Appendix E

Clean Water Act Section 404(b)(1) Evaluation

APPENDIX E
SABINE–NECHES WATERWAY CHANNEL IMPROVEMENT PROJECT, TEXAS
SECTION 404(b)(1) EVALUATION

I. Project Description

a. Location

The Sabine-Neches Waterway (SNWW) Channel Improvement Project (CIP) is located on the upper Texas Gulf Coast at the Texas-Louisiana state boundary. The existing 40-foot SNWW project is a federally authorized and maintained waterway located in Jefferson and Orange counties, Texas, and Cameron and Calcasieu parishes, Louisiana. All subsequent references to the SNWW in this report focus on the 77-mile-long channel flowing through Jefferson and Orange counties, Texas, and Cameron Parish, Louisiana (includes a 13.2-mile channel extension into the Gulf of Mexico [Gulf]). The SNWW begins offshore, follows the west side of Sabine Lake, and terminates just upstream of the Beaumont Turning Basin on the Neches River.

The project area for the Preferred Alternative is defined as areas that would be directly affected by implementation of the CIP (i.e., the proposed dredging footprint, existing and proposed placement areas [PAs] identified in the Dredged Material Management Plan [DMMP], and mitigation areas).

The study area includes a larger area for which environmental effects of alternatives have been analyzed. The study area encompasses 2,000 square miles, which contains the smaller project area, and includes the following water bodies and adjacent coastal wetlands: Sabine Lake and adjacent marshes in Texas and Louisiana, Neches River Channel up to the new Neches River Saltwater Barrier, Sabine River Channel to the Sabine Island Wildlife Management Area (WMA), the Gulf Intracoastal Waterway (GIWW) west to Star Bayou, the GIWW east to Gum Cove Ridge, the Gulf shoreline extending to 10 miles either side of Sabine Pass, and 35 miles offshore into the Gulf.

Further descriptions of the SNWW CIP can be found within chapters 1 and 3 and Figure 1.1-2 of the Final Environmental Impact Statement (FEIS).

b. General Description

This Section 404(b)1 evaluation addresses the discharge of dredged or fill material into the waters of the U.S. The objectives of the SNWW CIP include improvements to the efficiency of the deep-draft navigation system, and maintenance or enhancement of the quality of the area's coastal and estuarine resources. Maintenance and enhancement of the area's coastal and estuarine resources are associated with potential for reduced accidents and oil spills; beneficial use of dredged material; minimization of effects to oyster beds, seagrasses, and other valuable habitats; and avoiding areas of known cultural resources.

To achieve navigation efficiency objectives, the following is proposed:

- Deepening the Sabine Pass Jetty Channel, the Sabine Pass Channel, the Port Arthur Canal, the Sabine-Neches Canal, and the Neches River Channel to the Port of Beaumont from 40 to 48 feet.
- Deepening the existing SNWW Entrance Channel in the Gulf from 42 to 50 feet, plus advance maintenance and allowable overdepth, and constructing an extension of the offshore entrance channel (50 x 700 feet x 13.2 miles). Dredging would be conducted by hopper dredge. Additional details of this construction are provided below because of its potential to affected endangered sea turtles.
- Dredging in the Sabine Pass Jetty Channel would be conducted by hopper dredge, while the remaining inshore channels would be constructed with hydraulic pipeline dredges.
- Deepening the Taylor Bayou Channel and basins to 48 feet, and widening the entrance and connecting channels to improve vessel maneuverability.
- Dredging one new anchorage basin and two turning and anchorage basins on the Neches River Channel.
- Using 16 existing upland placement areas and two new expansions of existing placement areas for construction and maintenance of the Preferred Alternative. The quantity of maintenance material to be removed over the 50-year period of analysis is estimated to total approximately 650 million cubic yards (mcy).

To achieve coastal resource protection and ecological enhancement objectives, the following is proposed:

- Avoidance and minimization of resource impacts through alternative analyses.
- Avoidance of cultural and historical resources (e.g., Civil War–era shipwrecks).
- Implementation of Beneficial Use (BU) features for resource protection and restoration. Appropriate dredged materials, as part of the DMMP, would be beneficially used to restore 2,853 acres of emergent marsh, nourish 1,234 acres of existing marsh, and improve 871 acres of shallow-water habitat with the Neches River BU Feature (comprised of Rose City East, Bessie Heights East, and Old River Cove West), and regularly nourish approximately 6 miles of shoreline with the Gulf Shore BU Feature (Texas and Louisiana Points). Gulf shore nourishment, which affects piping plover Critical Habitat at Louisiana Point, is described in detail below.
- Unavoidable impacts of the Preferred Alternative in Texas are offset through the DMMP; impacts in Louisiana, however, required compensatory mitigation. Therefore, the mitigation plan consists of restoring five degraded marsh areas east of Sabine Lake near Willow and Black bayous, Louisiana. The plan would restore 2,783 acres of emergent marsh in existing open-water areas within the marsh, improve 957 acres of shallow-water habitat by creating shallower, smaller ponds and channels within the restored marsh, and stabilize and nourish 4,355 acres of existing marsh located in and around the marsh restoration zone. The amount of recommended mitigation is based upon the amount of marsh acreage that could be lost as a result of the project, and the additional amount that would need to be restored in order to fully compensate for adverse changes to biological function of the remaining marsh throughout the affected area over the period of analysis.

The proposed plan is the least environmentally damaging practicable alternative.

c. Authority and Purpose

The Senate Committee on Environment and Public Works Resolution, dated June 5, 1997, authorized the U.S. Army Corps of Engineers (USACE) to review previous USACE reports on the SNWW and other pertinent reports to determine the feasibility of modifying the channels serving the ports of Beaumont, Port Arthur, and Orange, Texas, in the interests of commercial navigation. These channels are collectively named the SNWW. The Sabine-Neches Navigation District (SNND), non-Federal sponsor of the existing channels to Beaumont and Port Arthur, requested that USACE initiate a reconnaissance study of potential channel improvements in September 1998. The reconnaissance investigation resulted in a finding that there was a Federal interest in the project and recommended that the study be continued into the feasibility phase. The SNND expressed its intent to act as the non-Federal sponsor for this phase of the study. The Final Feasibility Report (FFR) for the SNWW CIP would determine whether improvements to the existing Federal navigation project are justified, and provide documentation needed to request Congressional authorization and funding for construction of the project. The Sabine River Channel to Orange, Texas, was not included in this FFR due to expectations of continued low utilization of the existing 30-foot channel.

