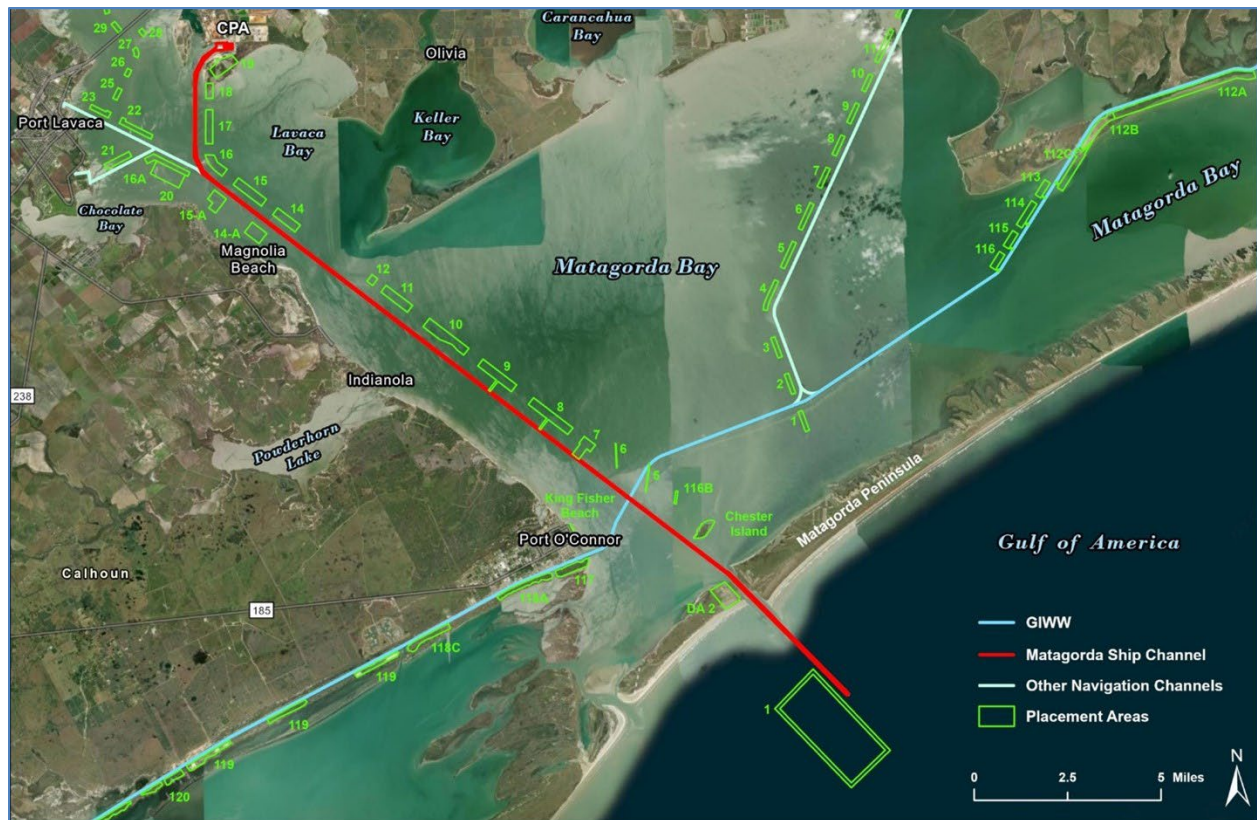
LOCATION

The 26-mile existing Federal MSC (ES Figure 1) is located 125 miles southwest of Galveston, Texas and 80 miles northeast of Corpus Christi, Texas. The channel extends from offshore in the Gulf through Matagorda Bay and Lavaca Bay to the Port.

The study area lies within Calhoun County (west side, ES Figure 2) and Matagorda County (east side, ES Figure 3), Texas.

SPONSOR

The non-Federal sponsor (NFS) for the FEIS was the Calhoun Port Authority of Point Comfort, Texas. The NFS was an active sponsor, secured public meeting sites, participated in every conference call and meeting, coordinated with the Matagorda Bay Pilots Association, and provided comments on documentation.

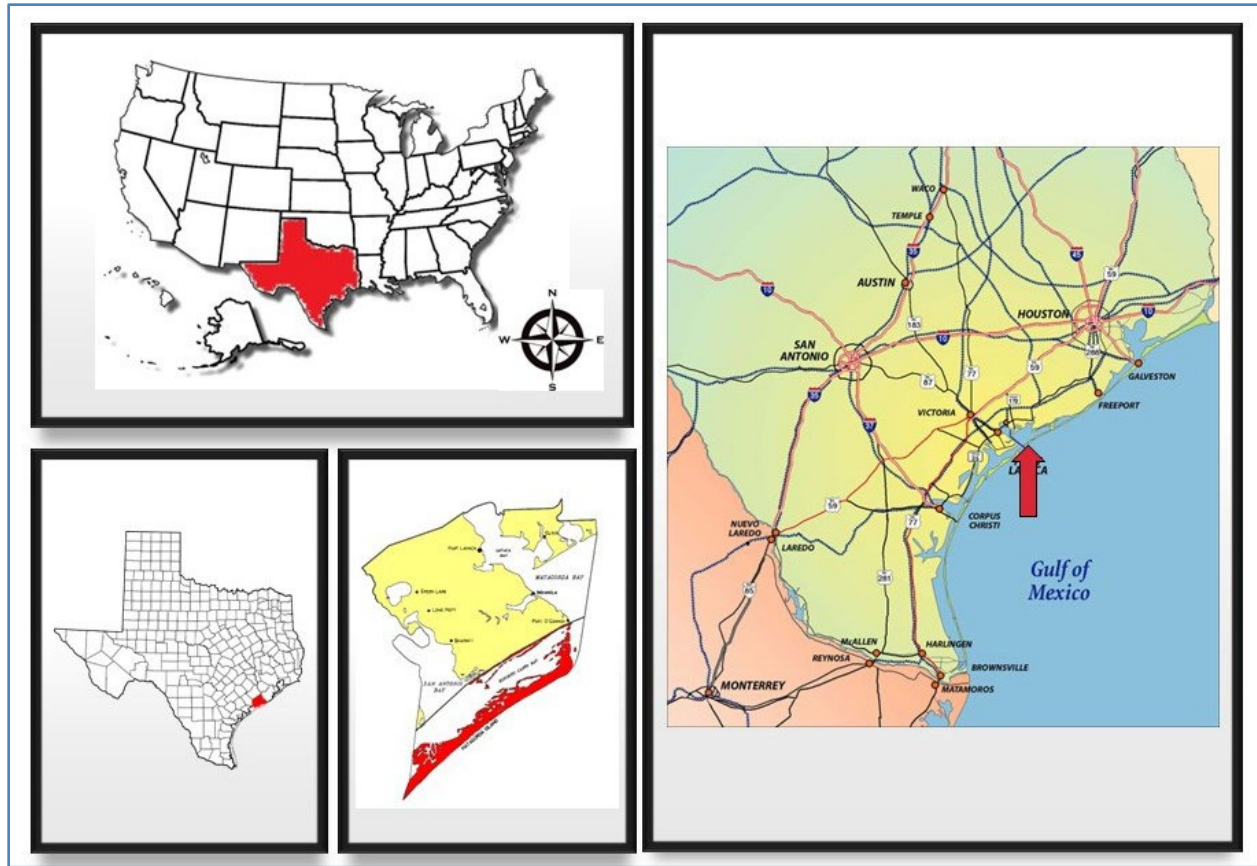


ES Figure 1 - Current Matagorda Ship Channel with Placement Areas

PROBLEMS AND OPPORTUNITIES

Problem Identification

- The existing designed channel depth limits channel use to vessels whose drafts are -38 feet (') Mean Lower Low Water (MLLW) or less.
 - Opportunities exist to modify the existing designed channel such that it can accept vessels whose drafts are greater than -38' MLLW.
- Vessels that require deeper drafts cannot come into the Port fully loaded.
 - Opportunities exist to modify the existing designed channel such that deeper draft vessels can come into Port fully loaded.
 - Opportunities exist to modify the existing designed channel such that deeper draft vessels do not have split their cargoes before coming to Port.
- The existing designed channel bottom width is 200' and limits channel use to a single vessel with a maximum width (beam) of 109'.
 - Opportunities exist to modify the existing designed channel such that it can accept vessels moving in both directions simultaneously.

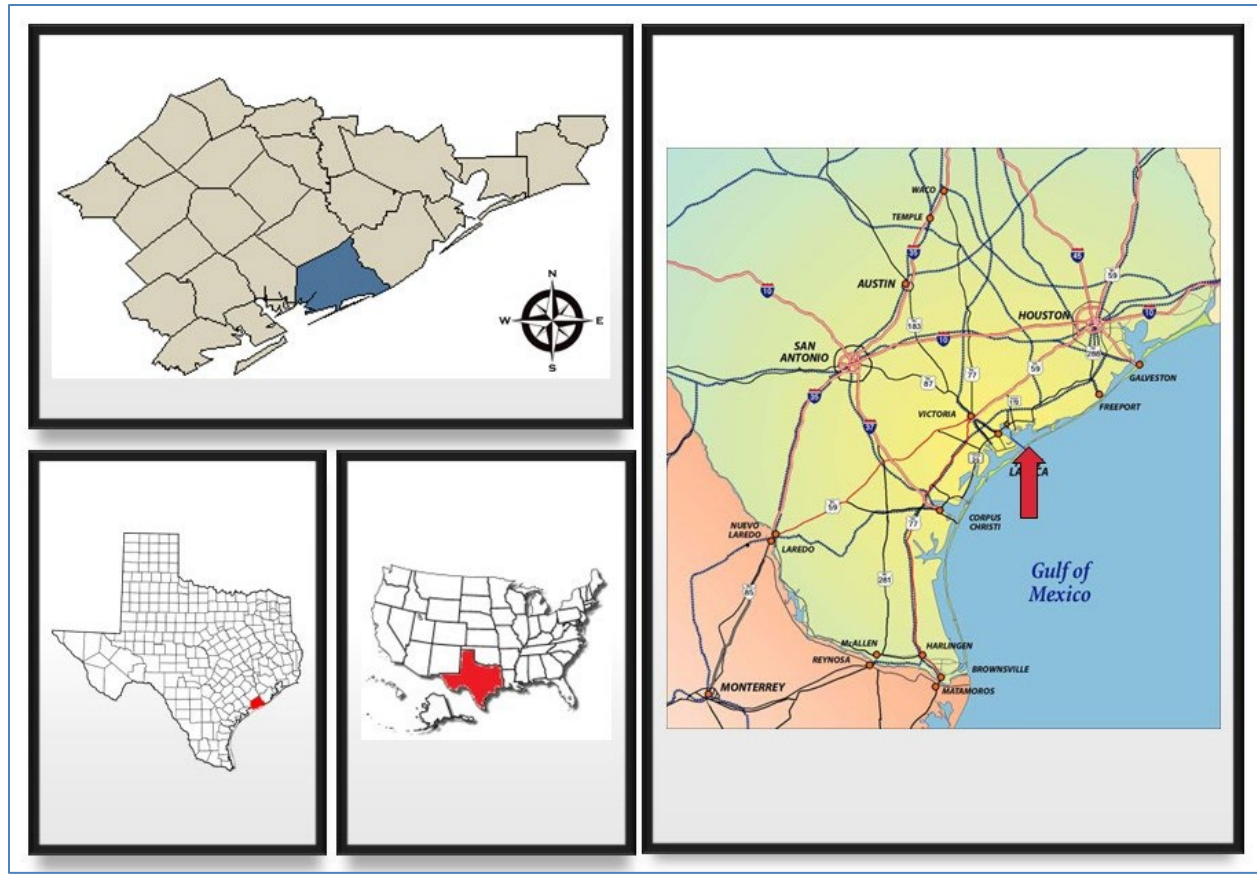


ES Figure 2 - Calhoun County, TX

- The existing designed channel bottom width is 200' and leaves little room for pilot error during times of high winds, waves, or changes in shoaling. Pilots will only move vessels through the MSC with a length overall (LOA) of 639' or longer during daylight.
 - Opportunities exist to modify the existing designed channel such that the Pilots feel it is safe for themselves, vessel's crews and the environment to move these, and larger vessels, during nighttime hours.
- The existing designed turning basin (1,000' by 1,000') (Figure 9) limits the size of vessels which can call on the Port facilities.
 - Opportunities exist to modify the existing turning basin such that it can accept larger vessels with larger transport capacities.

SPECIFIC PLANNING OBJECTIVES

- Improve the navigational efficiency of the deep-draft navigation system over the period of analysis (2024 – 2073)
- Improve the operational safety of the deep-draft navigation system over the period of analysis (2024 – 2073)



ES Figure 3 - Matagorda County, Texas

ALTERNATIVE PLANS

Alternatives	Depth Main / Entrance (MLLW)	Width Main / Entrance	Turning Basin	Passing Lane
No Action Plan	-38' / -40'	200' / 300'	~1,000'	NO
A	-41' / -43'	350' / 600'	1,200'	NO
	-43' / -45'	350' / 600'	1,200'	NO
	-45' / -47'	350' / 600'	1,200'	NO
	-47' / -49'	350' / 600'	1,200'	NO
	-49' / -51'	350' / 600'	1,200'	NO
	-51' / -53'	350' / 600'	1,200'	NO
B	-41' / -43'	350' / 600'	1,200'	YES
	-43' / -45'	350' / 600'	1,200'	YES
	-45' / -47'	350' / 600'	1,200'	YES

Alternatives	Depth Main / Entrance (MLLW)	Width Main / Entrance	Turning Basin	Passing Lane
	-47' / -49'	350' / 600'	1,200'	YES
	-49' / -51'	350' / 600'	1,200'	YES
	-51' / -53'	350' / 600'	1,200'	YES

TENTATIVELY SELECTED PLAN (TSP) at the DRAFT FEIS

Economic analyses indicated that Alternative Plan A at -47' / -49' MLLW was the National Economic Development (NED) Plan. It was the plan that reasonably maximized net economic benefits consistent with protecting the Nation's environment. The NFS agreed with the TSP and did not request a Locally Preferred Plan. Therefore, Alternative Plan A at -47' / -49' MLLW was the TSP.

Alternative	Depth Main / Entrance (MLLW)	Width Main / Gulf	Turning Basin
A	-47' / -49'	350' / 600'	1,200'

TSP ENVIRONMENTAL COMPLIANCE

Agency coordination began at the initial Scoping meeting and continued through regularly scheduled resource agency meetings. Representatives from USFWS, National Marine Fisheries Service (NMFS), the Environmental Protection Agency (EPA), Texas Parks and Wildlife Department (TPWD), and Texas General Land Office (GLO) and Texas Commission on Environmental Quality (TCEQ) were all invited to attend meetings. Initial meetings focused on alternative development. Meetings discussed the Dredged Material Management Plan (DMMP) and mitigation needs for unavoidable impacts. The resource agencies agreed with the proposed models, and with the approach of a conceptualized mitigation plan with further refinements in the planning and construction phase. Mitigation sites were discussed but not finalized at the TSP.

TSP COSTS AND BENEFITS

The plan with the highest net benefits was Alternative Plan A at -47' / -49' MLLW, which provided \$6,539,000 in Total Net Benefits, with a Benefit-to-Cost Ratio (BCR) of 1.3. Price Levels were October 2017, and the Discount Rate was 2.75% (\$ in thousands).

Alt A	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Increment Net Costs	Increment Net Benefits	BCR
-47' / -49' MLLW	\$24,051	\$30,590	\$6,539	\$1,449	\$3,664	1.3

PUBLIC COORDINATION

The USACE published the Intent to Prepare a Draft EIS for the Matagorda Ship Channel, TX, FEIS in the Federal Register, Vol. 81, No. 247, on Friday 23 December 2016.

The USACE and THE NFS held a Public Scoping Meeting in Port Lavaca, Texas on 24 January 2017. Public concerns and comments were solicited. Public review of the draft integrated FEIS began on 7 May 2018 with a public meeting held on 15 May 2018.

RECOMMENDED PLAN AT THE FINAL FEIS

Following the TSP, a ship simulation was performed to determine the channel width required to accommodate the design vessel, a mid-sized Aframax, among other specifications. It was determined from the simulation that the design width of the ~21-mile inner-bay channel could be decreased from 350' bottom width to 300' bottom width. This change in channel width combined with other refinements in feasibility level costs caused the project First Cost estimate to decrease from \$464,548,000 to \$212,498,000.

Alternative	Scale Main / Entrance (MLLW)	Width Main / Gulf	Turning Basin
A	-47' / -49'	300' / 550'	1,200'

RECOMMENDED PLAN COSTS AND BENEFITS

Alt A Scale	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Benefit / Cost Ratio
-47' / -49' MLLW	\$15,886	\$35,858	\$19,972	2.26
Price levels were October 2018, and the discount rate was 2.875% (\$ in thousands).				

RECOMMENDED PLAN – FIRST COSTS ALLOCATION

Cost Account	Project Features	Federal (75%)	Non-Federal (25%)	Total
		<i>October 2018 price levels</i>		
		Construction General – General Navigation Features (GNF)		
12	Dredging	\$91,121,000	\$30,373,000	\$121,494,000
06	Fish & Wildlife	\$19,693,000	\$6,564,000	\$26,257,000
01	Lands and Damages (Non-Federal 100%)	\$0	\$1,554,000	\$1,554,000
30	Planning, Engineering, and	\$14,711,000	\$4,904,000	\$19,615,000
31	Construction	\$9,388,000	\$3,129,000	\$12,517,000
02	Relocations	\$0	\$31,061,000	\$31,061,000
Total Cost		\$134,913,000	\$77,585,000	\$212,498,000

Benefits were calculated using the USACE approved HarborSym model. Benefits and costs were calculated with a base year of 2024 and a 50-year period of analysis (2024-2073) using

the FY19 discount rate of 2.875 percent. Construction of the Recommended Plan would generate total average annual benefits of \$35,858,000 with total average annual costs of \$15,886,000, producing a benefit-to-cost ratio (BCR) of 2.26 at the 2.875 percent discount rate.

Total First Costs of this project were \$212,498,000 with a Federal cost share of \$134,913,000, and a NFS cost share of \$77,585,000. Total First Cost for Aids to Navigation were 100% Federal with funds going to the US Coast Guard for \$1,883,000.