In March 2000, the USACE and the SNND signed an agreement to conduct an FFR and prepare a Final Environmental Impact Statement (FEIS) for the proposed CIP. The lead agency for the FEIS is USACE, with the U.S. Environmental Protection Agency (EPA) as a cooperating agency. The cost of the FFR and FEIS is shared by the USACE and the SNND.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Extensive core borings were taken and analyzed in conjunction with the 1982 feasibility report for the SNWW (USACE, 1982). Profiles of these borings are shown in cross sections of the project plans, included in that report. These borings support the general information presented below.

Site Geology

The site geology is characterized by modern marine deposits overlaying recent Holocene deposits that in turn overlay the Beaumont and Lissie formations of the Pleistocene Series. The modern deposits are generally normally consolidated clays, silts, and fine sands that were deposited through natural overwash and sedimentation processes or through man-made depositional processes. The recent deposits of the Holocene consist of silts, clays, silty sands, clayey sands, and clayey silts that exhibit the characteristics of normally to lightly overconsolidated materials. These deposits are generally encountered to depths of 30 to 40 feet.

Beaumont Clay is the predominant Pleistocene formation whose eroded surface forms the upper limit of stiff to very stiff clay material. It is red, yellow, and brown calcareous stiff clay that weathers into black or gray soil at the surface. Lenses of fine-grained, poorly graded sand and silt, and a few calcareous nodules are sometimes encountered in this formation. The clay fraction is composed of montmorillonite

(generally with calcium as the exchangeable cation), kaolinite, illite, and finely ground quartz, in that order of prevalence. The high percentage of montmorillonite accounts for the high shrink-swell potential of the material. Previous desiccation of the clays results in significant overconsolidation to great depths, with preconsolidation pressure approaching 3 tons per square foot. In addition to preconsolidating the soil, the desiccation process, along with occasional rewetting, has resulted in a network of fissures and slickensides that are now closed but that represent potential planes of weakness within the stratum. The thicknesses of these clays range from 25 to 400 feet. The Lissie Formation underlies the Beaumont and consists primarily of sands and silty sands.

Field Exploration

Limited field investigations were conducted for this project. Those conducted were limited to cone penetrometer testing along the proposed levee alignments at selected placement areas. In addition, probings were taken at selected restoration and minimization features to evaluate near surface foundation issues. The majority of the subsurface data for the project was compiled from existing data—data from the channel that was collected for the 40-foot project and data from placement areas that have been collected during periodic levee raising projects.

Excavatability

The proposed deepening will entail dredging new work material. Based on a review of limited existing soil boring data taken during previous studies, the material will range from very soft to very stiff clay and loose to dense sand. No rock is anticipated and blasting will not be required.

The new work material within the offshore reaches (sections 4, 3, 2, 1, A, B, C, and D) and the adjacent onshore reaches (sections 5 and 6) is likely to consist of soft clay with pockets of stiff clay; some sand may also be encountered. These reaches are located within the historic delta region of the Sabine and Neches rivers where normally to lightly consolidated materials are located. Materials in this area may vary as the rivers' discharge meandered through the deltaic zone.

New work material within the onshore reaches of the Port Arthur and Sabine-Neches canals (sections 7, 8, 9, 10, and 11) will likely consist of stiff to very stiff clay. These canals are part of the land cut section of the waterway and were excavated early in the 1900s. The stiff consistency of this material can be attributed to the overconsolidation pressure of the material that was previously overlying the canals.

The Neches River Channel is located upstream of the Sabine-Neches Canal. The new work material for this channel (sections 12 through 18) will vary from stiff clay to medium-dense sand. These variations can be attributed to the historic meanders of the Neches River, although sand was more abundant in the soil samples from sections 15, 16, 17, and 18. In addition, historically the maintenance dredging in these reaches has contained significant amounts of sand.

(2) Quantity of Material

New Work Material

Construction of the Preferred Alternative would require the development of significantly more PA capacity than currently exists for the SNWW project. The existing project uses 16 upland PAs. Construction of the Preferred Alternative would generate 98 mcy of new work material. The term "new work" refers to the material below the existing Waterway channel template, which is needed to be removed in order to increase to the new project depth. The following table depicts the volume in cubic yards (cy) of new work material from all reaches of the Preferred Alternative:

Section	Station	To Station	Estimated New Work (cy)	Total Per Reach (cy)
D	165+443	150+500	4,201,000	
C	150+500	132+000	4,648,000	
B	132+000	114+000	5,296,000	
A	114+000	95+734	4,592,000	18,737,000
1	95+734	53+000	8,307,000	8,307,000
2	53+000	18+000	7,051,000	
3	18+000	0+000	5,923,000	12,974,000
4	0+00	–126	2,978,000	2,978,000
5	0+00	186+00	4,459,600	
6	186+00	296+25	2,263,600	6,723,200
7	0+00	240+00	5,026,000	
8	240+00	325+84	3,281,900	
8TB	0+00	106+24	3,893,000	11,697,200
9	0+00	170+00	3,092,000	
10	170+00	592+93	8,852,000	11,944,000
11	0+00	96+00	1,628,000	
12	96+00	158+00	698,000	
13	158+00	292+00	4,882,000	
14	292+00	420+00	2,213,000	
15	420+00	522+00	2,611,000	
16	522+00	716+00	4,106,000	
17	716+00	776+00	2,845,000	
18	776+00	980+00	6,031,000	25,014,000
			Total	**98,374,400**

Maintenance Material

Shoaling is projected to increase with the Preferred Alternative for several reasons. The Entrance Channel would extend an additional 13.2 miles into the Gulf, and this would result in higher offshore dredging quantities. The deeper channel would have a greater cross-sectional area, making it function as a larger sediment trap, and higher salinities would increase flocculation and the deposition of suspended sediment. Section 2.5.2 in the FEIS describes, in detail, the SNWW sediment system and the existing project

shoaling and sediment transport conditions. Shoaling and sediment transport conditions for the existing SNWW include all segments of the existing SNWW navigation system that are discussed in detail in the FEIS. The discussion in the FEIS begins with the upstream end of the SNWW (the Neches River Channel), and moves downstream through the confined Sabine-Neches and Port Arthur canals, the Sabine Pass Channel, and then offshore into the Sabine Pass Jetty Channel, the Sabine Pass Outer Bar Channel, and the Sabine Bank Channel. Finally, the interaction of the channel and adjacent shoreline sections is described (refer to Section 2.5.2 in the FEIS).