GENERAL COST ALLOCATION

Feature	Federal Cost %¹	Non-Federal Cost %¹
General Navigation Features (GNF)	●90% from 0 feet to 20 feet ●75% from 20 feet to 50 feet ●50% for 50 feet and deeper	●10% from 0 feet to 20 feet ●25% from 20 feet to 50 feet ●50% for 50 feet and deeper
Mitigation	●75%	●25%
Navigation Aids	●100% USCG	●0%
Operation and Maintenance		
GNF	●100% except cost share 50% costs for maintenance > 50 feet	●0% except cost share 50% costs for maintenance > 50 feet
¹ The non-Federal sponsor shall pay an additional 10% of the costs of GNF over a period of 30 years, at an interest rate determined pursuant to Section 106 of WRDA 86. Normally, the value of LERR shall be credited toward the additional 10% payment..		

NON-FEDERAL SPONSOR SUPPORT

Texas Mid-Coast Region industries depend upon the NFS to provide berths from which they can import and export their products all over the world. The widening and deepening of the MSC will aid in the movement of crude oil, natural gas condensate and other liquid petrochemical products. This project will allow both current and future Port users to have the ability to import and export products overseas in larger vessels, which in turn will decrease their transportation costs and will add to the growing economic activity in the State of Texas. The NFS was supportive of the features in the Recommended Plan.

DREDGED MATERIAL MANAGEMENT PLAN

The MSCIP DMMP addressed the dredging needs, disposal capabilities, capacities of placement areas, environmental compliance requirements, and potential for beneficial use of dredged material, and indicators of continued economic justification. DMMPs are updated periodically due to changed conditions.

The DMMP identified specific measures necessary to manage the volume of material likely to be dredged over a 50-year period, from both construction and maintenance dredging. Non-Federal, permitted dredging within the related geographic area was considered in formulating Management Plans to the extent that disposal of material from these sources affects the size and capacity of PAs required for the MSC.

CONCLUSIONS

The selection of Alternative Plan A at -47' / -49' MLLW as the Recommended Plan reflected the information available during the study, and current Departmental policies governing formulation of individual projects. It did not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program, nor the perspective of higher review levels with the Executive Branch. Consequently, any recommendations are modified before they are transmitted to the Congress as proposals for authorizations and implementation funding. However, prior to transmittal to the Congress, the NFS, the State of Texas, interested Federal agencies, and other parties were advised of any modifications and were afforded an opportunity to comment further.

REQUIRED LANGUAGE

The requirements of Section 404(r) of Public Law 92-500, as amended, have been met.

**Plan Formulation Sections from the 2019 Final Feasibility Study /
Environmental Impact Statement for the Matagorda Ship Channel
Improvement Project**

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Description of the 2019 RECOMMENDED PLAN

After the TSP milestone, additional hydraulic, geotechnical, and economic analyses indicated that Alternative Plan A at scale -47' / -49' remained the NED Plan. It was the plan that reasonably maximized net economic benefits consistent with protecting the Nation's environment.

A hydraulic shoaling analysis was performed on the MSC. This analysis indicated the need for a sand engine, south of the jetty, on the Gulf side of the Matagorda Peninsula (2019 FEIS, Section 4.11.12). This change was captured in the updated design, quantities, costs, benefits, and DMMP.

A ship simulation was performed to identify the most economically beneficial dimension for the MSC. Channel widths were reduced by 50' for both the Entrance Channel and Main Channel. The dimension of the turning basin remained 1,200'. The width of the channel between the new turning basin and the port's facilities were slightly adjusted for safety reasons (2019 FEIS Appendix F – Plates).

After additional research into pipeline easements and locations, only 16 pipelines could be identified as being within the project template.

The DMMP was updated by removing PA ER3/D. NOTE: In 2002, the NFS and Alcoa Inc. entered into a Settlement Agreement WHEREAS, if mercury was present in, or on, or under all or part of the CCND owned lands, including submerged lands, described in the Lease Agreement dated June 16, 1982, those contaminated materials would be deposited in PA ER3/D. It included a CONTRACT FOR DREDGE DISPOSAL CAPACITY and TERM EASEMENT AND RIGHT OF WAY FOR ACCESS TO AND USE OF DREDGE ISLAND. See Volume 356, Page 681, of the Official Public Records of Calhoun County, Texas.

A slope stability analysis was performed which determined that the side slopes for the TSP remain the same for the Recommended Plan (2019 FEIS, Appendix E – DMMP).

1.1 Economic Analysis Updates

This section of the report describes changes and updates to the economic analysis for the recommended plan based on changes in both costs and benefits since the Draft Feasibility Report was released in 2018 (2019 FEIS, Appendix A – Economics, Section 5). The NED plan of deepening the channel to -47' / -49' depth remains unchanged by these updates. This section also updated costs and interest rates to FY 2019 (October 2018) prices levels.

1.1.1 Refinement of Channel Widths

Following the TSP milestone meeting, a ship simulation was performed to determine the channel width required to accommodate the design vessel. It was determined from the simulation that the design width of the ~21-mile inner-harbor channel could be decreased from 350' bottom width to 300' bottom width. This change in channel width combined with other refinements in feasibility level costs caused the project first cost estimate to decrease from \$464,548,000 to \$247,255,000. This revised project first cost will be used in this section to update the economic analysis results for the recommended plan (2019 FEIS, Appendix A – Economics, Section 5.1).

1.1.2 Refinement of Fleet Forecast

During the review of the Draft Feasibility Report, assumptions regarding the fleet forecast, specifically as it related to the new crude oil traffic, were revisited. The initial forecast of the number of design vessels calling at the Port annually, was created using data on petroleum product exports from Port Corpus Christi, was inconsistent with updated projections being made by channel users. A review of the data from Port Corpus Christi supported using a vessel fleet distribution with a greater number of Aframax vessels when considering exports of crude oil and condensate alone rather than all petroleum products. As such, the vessel fleet forecast was refined using the vessel fleet distribution of vessels exporting crude oil and condensate from Corpus Christi as a basis. The updated vessel fleet forecast that resulted from the refinement is displayed in Table 1 below. HarborSym runs were completed for each out-year (2024, 2034, and 2044) for the recommended plan using the new fleet forecast. Again, the vessel fleet was held constant after 2044 (2019 FEIS, Appendix A - Economics, Section 5.2).

Table 1 - Refined Vessel Fleet Forecast for Recommended Plan

Vessel Class	2024		2034		2044	
	FWOP	FWPC -47' / -49'	FWOP	FWPC -47' / -49'	FWOP	FWPC -47' / -49'
SPX1	110	110	127	127	146	145
SPX2	58	21	69	26	71	24
PX1	81	73	95	84	110	96
PT-SPX1	4	4	5	4	4	4
PT-SPX2	1	1	2	1	2	1
PT-PX1	5	4	6	4	5	4
PT-PX2	128	55	133	59	130	54
PT-Afra1	0	28	0	30	0	30
Total	388	296	438	334	468	359

1.1.3 Recommended Plan Costs

Feasibility-level costs for the recommended plan, including project first cost, IDC, total investment costs, annual total investment costs, annual OMRR&R costs, and annualized total costs are summarized and presented in Table 2 below. These costs were developed at the October 2018 price level and reflected the decrease in the design channel width (from 350' to 300' in the Bay and 600' to 550' in the Entrance Channel) that was established during the ship simulation (2019 FEIS, Appendix A – Economics, Section 5.3).

Table 2 - Recommended Plan Cost Summary

Alt A	Project Cost	IDC	Total Investment	AAEQ Total Investment	AAEQ OMRR&R	Total AAEQ
-47' / -49'	\$220,192	\$11,019	\$231,211	\$8,774	\$7,112	\$15,886
Oct 2018 Prices, 2.875% Discount Rate (\$ in thousands)						

1.1.4 NED Plan Net Benefits and Benefit-Cost Ratio

The annualized transportation cost savings (benefits); annualized costs, net benefits, and benefit/cost ratio for the recommended plan are summarized and displayed below (Table 3) (2019 FEIS, Appendix A – Economics, Section 5.4).

Table 3 - Recommended Plan Economic Analysis

Alt A	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Benefit/Cost Ratio
-47' / -49'	\$15,886	\$35,858	\$19,972	2.26
Oct 2018 Prices, 2.875% Discount Rate (\$ in thousands)				

1.1.5 Sensitivity Analysis

The Principles & Guidelines and subsequent ER1105-2-100 recognize the inherent variability to water resources planning. Navigation projects are subject to various uncertainties about future conditions. Therefore, a sensitivity analysis in which key quantitative assumptions and computations are changed is required to assess their effect on the final outcome. Therefore, a sensitivity analysis was conducted in which commodity tonnage levels were both lower than forecasted and higher than forecasted; however, this did not result in a change to the recommended plan (2019 FEIS, Appendix A – Economics, Section 6).

1.1.6 Multi-port Analysis

Multiport impacts, or the potential effects the deepening of the MSC could have on other ports, were assessed qualitatively for this study. Multiport analysis was necessary to consider, because with-project alternatives could induce regional transfer of cargo among competing ports. Therefore, it must be determined to what extent competition exists and how it affects the with- and without-project conditions (2019 FEIS, Appendix A – Economics, Section 7).

In multiport analysis, port hinterlands must be defined as either captive or competitive. Competitive cargo hinterlands are those in which there is a choice between ports for the origin or destination of cargo. Captive cargo hinterlands will use the study port exclusively for either origin or destination. The historical users of the MSC, such as Formosa, Invista, and INEOS, have a long history at the port and have facilities and infrastructure in close proximity to the Port. Though there are several ports along the Texas Gulf Coast that handle similar types of cargo to the Port of Point Comfort, the Port has historically had a captive cargo hinterland, with

its onsite/nearby channel users exclusively utilizing the MSC to receive and ship chemical products to and from their facilities.

The new users of the channel who are beginning to export crude oil via the MSC create more of a competitive cargo hinterland at the Port, because there are multiple ports along the Texas Gulf Coast that are equipped to export crude oil. However, these new channel users have recently made considerable investments in their facilities at Point Comfort. The Recommended Plan is intended to allow these users to more efficiently move cargo, either by loading vessels deeper, or by using larger vessels. There are many factors may influence the growth of a particular harbor: landside development and infrastructure, location of distribution centers for imports, source locations for exports, population and income growth and location, port logistics and fees, business climate and taxes, carrier preferences, labor stability and volatility, and business relationships. Though the deepening and widening may make the Port of Point Comfort a more desirable location for shippers in the future, it is not expected that the recommended plan will cause a shift in traffic from nearby ports.

1.2 General Description

For detailed drawings with station numbers see the 2019 FEIS, Appendix F – Engineering Appendix, Drawings No. G-2, and Drawing Nos. C-01 thru C-11. The Recommended Plan includes the addition of a new 1,200' turning basin in the Lavaca Bay reach to accommodate the larger vessels needing to navigate the Port. This plan also includes extending the entrance channel 13,000' further into the Gulf to allow for deepening to -49', as well as dredging a 1,600-ft long sediment trap in the area of the offshore bar. This improvement would allow larger and deeper draft ships to navigate the channel. 2019 FEIS Recommended Plan improved reaches are described below.

Table 4 - Recommended Plan Dimensions

Reach	STA	Bottom Width	Project Depth	Channel Depth	AO	Side Slope
Entrance Channel Extension	-33+000 to -20+000	550'	-49'	-52'	2'	1V:10H
Entrance Channel	-20+000 to 6+000	550'	-49'	-52'	2'	1V:10H
Jetty Channel	-6+000 to 0+000	550'	-49'	-52'	2'	1V:10H
Matagorda Bay	0+000 to 75+000	550' - 300'	-47'	-49'	2'	1V:3H
Lavaca Bay and Turning Basin	75+000 to 116+223	300' to 1,200' to 1,000'	-47'	-49'	2'	1V:3H
Point Comfort Turning Basin	116+223 to 117+223		-47'	-49'	2'	1V:3H
Point Comfort North & South Basins	117+223 to 118+502		-47'	-49'	2'	1V:3H

1.3 New Work Dredging

Hydrographic condition channel surveys were used to estimate the new work dredging quantities (2019 FEIS, Appendix E – DMMP, Section 4.1). The total amount of new work material to be dredged for the Recommended Plan was 21 mcy. New work material volumes did not contain maintenance material. The new work volumes included Advanced Maintenance as well as the recommended Allowable Over-depth. Table 29 provides the dimensions for the Recommended Plan and new work dredging, including advance maintenance and allowable over-depth. (2019 FEIS, Appendix F – Engineering, Section 6.3)

Table 5 - DMMP New Work Volumes

Start Station	End Station	Distance Interval (ft)	Volume w/Advanced Maintenance (CY)	Allowable Over-depth (CY)	Total Volume (CY)	PAs	Method
-33+000	-16+000	17,000	2,606,681	634,436	3,241,117	O5	Hopper
-16+000	-6+000	10,000	1,115,407	292,354	1,407,760	SE	Pipeline
-6+000	20+000	26,000	1,886,389	419,862	2,306,250	Sundown Island	Pipeline
20+000	25+000	5,000	577,757	29,262	607,019	NP1	Pipeline
25+000	55+000	30,000	3,557,723	222,288	3,780,011	NP2	Pipeline
55+000	80+000	25,000	2,918,279	228,873	3,147,152	NP3	Pipeline
80+000	85+000	5,000	525,600	71,559	597,159	NP4	Pipeline
85+000	98+400	13,400	1,534,157	66,864	1,601,021	NP5	Pipeline
98+400	113+300	14,900	2,415,745	151,401	2,567,146	NP6	Pipeline
113+300	118+502	5,202	1,519,876	188,887	1,708,763	NP7	Pipeline
				TOTAL:	20,963,397		

1.4 Allowable Over-depth

The allowable over-depth (AO) for the Recommended Plan shown previously in Table 4 is the additional dredging depth outside the required template that is permitted to allow for inaccuracies in the dredging process. The existing and proposed channels contain the same allowable over-depth (two feet) for the entire length of the channel. (2019 FEIS, Appendix F – Engineering, Section 6.4)

1.5 Advanced Maintenance

The existing Matagorda Entrance and Jetty Channel have a constant depth of three feet of Advanced Maintenance. The existing Matagorda Main Channel has a constant depth of two feet

of Advanced Maintenance. These depths were assumed to remain constant for the Recommended Plan. (2019 FEIS, Appendix F – Engineering, Section 6.5)

1.6 Mitigation Measures

Selection of potential mitigation sites and modeling of benefits will be conducted in coordination with resource agencies. While the exact locations have not been selected at this point for oyster reef mitigation construction, discussions with TPWD and USFWS have indicated that placing the reefs near the mouth of Powderhorn Lake or Keller Lake would provide a buffer from erosive forces currently effecting these areas. Further discussions with these agencies and their local biologists will continue during the planning and construction phases to confirm the best location for reef construction. The location of the marsh mitigation sites will be, to the extent practicable, within the areas surrounding Matagorda Bay.

Costs of the mitigation measures were estimated based on recent work in nearby bays and given to the economists for inclusion in the benefit to cost ratio calculation. These costs were updated for the final report. Impacts of the recommended will be fully compensated in accordance with specific impacts and benefits quantified by the Habitat Suitability Index (HSI) modeling. Marsh creation/mitigation was conducted in compliance with ER 1165-2-27 (Establishment of Wetland Areas in Connection with Dredging). (2019 FEIS, Appendix B – Environmental Resources, Section 5)

1.6.1 Oyster Reefs

After discussions with the resource agencies percent cultch cover was estimated to be 90 percent over the 129.2 acres impacted along the channel. This coverage was assumed to remain consistent over the entire period of analysis for the period of analysis.

The preferred option for oyster reef restoration was through artificial cultch placement. This method entails placing a hard substrate on the bay bottom which allows oyster spat to attach and mature into adults and develop into reefs. This is the most common method employed along the Texas Gulf coast.

There are multiple methods of providing artificial cultch for the reef development. One method is the use of reef balls, large concrete domes with space for the oyster spat to attach. The more common method is the use of crushed limestone or river pebble placement. Placement of this material in layers of thickness from 6-9" thick has been shown to be the most successful method of oyster reef creation. The mass placement of rock allows for effective coverage of the bay bottom to accomplish our goal of 90 percent cultch coverage.

There are two methods of seeding artificial cultch for the generation of oyster reef. The first method relies on the natural recruitment of oyster larvae. A second method, which could be used if natural seeding was unsuccessful, is direct seeding. This method involves the purchase of spat from farmed oysters and placing them directly on the artificial cultch.

The method of mass placement of crushed limestone and natural recruitment is the most common and most successful method of reef creation on the Gulf coast and is the recommend method of oyster mitigation. At this time comparable reef creation projects of this type in Texas have a cost of approximately \$157,000/acre. (2019 FEIS, Appendix B – Environmental Resources, Section 5.1)

1.6.2 Marsh

The location of the 2.0 acres of marsh restoration has not been isolated. The PDT has worked with the resource agencies and local agency biologists to find a suitable location. This mitigation will only be required in the unlikely case that PA P1 will need to be used. Without a specific location chosen for the mitigation within the Matagorda Bay system a conceptual mitigation plan will be discussed below.

A berm will initially need to be built around the two-acre site around the mitigation site to control the hydrologic conditions within the site. Channelization within the site will need to be constructed to make sure the proper amount of water flow will be able to reach the entire region of the mitigation site. Based upon the condition of the interior of the mitigation site there may need to be some grading of the land to control hydrologic sheet flow through the site. Planting of the appropriate vegetation (to be determined) will need to be done after grading. The estimated costs for this work were taken from recent marsh creation in the Matagorda Bay region and totaled \$80,000/acre. (2019 FEIS, Appendix B – Environmental Resources, Section 5.2)

1.7 Aids to Navigation

The PDT assumed that there are existing aids to navigation that will be affected by the proposed widening plan of the MSC that may require relocating or removal. There may also be a need for the installation of new aids to navigation. The US Coast Guard (USCG) is responsible for installing, relocating, and removing the aids to navigation. The MSC will be widened on both sides of the Entrance and Jetty Channel and on the west side of the channel through Lavaca Bay and Matagorda Bay.

A current meter is planned for installation between the jetties. The NOAA maintains another current meter near Sundown Island. This project plans to broadcast one or both current meter readings to ships in order to improve Aids to Navigation. (2019 FEIS, Appendix F – Engineering, Section 6.7)

1.8 Projected Shoaling Rates

The Corps Shoaling Analysis Tool (CSAT) was applied to estimate annual shoaling rate along MSC in support of DMMP development. The CSAT computes shoaling rate using channel boundary information from National Channel Framework (NCF), hydrographic survey datasets from e-Hydro (enterprise Hydrosurvey Processing), and historical dredging records. CSAT uses historical dredging records to identify dredging events, and shoaling rate and is computed based on elevation differences for the survey pairs between dredging events (2019 FEIS, Appendix F – Engineering, Section 2.10).

Average annual shoaling rate for the entire MSC reaches was 1,961,333 cy/yr for the 2012-2015 time period. CSAT identified significant spatial variability in shoaling rates along MSC reaches.