The existing shoaling quantities for the 40-foot project are summarized in the following table (these quantities were summarized from Section 2.5.2.7 of the FEIS and the sediment study by Parchure [2005]):

Channel	Material Types	cy/year
Sabine Bank Channel	76% silt/clay, 24% clay	4,235.2
Sabine Pass Outer Bar Channel	96% silt/clay, 4% sand	1,993.7
Sabine Pass Jetty Channel	89% silt/clay, 11% sand	1,138.5
Sabine Pass Channel	70% silt/clay, 30% sand	1,911.9
Port Arthur Canal	84% silt/clay, 16% sand	4,210.4
Sabine-Neches Canal	78% silt/clay, 22% sand	3,689.2
Neches River Channel	62% silt/clay, 38% sand	6,382.3

It is expected that the material types for the projected maintenance dredging would be similar to the existing. The predicted shoaling quantities for the 48-foot project are summarized in the following table:

Channel	cy/year
Extension	3,018.0
Sabine Bank Channel	4,639.0
Sabine Pass Outer Bar Channel	4,473.0
Sabine Pass Jetty Channel	1,352.7
Sabine Pass Channel	2,173.8
Port Arthur Canal	4,087.8
Sabine-Neches Canal	4,677.0
Neches River Channel	8,599.1

The predicted shoaling by dredging sections are presented in the following table:

Channel	Dredging Section	Channel Reach	O&M Cycle Freq (Year)	Shoaling cy/Cycle
EXT	D	Station 165+443 to 150+500	4	647,000
EXT	C	Station 150+500 to 132+000	4	801,000
EXT	B	Station 132+000 to 114+000	4	779,000
EXT	A	Station 114+000 to 95+734	4	791,000
ENT	1	Station 95+734 to 53+000	4	1,508,000
ENT	2	Station 53+000 to 18+000	4	3,131,000
SPOB	3	Station 18+000 to 0+000	1	4,473,000
SPJ	4	Station -214+88 to 0+00	5	1,352,700
SPC	5	Station 0+00 to 186+00	3	977,900

Channel	Dredging Section	Channel Reach	O&M Cycle Freq (Year)	Shoaling cy/Cycle
SPC	6	Station 186+00 to 295+60	3	1,195,800
PAC	7	Station 0+00 to 240+00	3	2,148,600
PAC	8	Station 240+00 to 326+24	2	2,340,000
		TB 0+00 to 106+25	2	1,327,000
SNC	9	Station 0+00 to 170+00	2	1,317,000
SNC	10	Station 170+00 to 592+91	4	3,360,000
NRC	11	Station 0+00 to 96+00	3	669,000
NRC	12	Station 96+00 to 158+00	3	432,000
NRC	13	Station 158+00 to 292+00	3	934,000
NRC	14	Station 292+00 to 422+00	4	1,163,000
NRC	15	Station 422+00 to 522+00	6	965,000
NRC	16	Station 522+00 to 716+00	6	1,879,000
NRC	17	Station 716+00 to 776+00	6	581,000
NRC	18	Station 776+00 to 980+00	6	1,976,000

NOTE: This table only shows the predicted shoaling per section estimate

Because of this predicted shoaling, maintenance dredging is projected to increase for the entire channel, from 407 mcy to 650 mcy over the 50-year period of analysis. Expressed as average annual quantities, quantities will increase from 8.1 mcy per year to 13.0 mcy per year (an increase of approximately 60 percent). Fifty-seven percent of the maintenance quantities for the Preferred Alternative would originate from the offshore channels, and 43 percent from the inshore channels. As would be expected with the offshore channel extension, maintenance dredging volumes for the offshore channel would increase more than the inshore reaches, with an increase from 162 mcy to 370 mcy and 251 mcy to 281 mcy, respectively.

Finding areas suitable for the development of new upland PAs along the inshore reaches was difficult. The majority of land adjacent to the SNWW is either covered by residential and industrial development and existing PAs, or is coastal wetland. For this reason, considerable effort was directed toward evaluating alternatives for the placement of dredged material. Maintenance material would be used to the greatest extent possible in the resulting DMMP. A discussion of the process used to evaluate these alternatives, and a description of alternatives considered, is provided in Section 2.5 of the FEIS.

e. Description of the Proposed Discharge

(1) Location

Sixteen PAs would be used to manage the CIP's new work and maintenance material over a 50-year period (see tables below and refer to figures 2.4-1c–g of the FEIS). Twelve of these PAs are currently used on the existing project, while four PAs are currently not utilized. Two new cells to two existing PAs have been proposed. All of these PAs are confined with water discharged from the sites via controlled spillways to outfall canals and drainage ditches.

New work material volumes by reach and proposed PAs (the new work plan) are presented in the following table:

Channel Reach	Channel Stations	Water-way Section	New Work Material Designation	New Work Dredged Volume (cy)**	New Work Material Construction	New Work Material Used for Construction Volume (cy)	New Work Material Surplus Volume (cy)
Sabine Bank Extension	165+443 to 150+500	D	PA D (Offshore)	4,201,000	0	0	0
	150+500 to 132+000	C	PA C (Offshore)	4,648,000	0	0	0
	132+000 to 114+000	B	PA B (Offshore)	5,296,000	0	0	0
	114+000 to 95+734	A	PA A (Offshore)	4,592,000	0	0	0
Sabine Bank Channel	95+734 to 53+000	1	PA 1 (Offshore)	8,307,000	0	0	0
Sabine Bank Channel	53+000 to 18+000	2	PA 2 (Offshore)	7,051,000	0	0	0
Sabine Outer Bar	18+000 to 0+000	3	PA 3 (Offshore)	5,923,000	0	0	0
Sabine Pass Jetty Channel	–214+88 to 0+00	4	PA 4 (Offshore)	2,978,000	0	0	0
Sabine Pass Channel	0+00 to 186+00	5	PA 5 (N and S)	4,459,600	New Hyd. levee; 400-foot-wide stockpile	3,104,137	1,093,593
	186+00 – 296+25	6	PA 5B	2,263,600	400-foot-wide stockpile	1,362,051	
			PA 5C		400-foot-wide stockpile	1,163,419	
Port Arthur Canal	0+00 –240+00	7	PA 8	5,026,000	Stockpile in southwest corner	5,026,000	0
	240+00 –325+84	8*	PA 8	6,671,200	Stockpile in southwest corner	3,691,462	0
			PA 9A		300 foot-wide stockpile	1,898,938	0
			PA 9B		300-foot-wide stockpile	1,080,800	0
Sabine-Neches Canal	0+00 – 170+00	9	PA 8	3,092,000	Stockpile in northeast corner	3,092,000	0
	170+00 – 592+91	10	PA 11	8,852,000	Stockpile in north-south corners	8,852,000	0

Channel Reach	Channel Stations	Water-way Section	New Work Material Designation	New Work Dredged Volume (cy)**	New Work Material Construction	New Work Material Used for Construction Volume (cy)	New Work Material Surplus Volume (cy)
Neches River Channel	0+00 – 96+00	11	PA 12	1,628,000	100-foot-wide stockpile	1,135,764	74,029
			PA 13		100-foot-wide stockpile	418,207	
	96+00 – 158+00	12	PA 14	698,000	100-foot-wide stockpile	522,906	–362,241
			PA 16		100-foot-wide stockpile	537,335	
	158+00 – 292+00	13	Old River Cove	4,882,000	Marsh BU	4,882,000	0
	292+00 – 422+00	14	PA 18	2,213,000	100-foot-wide stockpile	870,540	49,295
			PA 18A		New Hyd. Levee	293,164	
			Bessie Heights East		Hyd. Levee System	1,000,000	
	422+00 – 522+00	15	PA 21	2,611,000	100-foot-wide stockpile	397,094	1,739,808
			PA 23A		New Hyd. Levee	474,098	
	522+00 – 716+00	16	PA 23	4,106,000	400-foot-wide stockpile	2,728,359	–1,766,345
			PA 24		400-foot-wide stockpile	2,624,786	
			PA 24A		New Hyd. levee	519,200	
	716+00 – 776+00	17	PA 25	2,845,000	200-foot-wide stockpile	2,263,932	20,009
			PA 25A		New Hyd. levee; 100-foot-wide stockpile	561,060	
			PA 25		50-foot-wide stockpile	421,197	
			Rose City East		Hyd. Levee System	2,100,000	
	776+00 – 980+00	18	PA 26	6,031,000	400-foot-wide stockpile	1,773,504	96,456
			PA 27A		200-foot-wide stockpile	1,136,376	
			PA 27C		New Hyd. Levee	283,200	
			PA 27D		New Hyd. Levee	220,267	
					Total	54,433,796	944,604

* Includes new material from Taylor Bayou (0+00 to 106+25).

** New work volume includes additional advance maintenance and proposed allowable overdepth.

The 50-year plan for maintenance material is presented in the following table:

Chan. Reach	Channel Stations	Water-way Section	Maintenance Material Designation	Dredge Quantity Per Cycle (cy)	Years Per Cycle	Total # of Cycles	Dredging Cycle Schedule	50-Year Maint-enance Material Total (CY)
Sabine Bank Extension	165+443 to 150+500	D	PA D (Offshore)	647,000	4	12	Cycle 1 through 12	7,764,000
	150+500 to 132+000	C	PA C (Offshore)	801,000	4	12	Cycle 1 through 12	9,612,000
	132+000 to 114+000	B	PA B (Offshore)	779,000	4	12	Cycle 1 through 12	9,348,000
	114+000 to 95+734	A	PA A (Offshore)	791,000	4	12	Cycle 1 through 12	9,492,000
Sabine Bank Channel	95+734 to 53+000	1	PA 1 (Offshore)	1,508,000	4	12	Cycle 1 through 12	18,096,000
Sabine Bank Channel	53+000 to 18+000	2	PA 2 (Offshore)	3,131,000	2	25	Cycle 1 through 25	78,275,000
Sabine Outer Bar	18+000 to 0+000	3	PA 3 (Offshore)	4,473,000	1	50	Cycle 1 through 50	223,650,000
Sabine Pass Jetty Channel	–214+88 to 0+00	4	PA 4 (Offshore)	1,352,700	5	10	Cycle 1 through 10	13,527,000
Sabine Pass Channel	0+00 –186+00	5	TX 8-11,	977,900	3	16	LA 5-6: Cycle 1, 3, 5, 7, 9, 11, 13, 15	15,646,400
			LA 5-6				TX8-11: Cycle 2, 4, 6, 8, 10, 12, 14, 16	
	186+00 – 296+25	6	PA 5 (N and S)	824,700	3	16	Cycle 1 through 16	13,195,200
			PA 5B	243,700	3	16	Cycle 1 through 16	3,899,200
			PA 5C	127,500	3	16	Cycle 1 through 16	2,040,000
Port Arthur Canal	0+00 – 240+00	7	PA 8	2,148,600	3	16	Cycle 1 through 16	34,377,600
	240+00 – 325+84	8*	PA 8	1,317,000	2	25	Cycle 1 through 25	32,925,000
			PA 9A	311,100	2	25	Cycle 1 through 25	7,777,500
			PA 9B	311,100	2	25	Cycle 1 through 25	7,777,500
Sabine-Neches Canal	0+00 – 170+00	9	PA 8	1,317,000	2	25	Cycle 1 through 25	32,925,000
	170+00 – 592+91	10	PA 11	3,360,000	4	12	Cycle 1 through 12	40,320,000
Neches River Channel	0+00 – 96+00	11	PA 12	479,800	3	16	Cycle 1 through 16	7,676,800
			PA 13	189,200	3	16	Cycle 1 through 16	3,027,200
	96+00 – 158+00	12	PA 14	432,000	3	16	Cycle 1 through 16	6,912,000
	158+00 – 292+00	13	PA 16, TX 5-2	445,400	3	16	TX 5-2: Cycle 1–9, PA 16: Cycle 10–16	7,126,400
			PA 17, TX 5-2	488,600	3	16	TX 5-2: Cycle 1–9, PA 17: Cycle 10–16	7,817,600
	292+00 – 422+00	14	PA 18, TX 5-2	740,500	4	12	TX 5-2: Cycle 1–7, PA 18: Cycle 8–12	8,886,000
			PA 18A, TX 5-2	145,600	4	12	TX 5-2: Cycle 1–7, PA 18A: Cycle 8–12	1,747,200

Chan. Reach	Channel Stations	Water-way Section	Maintenance Material Designation	Dredge Quantity Per Cycle (cy)	Years Per Cycle	Total # of Cycles	Dredging Cycle Schedule	50-Year Maint-enance Material Total (CY)
			PA 21, TX 5-2	276,900	4	12	TX 5-2: Cycle 1–7, PA 21: Cycle 8–12	3,322,800
	422+00 – 522+00	15	PA 23, TX 5-2	629,200	6	8	TX 5-2: Cycle 1–4, PA 23: Cycle 5–8	5,033,600
			PA 23A, TX 5-2	335,800	6	8	TX 5-2: Cycle 1–4, PA 23A: Cycle 5–8	2,686,400
	522+00 – 716+00	16	PA 24	1,267,900	6	8	Cycle 1 through 8	10,143,200
			PA 24A	611,100	6	8	Cycle 1 through 8	4,888,800
	716+00 – 776+00	17	PA 25	581,000	6	8	Cycle 1 through 8	4,648,000
	776+00 – 980+00	18	PA 25A, TX 3-1E	542,900	6	8	TX 3-1E: Cycle 1, PA 25A: Cycle 2–8	4,343,200
			PA 26, TX 3-1E	595,600	6	8	TX 3-1E: Cycle 1, PA 26: Cycle 2–8	4,764,800
			PA 27A, TX 3-1E	397,100	6	8	TX 3-1E: Cycle 1, PA 27A: Cycle 2–8	3,176,800
			PA 27C, TX 3-1E	269,900	6	8	TX 3-1E: Cycle 1, PA 27C: Cycle 2–8	2,159,200
			PA 27D, TX 3-1E	170,600	6	8	TX 3-1E: Cycle 1, PA 27D: Cycle 2–8	1,364,800
							50-Year Maintenance Material Total	**650,372,200**