1.9 Real Estate

All PAs are owned, or will be acquired, by the NFS (2019 FEIS, Appendix D – Real Estate, Section 4.2). In the event contaminated materials are found within the dredge template, the Sponsor will be 100% responsible for investigation, removal and disposal of any HTRW involved with construction and O&M of the project in accordance with ER 1165-2-132 and PGL No. 34.

Navigational servitude may be exercised if necessary and approved at higher headquarters. The 2019 FEIS Real Estate Appendix contains more information on NFS-owned property and existing USACE interests in Section 4.

1.10 Placement Areas

The new least cost placement plan requires the creation of numerous in-bay PAs, and potentially an upland PA. Plate D-01 shows the locations of the PAs for the new least cost placement plan (2019 FEIS, Appendix E – DMMP, Section 7). PA capacities will be revised in PED once additional surveys and borings are completed. (2019 FEIS, Appendix F – Engineering, Section 6.10)

PA footprints have been assessed for reefs and anomalies. The least cost plan has been finalized regarding the inclusion of these potential unconfined PAs through cooperation with Galveston District Operations Division. The unconfined PAs were proposed to accept new work and maintenance material corresponding to the deepening and widening of the channel.

O5 – New ODMDS as Open-Water Unconfined PA - PA O5 is a 1,600-acre rectangular open-water PA located approximately three miles offshore and 1,200' south of the channel centerline. The ODMDS will be used for the placement of ~3.2 mcy of new work dredged material from Entrance Channel.

PA 1 – Existing ODMDS as Open-Water Unconfined PA - PA 1 is a 453-acre rectangular open-water PA located approximately two miles offshore and 1,000' south of the channel centerline. PA 1 will be used for the placement of ~17.9 mcy of maintenance material from the Entrance Channel over a 50-year period.

Sand Engine - Sand Engine (SE) is an approximate 119-acre, rectangular shaped site located at the entrance channel southwest of the jetties. The SE was not in previous DMMPs but deemed as a necessity to reduce erosion at the southwest jetty. The SE will accept both new work and maintenance materials with the 50-year DMMP. The material in the SE will also nourish the beach as dredge material is carried west by virtue of longshore drift. The SE will be used to contain ~1.4 mcy of new work material and 9.0 mcy of future maintenance material over a 50-year period.

Sundown Island as Open-Water Unconfined PA (BU Site as Bird Island) - Sundown Island periodically receives material from maintenance dredging of the GIWW and MSC but was not previously used to develop the 50-year DMMP. Sundown Island is ~442-acres and located southeast of GIWW. This island will expand to accept both new work and maintenance materials in the 50-year DMMP.

New Unconfined Open-Water PAs (NP 1, NP 2, NP 3, NP 4, NP 5, NP 6, and NP7) - These new PAs are located southwest of the ship channel in Matagorda Bay. The areas of NP1, NP6 and NP7 is estimated at 230 acres. The areas of NP 2 and NP 3 are estimated at 1433 acres and 661 acres. The areas of NP4, NP5, are estimated at 172 acres. These seven areas will be used for the placement of ~14.0 mcy of new work material.

O&M Unconfined Open-Water PAs (OP 1, OP 2, OP 3, OP 4, OP 5, OP 6, OP7, OP8, OP9, and OP10) - The areas of OP1, OP2, OP3, OP4, OP5 OP6, OP7, OP9, and OP10 are estimated 230 acres. The area of OP8 is estimated 172 acres. These ten PAs will be used for the placement of ~114.2 mcy of maintenance material over a 50-year period. It should be noted that OP1 to OP10 are located further away from the channel than New Work PAs to avoid maintenance material from shoaling back into channel.

P1 – Terrestrial Upland - Placement Area P1 will only be constructed and placed into if additional placement capacity is determined necessary in PED to accommodate new work dredge material. Placement Area P1 will be created south of Alamo Beach on existing agricultural land. The placement area will be designed and scaled to contain quantity of material needed. The containment dike will be constructed utilizing existing material within the placement area. The maximum footprint of this placement area would be 248-acres and could impact a maximum of 1.5 acres of farmed wetland. If impacted, marsh cells will be constructed as environmental mitigation.

Applicant's Preferred Alternative		New Work (mcy)	Maintenance (mcy)
Feature Identity	Feature Description		
O5	Offshore Dispersive Site	3.2	0.0
Sand Engine	New Unconfined Area for Work and Maintenance Material	1.4	9.0
Sundown Island	Existing Unconfined Area along GIWW	2.3	12.9
NP1 to NP7	New Unconfined Area only for New Work Material	14.0	0.0
OP 1 to OP 10	New Unconfined Area only for Maintenance Material	0.0	114.2
PA 1	Existing Offshore Dispersive Site	0.0	17.9
TOTAL	New Work and Maintenance Material	21.0	154.0

Figure 1 - Revised Placement Features for New Least Cost Placement Plan

1.11 Relocations

After the TSP milestone meeting, additional data was reviewed including 2018 Railroad Commission of Texas data, NFS pipeline easement records, and maps of pipelines prepared by Atkins in November 2017. As a result of the updated data, it was determined that the 22 pipelines identified in 2014 are no longer accurate (2019 FEIS, Appendix D – Real Estate, Section 12). Sixteen pipelines were identified in the project area: 8 in-service pipelines and 1 abandoned pipeline in Lavaca Bay, 5 in-service and 1 abandoned pipeline in Matagorda Bay, and 1 in-service pipeline crossing the Entrance Channel. This information is preliminary only and will need to be further verified in PED.

Therefore, ~16 pipelines cross the MSC and will need to be removed or relocated. With the exception of the ammonia and acrylonitrile pipelines operated by Ineos USA Pipelines, the pipelines carry natural gas (

Table 6).

The NFS owns the submerged lands where the pipelines cross the channel. The NFS lease agreements with the pipeline companies require the pipeline owners to remove and/or relocate the lines at the owner's expense, if required for improvements to the MSC.

However, since this was a deep-draft navigation project, the NFS must bear at least 50 percent of the cost of relocation as required by WRDA Section 101(a)(4) and explained in Policy Guidance Letter (PGL) 44. The law apportions the remaining payment responsibility to the pipeline owner. Costs borne by the NFS for utility relocations are credited toward the NFS's additional payment of 10% of the cost of the general navigation features. To the extent that the total amount eligible for credit under Section 101(a)(2) exceeds 10 percent of the total cost of the general navigation features, the NFS shall not be entitled to reimbursement.

Table 6 - Pipelines that May Require Removal / Relocation

	Approx. Channel Station	#	T4 Permit No. or P5 No.	Operator	Size	Depth	Permit No.	Miles	Status ¹
Lavaca Bay	+105+594	1	07368/605990	Neumin Production Company	4.5"	-	-	2.88	In Service*
	+91+330	1	04143/845690	Texas Eastern Trans, LP	30"	-50'	3560	3.99	In Service
	+91+330	1	05554/424191	Ineos USA LLC	8.63"	-	-	24.48	In Service
	+91+330	1	05569/424191	Ineos USA LLC	8.63"	-	-	24.47	In Service
	+82+960	4	00441/624246	Onyx Pipeline Company	8.63"	-	-	4.34	Abandoned
	+76+314	1	90134/881288	Valero Interstate Trans Co.	6.63"	-	82679	2.29	In Service
Matagorda Bay	+72+949	4	00276/489680	Lavaca Pipeline Company	8.63"	-	4566	16.51	In Service**
	+43+000	1	07025/385533	High Island Gas LLC	16"	-	6729	7.8	In Service**
	+22+472	1	06146/876520	Union Oil Co of CA	8.63"	-	-	8.14	Abandoned
Offshore	-18+472	1	02878/253368	Enterprise Products Operating LLC	24"	-65'	14794	26.21	In Service
¹ Information on Status of pipeline provided by the Railroad Commission of Texas (RRC) *This line has been cut, flushed, filled with bay water, and capped according to the NFS. ** These lines are listed as in-service by the Railroad Commission of Texas, but as abandoned in July 2016 according to the NFS.									

1.12 Hazardous and Toxic Materials

The potential for encountering impacted material during the construction of the project is limited. Impacts associated with regulated facilities are most likely to be encountered near the source of the contaminants. These sources include, but are not limited to, industry located in the Point

Comfort area. According to a review of database records and research of the environmental history of the region, the industrial activity adjacent to Lavaca Bay has caused measurable impacts to the terrestrial and marine environments adjacent to this and adjacent waterways.

The industrial activity adjacent to Lavaca Bay is extensive and primarily related to two large industrial complexes located immediately adjacent to the project. Industrial activity at Alcoa Point Comfort Operation and Formosa has resulted in quantifiable impacts to groundwater, surface water, soil, and sediment. Corrective action performed at both facilities has minimized the potential to encounter media during project construction. In spite of remedial activities, the potential for the project to encounter impacted media remains. The documented areas impacted by previous industrial activity are isolated to the Lavaca Bay adjacent to Point Comfort.

According to the regulatory agency database report, the northern extent of the project enters into an area defined as an NPL or Superfund site. This area has been defined as having been impacted by contaminant releases from the Alcoa facility. Data provided by NOAA delineates elevated levels of mercury within sediment near Dredge Island. The concentrations of mercury within the impacted area range from below detection limits to 2.00 mg/kg. Over the past fifteen years no sediment samples have shown mercury levels that exceed TCEQ water quality standards.