* Includes maintenance material from Taylor Bayou (0+00 to 106+25)

The CIP would also incorporate BU areas as part of the DMMP; the Preferred Alternative includes two BU features: Neches River BU Feature (includes Rose City East, Bessie Heights East, and Old River Cove West Marsh Restoration sites) and the Gulf Shore BU Feature (Texas and Louisiana Point Shoreline Nourishment). For detailed information, refer to the DMMP (Appendix D of the FEIS, tables 4-1 and 5-3), which depicts all discharge locations which include all PAs, and BU features.

(2) Size

Discharges within the 16 PAs would cover approximately 11,730 acres. BU features include restoration of 2,853 acres of emergent marsh, nourish 1,234 acres of existing marsh, and improve 871 acres of shallow water habitat (Neches River BU Feature), and regularly renourish approximately 6 miles of shoreline (Gulf Shore BU Feature). Detailed information can be found in the DMMP (Appendix D of the FEIS, tables 5-1 and 5-3).

(3) Type of Site and Habitat

Placement would occur on subsided marsh (BU feature and mitigation), eroding beach shoreline along Texas and Louisiana Points (BU feature), and existing and confined PAs.

(4) Time and Duration of Discharge

Fifteen construction contracts are planned for dredging and discharging. Contracts 1–5 would be constructed with hopper dredges and contracts 6–12 with hydraulic pipeline dredges. The dredging contracts would be accomplished over a period of about 6 years. The ecological mitigation contracts (13–15) would be accomplished throughout the construction sequence. Dredging for the mitigation contracts does not involve the use of new work or maintenance material from the SNWW CIP. Refer to the FEIS for a description of this work. The proposed sequence for dredge and construction is shown in the following table.

Contract Number	Contract Schedule	Construction Start (month/fiscal year)	Construction Finish (month/fiscal year)
	Hopper Dredging:		
1	**Sabine Bank Extension**	October 2012	January 2013
	Section D Station 165+000 to 165+443		
	Section C Station 165+443 to 132+000		
2	Section B Station 132+000 to 114+000	February 2013	July 2014
	Section A Station 114+000 to 95+734		
3	**Sabine Bank Channel**	October 2015	August 2015
	Section 1 Station 95+734 to 53+000		
4	**Sabine Pass Outer Bar & Bank Channels**	October 2016	March 2017
	Section 2 Station 53+000 to 18+000		
	Section 3 Station 18+000 to 0+000		
5	**Sabine Pass Jetty Channel**	April 2017	September 2017
	Section 4 Station -214+88 to 0+00		
	Pipeline Dredging:		
6	**Sabine Pass Channel**	October 2016	January 2018
	Section 5 Station 0+00 to 186+00		
	Section 6 Station 186+00 to 296+25		
7	**Port Arthur Canal**	October 2012	August 2015
	Section 7 Station 0+00 to 240+00		
	Section 8 Station 240+00 to 325+84		
8	**Taylor Bayou Basin Area:**		
	Sabine-Neches Canal	April 2017	September 2018
	Section 9 Station 0+00 to 170+00		
9	Section 10 Station 170+00 to 592+94	April 2014	May 2017
10	**Neches River Channel**	October 2012	March 2014
	Section 11 Station 0+00 to 96+00		
	Section 12 Station 95+00 to 158+00		
	Section 13 Station 158+00 to 292+00		
11	Section 14 Station 292+00 to 422+00	April 2015	July 2018
	Section 15 Station 422+00 to 522+00		
	Section 16 Station 522+00 to 716+00		
12	Section 17 Station 716+00 to 776+00	October 2012	March 2015
	Section 18 Sta. 776+00 to 980+00		
13	**Mitigation for Willow Bayou, Louisiana**	October 2015	May 2018
14	**Mitigation for West Black Bayou, Louisiana**	October 2012	February 2014
15	**Mitigation for East Black Bayou, Louisiana**	October 2014	May 2015

f. Description of Disposal Method

The construction would utilize a combination of traditional and relatively new dredging techniques. Equipment used to dredge the channels would be those traditionally employed: hopper dredges in the offshore reaches, and hydraulic pipeline dredges in the other reaches. Disposal of the new work material

would be in conventional upland PAs and offshore PAs, as well as innovative, nontraditional dredging techniques of placement into marshes and adjacent shorelines. These techniques are mandated due to the requirements of the mitigation and DMMP restoration and nourishment features. Contracts would be written to not only emphasize the removal of material from the channel, but also emphasize successful completion of mitigation and restoration features so that they would perform to intended purposes. Best Management Practices (BMPs), such as silt curtains, may be implemented where appropriate to control and reduce turbidity during dredging and placement. BMPs would also be employed during construction of temporary containment levees and spill boxes for restoration sites. The DMMP (Appendix D of the FEIS) provides more information.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

Substrate elevations in BU features and mitigation areas would be approximately mean sea level. In PAs where new levees are required, hydraulic fill levees would be constructed using new work material. The design template provides a 100-foot crest width, 3:1 side slopes, and a 6-foot height.

(2) Sediment Type

From historical dredging records of the SNWW, dredged materials are expected to be composed of 51 percent silt, 31 percent clay, and 18 percent sand. Recent sediment tests for the Entrance Channel Extension, which consisted of grab samples from about the top foot of shore sediments, revealed predominantly sand: 26 percent of the samples contained >90 percent sand, 41 percent contained >80 percent sand, and only two samples had a sand content less than 50 percent. The maximum sand content was 99.1 percent. Section 3.4 of the FEIS discusses sediments further.

(3) Dredged/Fill Material Movement

Upland PAs would have containment levees to control fill movement after deposition; minor amounts of suspended solids may occur during construction, placement within BU features, or during mitigation efforts. BU marsh restoration areas would be protected from erosion by low levees, and BMPs may be implemented to control and reduce turbidity during discharge. The restored marshes would be stabilized initially by the planting of estuarine plants species (e.g., *Spartina* spp.); rapid natural colonization of marsh vegetation would also be expected based upon previous experience in the area. BU features targeting shoreline stabilization at Texas and Louisiana Points would include regular, unconfined discharge by hydraulic pipeline dredge. Section 2.5.3.2.2 of the FEIS describes predicted movement.