Due to the prolonged use of portions of the area as military training, the potential of unexploded ordnance within the project area does exist. However, the potential to encounter unexploded ordnance during dredging activity is considered to be quite low. The existing channel has been maintained through maintenance dredging for the last 50 years and there have been no reported incidences of unexploded ordnance encountered in the Matagorda Bay area.

Dredge material will be tested for contaminants and if any are found, the Sponsor will be 100% responsible for investigation, removal and disposal of any HTRW involved with construction and O&M of the project in accordance with ER 1165-2-132 and PGL No. 34. (2019 FEIS, Appendix F – Engineering, Section 7.0)

The DMMP was updated by removing PA ER3/D. NOTE: In 2002, the NFS and Alcoa Inc. entered into a Settlement Agreement WHEREAS, if mercury is present in, on, or under all or part of the CCND owned lands, including submerged lands, described in the Lease Agreement dated June 16, 1982, those contaminated materials will be deposited in PA ER3/D. It includes a CONTRACT FOR DREDGE DISPOSAL CAPACITY and TERM EASEMENT AND RIGHT OF WAY FOR ACCESS TO AND USE OF DREDGE ISLAND. See Volume 356, Page 681, of the Official Public Records of Calhoun County, Texas.

1.13 Environmental Objectives and Requirements

Significant ecological, aesthetic, and cultural values must be preserved and protected. Natural resources should also be conserved. The human and natural environments should be maintained and restored as needed. Plans implemented to improve navigation should avoid damaging the environment and contain methods to minimize or mitigate damages to the environment.

The different depths considered under Alternative A would each have similar environmental impacts. The relative differences would be proportional to the depths in that the shallowest proposed channel would have the least amount of impacts, while the deepest proposed channel would have the largest amount of impacts (Table 7). The impacts are associated with each depth scale and are expected to be proportional to each depth scale of Alternative A in intensity. Each foot of additional depth of dredging increases the impact to bay bottom by 19 acres.

Table 7 - Alternative A -47' / -49' Showing Depth, Width, and Dredge Quantities

Channel Depth (MLLW)	Bottom Width (ft)	Top of Channel Width (ft)	Dredge Quantities (mcy)
-47' / -49'	300'	632'	21

1.14 Operations and Maintenance

The estimated annual maintenance dredging volume was based on a CSAT modeling software that calculates the volume using: historic dredging records, total suspended sediment concentrations, hydrodynamics of the proposed channel, and the amount and location of material placed in unconfined PAs. Projected maintenance volumes per cycle for each reach of the channel are provided in Table 8. All open water PAs for maintenance material theoretically have an unlimited capacity since they are unconfined and dispersive. (2019 FEIS, Appendix F – Engineering, Section 9.0)

Table 8 - Projected Maintenance Dredging Volumes per Cycle

Start Station	End Station	Dredge Quantities per Cycle (CY)	50 Year O&M Quantities (CY)	Placement Area	Method	Frequency (years)
-33+000	-15+000	1,433,731	17,921,632	1	Hopper	4
-15+000	-6+000	716,865	8,960,816	SE	Hopper	4
-6+000	25+000	517,783	12,944,583	Sundown Island	Pipeline	2
25+000	35+000	114,520	2,863,000	OP1	Pipeline	2
35+000	45+000	114,520	2,863,000	OP2	Pipeline	2
45+000	55+000	114,520	2,863,000	OP3	Pipeline	2
55+000	65+000	114,520	2,863,000	OP4	Pipeline	2
65+000	75+000	512,052	12,801,308	OP5	Pipeline	2
75+000	85+000	518,106	12,952,653	OP6	Pipeline	2
85+000	97+446	641,766	16,044,156	OP7	Pipeline	2
97+446	110+000	642,238	16,055,948	OP8	Pipeline	2
110+000	114+000	807,781	20,194,537	OP9	Pipeline	2
114+000	118+502	988,107	24,702,678	OP10	Pipeline	2

1.15 Cost Estimate for the Recommended Plan

A detailed cost estimate for the Recommended Plan has been developed utilizing Micro Computer Aided Cost Estimating System (MCACES) software tools (2019 FEIS, Appendix F – Engineering, Section 12).

Costs have been updated to reflect the revisions made to the Recommended Plan post ship simulations.

An Abbreviated Risk Analysis (ARA) developed with the participation of the PDT in October 2017, was revised in November of 2018 to take into account deleted and added Features of Work. For screening of alternatives for the TSP, an average risk contingency of 37% from the ARA was applied to the direct first construction costs, as well as for PED and Construction Management (CM). Since the total project cost of the TSP exceeds \$40 million, a formal Cost and Schedule Risk Analysis (CSRA) was required. The CSRA was prepared by the Cost Center of Expertise in Walla Walla District, with participation from the PDT. Refined risk contingencies were developed using the risk modeling software, Crystal Ball. The resulting contingency markups of 29% were then applied to all Code of Accounts for features of work, as well as PED, and CM. However, the 25% risk contingency developed by Real Estate Section would continue to be utilized for the Lands and Damages Code of Account. A summary breakdown of the Federal, Non-Federal, and Associated Costs for the Recommended Plan is below (Table 9).

Costs for required port improvements, considered “Associated Costs” were generated by the NFS and reviewed appropriately by Cost Engineer. Relocations total \$31,061,000, while Berthing Improvements & Docks total \$4,759,000. (2019 FEIS, Appendix F – Engineering, Section 12.0) Aids to Navigation, which is 100% federally funded and paid to the US Coast Guard, total \$1,883,000.

Table 9 - Recommended Plan – First Costs Allocation

Cost Account	Project Features	Federal (75%)	Non-Federal (25%)	Total
		October 2018 price levels		
		Construction General – General Navigation Features (GNF)		
12	Dredging	\$91,121,000	\$30,373,000	\$121,494,000
06	Fish & Wildlife Facilities	\$19,693,000	\$6,564,000	\$26,257,000
01	Lands and Damages (Non-Federal 100%)	\$0	\$1,554,000	\$1,554,000
30	Planning, Engineering, and Design	\$14,711,000	\$4,904,000	\$19,615,000
31	Construction Management	\$9,388,000	\$3,129,000	\$12,517,000
02	Relocations	\$0	\$31,061,000	\$31,061,000
Total Cost		\$134,913,000	\$77,585,000	\$212,498,000

Benefits were calculated using the USACE approved HarborSym model. Benefits and costs were calculated with a base year of 2024 and a 50-year period of analysis (2024-2073) using the FY19 discount rate of 2.875 percent. Construction of the Recommended Plan would generate total average annual benefits of \$35,858,000 with total average annual costs of \$15,886,000, producing a benefit-to-cost ratio (BCR) of 2.26 at the 2.875 percent discount rate.

Total First Costs of this project are \$212,498,000 with a Federal share of \$134,913,000, and a NFS cost share of \$77,585,000. Total First Cost for Aids to Navigation is 100% Federal with funds going to the US Coast Guard for \$1,883,000.

Table 10 - General Cost Allocation

Feature	Federal Cost % ¹	Non-Federal Cost % ¹
General Navigation Features (GNF)	●90% from 0 feet to 20 feet ●75% from 20 feet to 50 feet ●50% for 50 feet and deeper	●10% from 0 feet to 20 feet ●25% from 20 feet to 50 feet ●50% for 50 feet and deeper
Mitigation	●75%	●25%
Navigation Aids	●100% USCG	●0%
Operation and Maintenance		
GNF	●100% except cost share 50% costs for maintenance > 50 feet	●0% except cost share 50% costs for maintenance > 50
¹ The non-Federal sponsor shall pay an additional 10% of the costs of GNF over a period of 30 years, at an interest rate determined pursuant to Section 106 of WRDA 86. Normally, the value of LERR shall be credited toward the additional 10% payment.		

1.16 Residual Risk and Uncertainty

There is no minimum level of performance, or protection, or size required for USACE projects. The smaller in size, or the lower the level of performance however, the higher the residual risk. Residual risk can never be completely eliminated in any project.

The Recommended Plan as described in Section 4.11 is the NED plan for the Matagorda Ship Channel Section 216 feasibility study. The following risks were identified during the study.

Table 11 - Residual Risk and Uncertainty

Operations Risks		Management
The channel through the offshore bar will fill in within 2-6 months (advanced maintenance schedule for this area is every 2.5 to 5 years.)	Very Low	The Pilots are very familiar with the existing channel and have indicated that they will continue to adjust their current Pilot's Rules which already take this section of the Entrance Channel, and its bathymetry into account. Also, a sediment trap has been added to the design of the MSC to address the shoaling at this bar.
During certain weather and sea events, pilots can ground out on the bottom while navigating the larger draft ships.	Low	Post-TSP Ship Simulations informed the design for the Recommended Plan. The Pilots are very familiar with the existing channel and have indicated that they will continue to adjust their current Pilot's Rules which already take weather conditions into account.

Jetty Deficiency Project not implemented before the MSC construction	NONE	Post-TSP Ship Simulations shows that the bottleneck, being addressed as part of the Jetty Deficiency fix, does not prevent the MSC design vessel from using the Matagorda Ship Channel.
The constructed channel may be too narrow, too shallow and unsafe. Vessels could ground.	Low	Post-TSP Ship Simulations show that the design vessels may safely pass through the Matagorda Ship Channel in anticipated FWP conditions. However, there is no guarantee that unanticipated conditions, such as weather, could cause vessels to ground.
Environmental Risk		Management
Sundown Island erodes	NONE	Sundown Island is part of the current DMMP, as well as the DMMP for this study. It will not erode away. Also, the USFWS has already said that any USACE navigation projects in the area should include dredge disposal at Sundown Island.

2 Plan Implementation

2.1 Placement of Dredged Materials on Beaches

The DMMP developed for the MSCIP, Texas study was the least cost Placement plan (2019 FEIS, Appendix E – DMMP, Section 6.2). Assessment by the USACE Hydraulics and Hydrology Branch concluded that if the land surrounding jetty continues to erode the southwest jetty will fail and likely cause closure of the entrance channel. Therefore, a SE was formulated to address this). The SE is an approximate 165-acre, rectangular shaped site located at the entrance channel southwest of the jetties. The SE was not in previous DMMPs but deemed as a necessity to reduce erosion at the southwest jetty.

The SE will accept both new work and maintenance materials in the 50-year DMMP. The material in the SE will also nourish the beach as dredge material is carried west by virtue of longshore drift. (2019 FEIS, Appendix F – Engineering, Section 6.10)

Reach Description	Reach Stationing	Dredging Quantity (cy)	Placement Area	Type of Dredge
New Entrance Channel Extension	-33+000 to -20+000	2,383,334	New Work ODMDS 05	Hopper
Entrance Channel	-20+000 to -6+000	2,265,543	ODMDS 05	Hopper
Jetty Channel	-6+000 to 0+000	549,977	Sundown Island	Pipeline
Matagorda Bay	0+000 to 45+000	4,917,397	Sundown NP1,NP2	Pipeline
Matagorda Bay	45+000 to 75+000	3,775,899	NP2,NP3	Pipeline
Lavaca Bay	75+000 to 95+000	2,260,593	NP3,NP4, NP5	Pipeline
Lavaca Bay	95+000 to 105+000	1,532,673	NP5,NP6	Pipeline
Lavaca Bay and New 1,200' Turning Basin	105+000 to 116+223	2,707,704	NP6,NP7	Pipeline
Point Comfort Turning Basin	116+223 to 117+223	293,024	NP7	Pipeline
Point Comfort North and South Basins	117+223 to 118+502	277,253	NP7	Pipeline
Total New Work		20,963,397		

Figure 2 - New Work Quantities with Placement Areas

2.2 Dredged Material Management Plan

A DMMP was prepared for any alternative plan, except for the No Action Plan.

All federally maintained navigation projects must demonstrate that there is sufficient dredged material disposal capacity for a minimum of 50-years. A preliminary assessment is required for all Federal navigation projects to document the continued viability of the project and the availability of dredged material disposal capacity sufficient to accommodate 50-years of maintenance dredging. If the preliminary assessment determines that there is not sufficient capacity to accommodate maintenance dredging for the next 50-years, then a dredged material management study must be performed.

The MSCIP DMMP (2019 FEIS, Appendix E) addressed the dredging needs, disposal capabilities, capacities of PAs, environmental compliance requirements, and potential for beneficial usage of dredged material, and indicators of continued economic justification. The MSCIP's DMMP would be updated periodically to identify any potentially changed conditions.

The MSCIP DMMP identified specific measures necessary to manage the volume of material likely to be dredged over a 50-year period, from both construction and maintenance dredging. Non-Federal, permitted dredging within the related geographic area shall be considered in formulating Management Plans to the extent that disposal of material from these sources affects the size and capacity of PAs required for the MSC.

It is the USACE policy to accomplish the disposal of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner. Disposal would be consistent with sound engineering practice and meet all Federal environmental standards, including the environmental standards established by Section 404 of the Clean Water Act of 1972 and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended.

2.2.1 Initial Dredging (New Work)

The volume calculations are based on the channel dimensions. The volume calculations include both the overdepth and advanced maintenance requirements (2019 FEIS, Appendix E – DMMP, Section 4.1).

2.2.2 Maintenance Dredging

The estimated annual maintenance dredging volume was based on a CSAT modeling software that calculates the volume using: historic dredging records, total suspended sediment concentrations, hydrodynamics of the proposed channel, and the amount and location of material placed in unconfined placement areas. Projected annual maintenance volumes for each reach of the channel are provided in 2019 FEIS Appendix E – DMMP, Section 4.2. All open water placement areas for maintenance material theoretically have an unlimited capacity since they are unconfined and dispersive.

2.2.3 Typical Dredging Equipment

The type of dredging equipment considered depended on the type of material, the depth of the channel, the depth of access to the disposal or placement area (PA), the amount of material, the distance to the disposal or PA, the wave-energy environment, and so forth (2019 FEIS, Appendix E – DMMP, Section 5). Based on these considerations, three types of dredging equipment will be utilized as follows:

1. Hydraulic Pipeline Dredges in Lavaca Bay and Matagorda Bay Reaches,
2. Hopper dredge or clamshell dredge with dump scows in portions of the Matagorda Bay Reach, and
3. Hopper dredge and Hydraulic Pipeline Dredges in the Offshore Reach.

A detailed description of the types of dredging equipment can be found in EM 1110-2-5025, *Dredging and Dredged Material Management* (USACE, 1983.).

2.2.4 New Least Cost Placement Plan

Redundant placement areas were removed from the placement plan due to cutting construction costs and less material required to be dredged at longer distances (2019 FEIS, Appendix E – DMMP, Section 6.2). PA ER3/D was determined to be unnecessary to construct since sheet pilings would have to be placed along the entire perimeter of the newly constructed portion of the placement area to contain existing unsuitable material that may be stirred up while dumping new material. The construction of PA P1 was determined to be unnecessary unless additional placement capacity is needed for new work dredge material. The SE was added to the placement plan under advisement of Galveston Hydraulics and Hydrology Branch to reduce erosion at the southwest jetty. Placement areas will remain on the west side of the channel with exception of NP7, OP10 and Sundown Island on the east side of the channel. Updated placement plan is illustrated in the 2019 FEIS Appendix F – Engineering, Plate D-01.

2.2.5 Description of Placement Areas

See 2019 FEIS Section 4.11.12 and Appendix E – DMMP, Section 7.

2.3 Mitigation

There were unavoidable impacts to oysters and marshes, after minimization and avoidance efforts were completed. Placement of dredged material would result in the loss of 1.5 acres of marsh at PA1. The Habitat Suitability Index (HSI) model for clapper rail (Lewis and Garrison, 1983) was used to estimate impacts and mitigation requirements. The model indicates the loss of 0.8 Average Annualized Habitat Units (AAHUs) from the material placement. The clapper rail model indicated 2 acres of marsh mitigation would be required to achieve a replacement value of 0.9 AAHUs.

During the construction phase of the TSP, 129.2, or ~130 acres of oyster reef habitat will be dredged during the construction of the channel. Use of the American Oyster HSI model found a net loss of 79.3 AAHUs. The model calculated that ~130 acres of new oyster reef would provide 79.8 AAHUs.

The HSI was used to quantify the loss of functional value of oyster reef habitats impacted. A second HSI was used to quantify the loss of functional value of marsh and farmed wetlands.

The HSI addresses losses due to placement of new work and maintenance material over a 50-year planning period. The analysis is also used to ensure that proposed mitigation would restore all lost functional value over the 50-year analysis period. The HSI for marsh and farmed wetland was calculated using the model for clapper rail using a spreadsheet certified for one-time use by the USACE Eco-PCX.

The recommended plan channel modifications would not impact any wetlands. The placement of dredged material will impact 1.5 acres of marsh lands. Two acres of marsh mitigation will be done in accordance with ER 1165-2-27 (Establishment of Wetland Areas in Connection with Dredging).

Selection of potential mitigation sites and modeling of benefits will be conducted in coordination with resource agencies during PED. The location of the marsh mitigation sites will be, to the extent practicable, within the areas surrounding Matagorda Bay. In addition, the location of oyster reef mitigation will be within the Matagorda Bay system. Periodic meetings with the resource agencies have been ongoing to try to narrow down locations for the mitigation. (2019 FEIS, Appendix B – Environmental Resources)

2.4 Design and Construction Considerations

- Construction occurs between 2020 and 2024.
- The Non-Federal Sponsor shall be responsible, as between the Government and the Non-Federal Sponsor, for the costs of HTRW cleanup and response, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination as stated in the Project Partnership Agreement (PPA). Such costs shall be paid solely by the Non-Federal Sponsor without reimbursement, or credit, by the Government.
- The DMMP was updated by removing PA ER3/D. NOTE: In 2002, the NFS and Alcoa Inc. entered into a Settlement Agreement WHEREAS, if mercury is present in, or on, or under all or part of the CCND owned lands, including submerged lands, described in the Lease Agreement dated June 16, 1982, those contaminated materials will be deposited in PA ER3/D. It includes a CONTRACT FOR DREDGE DISPOSAL CAPACITY and TERM EASEMENT AND RIGHT OF WAY FOR ACCESS TO AND USE OF DREDGE ISLAND. See Volume 356, Page 681, of the Official Public Records of Calhoun County, Texas.

2.5 LERRD Considerations

The MSC is an existing Federal project. The Lands, Easements, Rights-of-way, Relocations, and Disposal areas (LERRDs) required to construct, operate, and maintain the recommended alternative are identified in the Real Estate Plan (2019 FEIS, Appendix D). The NFS is required to furnish all LERRD for this proposed cost-shared project.