(4) Physical Effects on Benthos

Temporary and localized impacts to benthic organisms and their Gulf, estuarine and riverine water-bottom habitats would occur; however, benthic organisms are expected to quickly rebound from the short-term impacts from marsh restoration and shoreline nourishment. BMPs would be used where appropriate

to contain and control sediment and dredged material movement. Effects on aquatic organisms are discussed in Section 4.11 of the FEIS.

(5) Other Effects

None known.

(6) Actions Taken to Minimize Impacts

This project was fully coordinated with State and Federal resource agencies. Their recommendations were considered, incorporated, and described in the DMMP. Any unavoidable losses were mitigated. The BU features and mitigation sites are expected to lead to an overall increase in the diversity and productivity of estuarine and benthic habitat in the project area.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

The dredging and placement operations are expected to have only minor, short-term impacts on water quality in the area. Impacts to water quality are discussed more fully in Section 4.4 of the FEIS. BMPs would be implemented where appropriate.

(a) Salinity

The Preferred Alternative would provide a deeper navigation channel that would allow a greater amount of tidal circulation and exchange with the Gulf than is currently the case. Changes in salinities over the SNWW estuarine system were projected with the hydrodynamic salinity (HS) model (Brown and Stokes, 2009) described in sections 4.1 and 4.2 of the FEIS, where the modeling efforts included mitigation measures, relative sea level rise, and alternatives. The HS model determined that approximately 211,500 acres will be impacted by the slight increase in salinity in Texas and Louisiana. The average water surface elevation through most of the study area would largely be unaffected by the 48-foot channel. However, both the amplitude and average elevation of the tide on the upper Neches River near the saltwater barrier could exhibit a measurable increase, on the order of an average increase in water surface elevation of 0.8 inch.

(b) Water Chemistry

Aside from a temporary increase in local suspended solids, no impacts are expected (Section 4.4 of the FEIS describes water quality impacts).

(c) Clarity

There may be a local and temporary increase in turbidity during dredging and placement operations. BMPs such as temporary containment levees and spill boxes would be implemented where appropriate to control and reduce turbidity during dredging and discharges into confined PAs, BU features, and

mitigation areas during construction. Water clarity is expected to return to normal background levels shortly after operations are completed.

(d) Color

Water immediately surrounding the construction area may become discolored temporarily due to disturbance of the sediment. BMPs would be implemented to reduce and control turbidity.

(e) Odor

The new work material is not expected to be anoxic, so there should be no odors associated with dredging and placement.

(f) Taste

No detectable impacts in the estuarine environment.

(g) Dissolved Gas Levels

No dissolved gas levels except, perhaps, minor amounts of hydrogen sulfide are expected.

(h) Nutrients

Nutrient levels may be elevated near the PAs during discharge but these increases would be local and temporary.

(i) Eutrophication

Nutrients are not expected to reach levels high enough for periods long enough to lead to eutrophication of the surrounding waters.

(j) Others as Appropriate

None known.

(2) Current Patterns and Circulation

Components of the Preferred Alternative (e.g., shoreline nourishment, marsh nourishment, and restoration) were not shown to significantly affect currents or circulation patterns (sections 4.4 and 4.6 of the FEIS describe currents and flows).

(a) Current Patterns and Flow

The Preferred Alternative would not have an effect on freshwater inflows to the system. The 48-foot project would not change large-scale circulation estuarine patterns, but it would cause the leading edge of the salinity wedge to intrude farther upstream.

(b) Velocity

The channel deepening would result in general increases in velocity along the entire channel; however, magnitudes are relatively minor, with less than 0.5 foot/second in most cases (Parchure et al., 2005). The largest changes would occur in the Sabine-Neches Channel, but the absolute magnitude is small.

(c) Stratification

No increase in stratification would be expected with the Preferred Alternative. The SNWW navigation channels would remain highly stratified with channel deepening.

(d) Hydrologic Regime

Although the Preferred Alternative would increase tidal exchange and slightly increase salinity levels, hydrologic and tidal regimes would not be altered on a large scale.

(3) Normal Water Level Fluctuations

The average water surface elevation through most of the study area would largely be unaffected by the 48-foot channel, and no significant increase in tidal amplitude would be expected.

(4) Salinity Gradients

The Preferred Alternative would provide a deeper navigation channel that would allow a greater amount of tidal circulation and exchange with the Gulf than is currently the case. Changes in salinities over the SNWW estuarine system were projected with the HS model (Brown and Stokes, 2009) described in sections 4.1 and 4.2 of the FEIS, where the modeling efforts included mitigation measures, relative sea level rise, and alternatives. During median flows, the transition would shift to near Bessie Heights on the Neches River, to Keith Lake on the Sabine-Neches Canal, and Johnson's Bayou on Sabine Lake. During low flows, the transition would shift to near Rose City on the Neches River, the Sabine River near Orange, Texas, and Willow Bayou on Sabine Lake. The 48-foot project would cause the leading edge of the salinity wedge to intrude further upstream.

(5) Actions That Will Be Taken to Minimize Impacts

The following objectives were established to offset or minimize impacts from the SNWW CIP. The objectives were developed by USACE in consultation with the Interagency Coordination Team (ICT).

- Minimize salinity impacts to the SNWW affected area
- Maximize the use of dredged material in marsh restoration measures
- Meet goal of no net loss of wetlands
- Replace lost habitat quality on a 1:1 ratio
- Replace habitats in-kind to the extent practicable
- offset or minimize losses in the state where they occur

- Share dredged material from Sabine Pass equally between Louisiana and Texas

Ultimately, unavoidable impacts of the Preferred Alternative in Texas are more than offset by benefits of the DMMP (which includes BU features); impacts in Louisiana, however, required compensatory mitigation. Therefore, the mitigation plan consists of restoring five degraded marsh areas east of Sabine Lake near Willow and Black bayous, Louisiana. The plan would restore 2,783 acres of emergent marsh in existing open-water areas within the marsh, improve 957 acres of shallow-water habitat by creating shallower, smaller ponds and channels within the restored marsh, and stabilize and nourish 4,355 acres of existing marsh located in and around the marsh restoration zone. The amount of impacts avoidance, minimization, or mitigation is based upon the amount of marsh acreage that could be lost as a result of the project, and the additional amount that would need to be restored in order to fully compensate for adverse changes to biological function of the remaining marsh throughout the affected area over the 50-year period of analysis. Mitigation is fully described in Chapter 5 of the FEIS.

The Neches River BU Feature would offset or minimize impacts to Texas wetlands on the Sabine and Neches rivers by restoring 2,853 acres of emergent marsh, improve 871 acres of shallow-water habitat, and nourish 1,234 acres of existing marsh. The BU feature also offsets direct impacts from connecting 86 acres of freshwater marsh to a confined PA.

c. Suspended Particulate/Turbidity Determination

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

A temporary and localized increase in suspended particulates and turbidity levels is expected during dredging and placement operations of new work and maintenance material. BMPs would be implemented where appropriate.

(2) Effects on Chemical and Physical Properties of the Water Column

(a) Light Penetration

Turbidity levels would be temporarily increased during dredging and placement operations of new work and maintenance material.

(b) Dissolved Oxygen

No adverse impacts to dissolved oxygen (DO) are expected; a reduction in DO may occur at localized and temporary events during placement.

(c) Toxic metals and organics

Suspended particles resulting from placement would not result in detrimental effects to chemical and physical properties of the water column. Extensive chemical analyses, bioassays, and bioaccumulation studies of offshore sediment material were conducted in accordance with EPA Regulations and the *Ocean*

Testing Manual. Results indicate that there are no causes for concern related to chemical contaminants and that these sediments are suitable for ocean placement. Similar testing was performed numerous times on maintenance material dredged from the 22-mile existing SNWW Entrance Channel, and these sediments were always found to be acceptable for ocean placement. Section 4.5 of the FEIS discusses sediment testing results.

An examination of the sediment data presented in PBS&J (2004) and sediment data recently collected in March 2008 and April 2009 indicates no cause for concern, with the possible exception of elevated polycyclic aromatic hydrocarbons (PAHs) in one reach of the Neches River. There are nine sites listed in Table 3.3-1 in the FEIS that are considered to be priority Hazardous, Toxic, and Radioactive Waste (HTRW) sites, and there is a reach of the Neches River (stations 750 + 000 to 950 + 000, Figure 2.4-1g in the FEIS) that has higher sediment PAH concentrations than other reaches of the SNWW, but the location of the sites in Table 3.3-1 in the FEIS do not correlate to the higher-PAH reach of the Neches River. Additionally, none of those PAHs are found in the elutriate samples from the higher-PAH reach of the Neches River (Section 3.3 in the FEIS), so there is no indication that those PAHs would be released during dredging and/or placement. Taking all of this information into account, there appear to be no reaches of the SNWW that exhibit a cause for concern.

(d) Pathogens

None expected or found.

(e) Aesthetics

The PAs, BU features, and mitigation areas have been designed and selected with coordination between necessary and interested resource agencies to minimize environmental impacts and reduce or eliminate adverse aesthetic qualities.

(f) Others as Appropriate

None known.

(3) Effects on Biota

No impacts are expected on photosynthesis, suspension/filter feeders, and sight feeders, except for temporary and localized impacts from placement operations (e.g., burial of benthos or temporary increase of local turbidity levels).

Creating benefits for estuarine biota (species depend on estuaries at some time in their life cycle for protection, food, and as a nursery site), the Neches River BU Feature (comprised of Rose City East, Bessie Heights East, and Old River Cove West) would restore 2,853 acres of emergent marsh, nourish 1,234 acres of existing marsh, and improve 871 acres of shallow-water habitat. The Gulf Shore BU Feature (Texas and Louisiana Points) involve regular nourishment of approximately 6 miles of shoreline. Additionally, the mitigation plan consists of restoring five degraded marsh areas east of Sabine Lake near

Willow and Black bayous, Louisiana. This mitigation measure would restore 2,783 acres of emergent marsh in existing open-water areas within the marsh, improve 957 acres of shallow-water habitat by creating shallower, smaller ponds and channels within the restored marsh, and stabilize and nourish 4,355 acres of existing marsh located in and around the marsh restoration zone. Chapter 5 of the FEIS discusses mitigation for habitats.

(4) Actions Taken to Minimize Impacts

Construction and placement plans for the dredged materials have been closely coordinated with the resource agencies to assure minimal impacts to aquatic habitats. Additionally, a Wetland Value Assessment was performed for SNWW CIP impacts to ensure proper mitigation or replacement of estuarine vegetation communities. Dredged material has been used beneficially to the maximum extent possible, resulting in the offsetting of all project impacts in Texas, and offsetting of some impacts in Louisiana. In addition, new upland PAs were sited to avoid impacts to wetlands to the greatest extent possible. BMPs would include construction of temporary containment levees/spill boxes for restoration sites and could include silt curtains during discharges in BU features.

d. Contaminant Determinations

The USACE has collected and archived a significant amount of water and sediment chemistry data as well as elutriate data that provide information on those constituents that are dissolved into the water column during dredging and placement. The water and elutriate study results are summarized by channel station in Section 3.3.1 of the FEIS. Based on available data, there is no indication of current water or elutriate contaminant problems along the SNWW. In consideration of Louisiana Department of Environmental Quality (LDEQ) requirements, Sabine Pass sediment was compared to Louisiana's RECAP non-industrial Screening Standards. All detected analytes were below the lowest value for the respective standard. PBS&J also compared water and elutriate results to the Louisiana Surface Water Quality Standard (LWQS), and found no exceedances.

An examination of the sediment data presented in PBS&J (2004), and sediment data recently collected in March 2008 and April 2009, indicates no cause for concern, with the possible exception of elevated PAHs in one reach of the Neches River. There are nine sites listed in Table 3.3-1 in the FEIS that are considered to be priority HTRW sites, and there is a reach of the Neches River (stations 750 + 000 to 950 + 000, Figure 2.4-1g in the FEIS) that has higher sediment PAH concentrations than other reaches of the SNWW, but the location of the sites in Table 3.3-1 in the FEIS do not correlate to the higher-PAH reach of the Neches River. Additionally, none of those PAHs are found in the elutriate samples from the higher-PAH reach of the Neches River (Section 3.3 in the FEIS), so there is no indication that those PAHs would be released during dredging and/or placement. Taking all of this information into account, there appear to be no reaches of the SNWW that exhibit a cause for concern.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

Construction and placement operations are expected to have only minor temporary, local impacts on plankton from increased turbidity levels.

(2) Effects on Benthos

Temporary and localized impacts to benthic organisms and their Gulf, estuarine, and riverine water-bottom habitats would occur; however, benthic organisms are expected to quickly rebound from the short-term impacts from marsh restoration and shoreline nourishment.