The NFS will be responsible for removal of pipelines obstructing the channel. The Galveston District's policy states that existing pipelines (measured from the top of the pipe) shall have, "a minimum of 20 ft. below the authorized project depth of the channel plus a distance of 50 ft. on each side of the channel measured from the bottom edge of cut and perpendicular to the centerline". Any pipelines that are not deep enough to comply with the District's clearance requirements within the proposed channel template will have to be removed or relocated. During this study, 16 pipelines were identified for removal or relocation. This number will need to be

verified in PED. The NFS must bear at least 50% of the cost of utility relocation for projects with an authorized depth of greater than 45' as required by WRDA Section 101(a)(4) and explained in PGL 44. The law apportions the remaining payment responsibility to the pipeline owner. Costs borne by the NFS for utility relocations are credited toward the NFS's additional payment of 10% of the cost of the general navigation features. To the extent that the total amount eligible for credit under Section 101(a)(2) exceeds 10% of the total cost of the general navigation features, the NFS shall not be entitled to reimbursement.

The NFS has already secured the right-of-way for approximately half the lands necessary for the utility/pipeline easement from the bay to PA P1, however, an additional easement totaling 1.33 acres will need to be acquired. As a result of affecting the marshland in upland PA P1, up to 2 acres of mitigation lands will need to be acquired by the NFS. The NFS will be eligible for LERRD credits for all land costs and the administrative costs associated with providing LERRD. (2019 FEIS, Appendix D – Real Estate)

2.6 Operations and Maintenance Considerations

- Deeper dredging, both new and maintenance, at the offshore bar is being implemented, since the bar is limiting the draft of vessels. (2019 FEIS, Appendix F – Engineering, Section 9.0)

2.7 Institutional Requirements

2.7.1 Coast Guard Coordination

The Galveston District, in cooperation with the Pilots, would coordinate directly with the Coast Guard concerning the installation and modifications of aids to navigation, the regulation of lightering areas (docking and loading areas used to off-load heavy cargo from larger vessels to smaller vessels and vice versa), anchorage and channels. (2019 FEIS, Appendix F – Engineering, Section 6.7)

2.7.2 The USACE Campaign Plan¹

The USACE developed a campaign plan with a mission to “deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce risk from disaster.” This Campaign Plan shaped the USACE command priorities, focuses transformation initiatives, measures and guides progress, and helps the USACE adapt to the needs of the future.

The Recommended Plan does address Goals 2 and 4 of the Campaign Plan.

- Campaign Plan Goal 2: Deliver enduring and essential water resource solutions using effective transformation strategies
 - Objective 2c: Deliver quality solutions and services
 - Objective 2d: Deliver reliable, resilient, and sustainable infrastructure systems

¹ <http://www.usace.army.mil/about/campaignplan.aspx>.

- Campaign Plan Goal 4: Build resilient people, teams, systems, and processes to sustain a diverse culture of collaboration, innovation, and participation to shape and deliver strategic solutions
 - Objective 4b: Enhance trust and understanding with customers, stakeholders, teammates, and the public through strategic engagement and communication

2.7.2.1 Environmental Operating Principles²

In 2002 and again in 2012, the USACE formalized a set of Environmental Operating Principles (EOPs) applicable to decision-making in all programs. The principles are consistent with the National Environmental Policy Act (NEPA), the Army Strategy for the Environment, other environmental statutes, and the Water Resourced Development Act (WRDA) of 2007. The EOPs inform the plan formulation process. They are integrated into all project management processes.

The Recommended Plan is consistent with the EOPs, which are as follows:

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

2.8 List of Preparers

Name	Technical Specialty
Franchelle Craft	Project Management
Kathy Skalbeck	Plan Formulation
Dr. Thomas White	Hydrology and Hydraulic Engineering
Jennifer Purcell	Economics
Todd Nettles	Economics – DDN PCX
Janelle Stokes	Environmental Resources

² <http://www.usace.army.mil/Missions/Environmental/Environmental-Operating-Principles/>

Harmon Brown III	Environmental Resources
John Campbell	Cultural Resources
Brandon Crawford	Geotechnical Engineering
David Clark	HTRW
Lisa Mairs	Real Estate
Nichole Schlund	Real Estate
Brenda Hayden	Engineering Lead
Dale Williams	Cost Engineering
Brandon Crawford	Cost Engineering

3 2019 District Engineer's Recommendation

3.1 Recommendation

Recommendation For the Proposed Implementation of the Section 216, Matagorda Ship Channel, Texas, FINAL Integrated Feasibility Report and Environmental Impact Statement

I recommend implementation of the NED plan, identified as Alternative Plan A at -47' MLLW in the Matagorda Ship Channel, Texas, FINAL Integrated Feasibility Report and Environmental Impact Statement, in the Vicinity of the City of Point Comfort, Texas, May 2019, with such modifications thereof as in the discretion of the Commander, Headquarters, US Army Corps of Engineers (HQUSACE), may be advisable.

The total project first cost is estimated to be \$212,498,000 at October 2018 prices, with a Federal share of \$ 134,913,000 (Federal) and the NFS share of \$77,585,000. Annual operation, maintenance, repair, rehabilitation, and replacement costs are estimated to be \$8,774,000 at October 2018 prices, a Federal discount rate of 2.875%, and a period of analysis of 50 years. Total First Cost for Aids to Navigation are 100% Federal with funds going to the US Coast Guard for \$1,883,000.

The NFS would be the Calhoun Port Authority.

I make this recommendation with the provision that prior to implementation the NFS enter into a binding project partnership agreement (PPA) with the Secretary of the Army that defines the terms and conditions of cooperation for the project. In this agreement, the NFS would agree to comply with applicable Federal laws and policies, including, but not limited to, the items of local cooperation, as specified below:

- a. Provide 10% of the total cost of construction of the general navigation features (GNFs) attributable to dredging to a depth not in excess of 20', plus 25% of the total cost of construction of the GNFS attributable to dredging to a depth in excess of 20' but not in excess of 50', as further specified below:
 - i. Provide 50% of design costs allocated by the Government to commercial navigation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project.

- ii. Provide, during construction, any additional funds necessary to make its total contribution for commercial navigation equal to 10% of the total cost of construction of the GNFs attributable to dredging to a depth not in excess of 20', plus 25% of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 20' but not in excess of 50'.
- b. Provide all lands, easement, rights-of-way, relocations and disposal (LERRD), including those necessary for the borrowing of material and disposal of dredged or excavated material, and perform or assure the performance of all relocations, including utility relocations, all as determined by the Government to be necessary for the construction or operation and maintenance of the GNFs;.
- c. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the GNFs, an additional amount equal to 10% of the total cost of construction of GNFs less the amount of credit afforded by the Government for the value of the LER and relocations, including utility relocations, provided by the Sponsor for the GNFs. If the amount of credit afforded by the Government for the value of LER, and relocations, including utility relocations, provided by the Sponsor equals or exceeds 10% of the total cost of construction of the GNFs, the Sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of LER and relocations, including utility relocations, in excess of 10% of the total costs of construction of the GNFs;
- d. Provide, operate, and maintain, at no cost to the Government, the local service facilities in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Government;
- e. Give the Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, and maintaining the GNFs;
- f. Hold and save the US free from all damages arising from the construction or operation and maintenance of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the US or its contractors;
- g. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of three years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as would properly reflect total cost of construction of the project, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 C.F.R., Section 33.20;

Perform, or ensure performance of, any investigations for hazardous substances as are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC. 9601–9675, that may exist in, on, or under LERRD that the Government determines to be necessary for the construction or operation and maintenance of the GNFs. However, for lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the Government provides the Sponsor with prior specific

written direction, in which case the Sponsor shall perform such investigations in accordance with such written direction;

- h. Assume complete financial responsibility, as between the Government and the Sponsor, for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under LERRD that the Government determines to be necessary for the construction or operation and maintenance of the project;
- i. To the maximum extent practicable, perform its obligations in a manner that would not cause liability to arise under CERCLA;
- j. Comply with Section 221 of PL 91-611, Flood Control Act of 1970, as amended, (42 USC. 1962d-5b) and Section 101(e) of the WRDA 86, PL 99-662, as amended, (33 USC. 2211(e)) which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the Sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;
- k. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, PL 91-646, as amended, (42 USC. 4601-4655) and the Uniform Regulations contained in 49 C.F.R. 24, in acquiring lands, easements, and rights-of-way necessary for construction, operation, and maintenance of the project including those necessary for relocations, the borrowing of material, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;
- l. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, PL 88-352 (42 USC. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 USC. 3141-3148 and 40 USC. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 USC. 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 USC. 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 USC. 276c));
- m. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation that are in excess of one percent of the total amount authorized to be appropriated for the project; and
- n. Not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the Sponsor's obligations for the project costs unless the Federal agency providing the Federal portion of such funds verifies in writing that such funds are authorized to be used to carry out the project.
- o. Construction of the recommended channel improvements is estimated to take four years to complete (2020 – 2024). During this period, the Government and the Sponsor shall diligently maintain the projects at their previously authorized dimensions according to the previous cooperation agreement. Maintenance materials that have accumulated in the channels at the time that "before dredging" profiles are taken for construction payment shall be considered as new work material and cost-shared according to the new cooperation agreement. Any dredging in a construction contract reach after the improvements have been completed and the construction contract closed would be

considered to be maintenance material and cost-shared according to the new agreement.

The recommendation was signed by TIMOTHY R. VAIL, COLONEL, EN, Commanding on 08 August 2019.

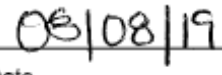
 TIMOTHY R. VAIL COLONEL, EN Commanding	 Date
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Figure 3 - Galveston District DE's Signature