(3) Effects on Nekton

Wright (1978) indicates that nekton is not directly affected by dredged material placement for marsh restoration in shallow, open-water areas and shoreline nourishment since they can avoid areas of high turbidity. The benthos within BU features, which would have been used as a food source, may be temporarily and detrimentally affected, but the restored marshes would ultimately improve habitat for benthic organisms. The elutriate analyses and bioassessments with undisturbed virgin sediment yielded no expectation of short-term water column or benthic toxicity from dredging or placement operations, except from increased turbidity. Therefore, no significant impacts to the nekton of the area from the proposed dredging and placement operations are expected.

(4) Effects on Aquatic Food Web

The estuarine and Gulf food web would benefit from greater productivity associated with marsh restoration in shallow, open-water areas and shoreline nourishment. Reductions in primary productivity from turbidity would be localized around the immediate area of the construction and maintenance dredge operations and would be limited to the duration of the plume at a given site.

(5) Effects on Special Aquatic Sites

The Preferred Alternative is not expected to have detrimental effects on special aquatic sites (i.e., sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes) in the study area. The Neches River BU Feature would offset impacts to Texas wetlands on the Sabine and Neches rivers by restoring 2,853 acres of emergent marsh, improving 871 acres of shallow-water habitat, and nourishing 1,234 acres of existing marsh. The BU feature also offsets direct impacts from connecting 86 acres of freshwater marsh to a confined PA. In addition, new upland PAs were sited to avoid impacts to wetlands to the greatest extent possible.

The mitigation plan consists of restoring five degraded marsh areas east of Sabine Lake near Willow and Black bayous, Louisiana. The plan would restore 2,783 acres of emergent marsh in existing open-water areas within the marsh, improve 957 acres of shallow-water habitat by creating shallower, smaller ponds and channels within the restored marsh, and stabilize and nourish 4,355 acres of existing marsh located in

and around the marsh restoration zone. The amount of recommended mitigation is based upon the amount of marsh acreage that could be lost as a result of the project, and the additional amount that would need to be restored in order to fully compensate for adverse changes to biological function of the remaining marsh throughout the affected area over the 50-year period of analysis. Chapter 5 of the FEIS discusses mitigation for estuarine habitats.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Preferred Alternative PAs would not require mixing zones as they include levees and dewatering designs. Mixing zones would occur during marsh restoration or shoreline nourishment; however, testing of elutriates prepared with maintenance material has not demonstrated contaminants or other causes for concern.

(2) Determination of Compliance with Applicable Water Quality Standards

Sediment analyses of new work material have been performed, and testing of elutriates prepared with maintenance material has not demonstrated any violation of applicable water quality standards. The State of Texas has issued a water quality certificate for current maintenance dredging of the SNWW, indicating that water quality standards are being met.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply

The proposed project would not impact any municipal or private water supplies. On the Neches River, water intakes are located upstream of the Neches River Saltwater Barrier; on the Sabine River, water intakes are located well upstream of the projected saltwater intrusion.

(b) Recreational and Commercial Fisheries

Recreational and commercial fishing in Sabine Pass areas and the immediate Gulf may benefit as a result of the marsh restoration efforts, which would increase estuarine habitats that are critical to the marine food web.

(c) Water-related Recreation

The project would improve navigation, which may improve water-related recreation.

(d) Aesthetics

The project is designed to minimize any adverse impacts to the environment and aesthetic qualities in the area.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

No special sites would be negatively impacted by the project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

The project is expected to result in net benefits to the environment without adding to negative cumulative impacts in the aquatic ecosystem. A Wetland Value Assessment was performed to ensure adequate replacement of wetlands and ecological functions.

h. Determination of Secondary Effects on the Aquatic Ecosystem

No adverse significant secondary effects on the aquatic ecosystem should occur as a result of the recommended project, but secondary beneficial effects are expected from marsh restoration and shoreline nourishment efforts.

Literature Cited

Brown, G.L., and J. Stokes. 2009. Numerical Model Study of Potential Salinity Impacts Due to Proposed Navigation Improvements to the Sabine-Neches Waterway, Texas (August 2009 draft report). U.S. Army Engineer Research Development Center – Coastal and Hydraulics Laboratory (ERDC-CHL), Vicksburg, Mississippi.

Parchure, T.M., S. Maynord, and S. Sarruff. 2005. Desktop Study for Sediment-Related Problems at Sabine-Neches Project. U.S. Army Corps of Engineers, Engineer Research and Development Center, Coastal Hydraulics Laboratory, Vicksburg, Mississippi.

PBS&J. 2004. Sabine-Neches Waterway Entrance Channel 2004 Contaminant Assessment. Document No. 040338. Austin, Texas.

U.S. Army Corps of Engineers (USACE). 1982. Sabine-Neches Waterway, Texas: feasibility report and environmental impact statement for channel improvements for navigation. U.S. Army Engineer District, Galveston, Texas.

Wright, T.C. 1978. Aquatic dredged material disposal impacts. U.S. Army Eng. Water Experiment Station Environmental Laboratory, Vicksburg, Mississippi, Technical Report DS-78-1.

FINDINGS OF COMPLIANCE WITH
SECTION 404(b)(1) GUIDELINES
FOR SABINE–NECHES WATERWAY – CHANNEL IMPROVEMENT PROJECT
JEFFERSON AND ORANGE COUNTIES, TEXAS

1. No significant adaptations of the Guidelines were made relative to the evaluation for this project.

2. The recommended plan is the result of thorough evaluation of seven proposed alternatives (including the No-Action Alternative).

3. The recommended plan would not violate any applicable State or Federal water quality criteria or toxic effluent standards of Section 307 of the Clean Water Act.

4. The recommended plan would not adversely affect any federally or State-listed threatened or endangered species or their critical habitat or violate any protective measures for any sanctuary. Various resource agencies, including FWS and NMFS, have been consulted regarding potential issues of any federally or State-listed threatened or endangered species or their critical habitat (e.g., sea turtle avoidance measures would be implemented during operations).

5. The recommended plan would not result in adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The PAs, BU features, and mitigation sites would provide additional habitat for life stages of marine species and additional habitat for colonial waterbirds. There are no significant adverse impacts expected to the estuarine ecosystem diversity, productivity and stability, or recreational, aesthetic, and economic values.

6. Appropriate steps to minimize potential adverse impacts on the estuarine system include close coordination with State and Federal resource agencies during final design prior to construction to incorporate all valid suggestions. Special aquatic sites or sensitive habitat affected by channel deepening and expansion would be mitigated.

7. Based on the guidelines, the preferred alternative is specified as complying with the requirements of the Section 404(b)(1) guidelines.

Dolan Dunn — 4/29/10

Mr. Dolan Dunn
Chief–Planning, Environmental, and Regulatory Division
U.S. Army Corps of Engineers, Galveston District

Date