APPENDIX G

CLEAN WATER ACT SECTION 404(B)(1) EVALUATION
BRAZOS ISLAND HARBOR
CHANNEL IMPROVEMENT PROJECT
CAMERON COUNTY, TEXAS

U.S. Army Corps of Engineers, Galveston District
2000 Fort Point Road
Galveston, Texas 77550

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I. Project Description

a. Location

The Brazos Island Harbor (BIH) project is an existing deep-draft navigation project located on the south Texas coast near the border with Mexico (Figure 1). The channel uses the natural Brazos-Santiago Pass to connect the Gulf of Mexico with the Main Channel (the inland portion of the BIH). The Port of Brownsville is located at the western end of the Main Channel and includes a man-made basin located three miles north of the Rio Grande River and five miles east of the City of Brownsville. The BIH provides for 42-foot mean lower low water (MLLW) depth on the inland portion of the channel and a 44-foot MLLW depth in the offshore Entrance and Jetty Channels. The BIH is essentially a straight waterway with no bridges or other obstructions for the entire 19.4-mile length of the waterway and is operated for one-way traffic only. The existing waterway consists of the Entrance Channel (1.3 miles), Jetty Channel (1.1 miles), Main Channel (15.1 miles), Turning Basin Extension (1.3 miles) and Turning Basin (0.6 mile).

The study area is located entirely within Cameron County, Texas, and encompasses the entire BIH and surrounding region. The area is located in the Lower Rio Grande Valley (LRGV) and encompasses approximately 103,250 acres (160 square miles), extending 3 miles north, south, and west of the BIH and continuing 5 miles offshore into the Gulf of Mexico. The study area also is extended for 10 miles along both sides of Brazos-Santiago Pass for the purpose of evaluating potential shoreline impacts from deepening and extending the Entrance Channel.

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 U.S. Army Corps of Engineers (USACE) prepared a draft Integrated Feasibility Report and Environmental Assessment (DIFR-EA) which identifies a Tentatively Selected Plan (TSP) to deepen the existing channel from an authorized depth of 42-feet to a new depth of 52 feet and evaluates the potential impacts of this plan on the environment. The improvements would extend the BIH Entrance Channel to a depth of -54 feet MLLW at a width of 300 feet, deepen the existing BIH Entrance Channel to -54 feet MLLW at an existing width of 300 feet, and deepen the existing BIH Jetty Channel to -54 feet MLLW at an existing width of 300 feet. The TSP would also deepen the Main Channel to a depth of -52 feet MLLW at existing widths ranging from 250 to 400 feet, maintain the existing depth of -42 feet MLLW and width of 325 feet from station 84+200 to 86+000, and maintain the existing depth of -36 feet MLLW and widths

ranging from 325 to 1200 feet from station 86+000 through the end of the turning basin at station 89+500. No channel widening is proposed and channel side slopes would remain the same as the existing project – one foot vertical over six feet horizontal in the Entrance and Jetty Channels; one foot vertical over three feet horizontal from station 0+000 to 35+000 and one foot vertical over two and one-half feet horizontal from station 35+000 through 89+500 in the Main Channel. The actual dredging depth would be up to 4 feet deeper in the Entrance and Jetty Channels due to 2 feet of advance maintenance (AM) and 2 feet of allowable overdepth (AO), and up to 3 feet deeper in the Main Channel due to 2 feet of AM and 1 foot of AO. No improvements are proposed for the existing jetties. If the project is authorized, the three-year construction period could begin in fiscal year 2018.

Construction of the proposed project would generate approximately 14.1 million cubic yards (mcy) of dredged material. Maintenance of the deepened channel would generate a total of 61.7 mcy of maintenance-dredged material over the 50-year period of analysis. Material dredged from the Entrance and Jetty channels during construction would be placed in the new work Ocean Dredged Material Disposal Site (ODMDS), and the remainder of the new work material would be placed in existing, upland, confined dredged material placement areas (PAs) 2, 4B, 5A, 5B, 7, and 8. Maintenance dredging would generally be conducted by hopper and cutterhead dredges, with material being distributed among a nearshore Feeder Berm or the existing Maintenance ODMDS, and upland, confined PAs 4A, 4B, 5A, 5B, 7, and 8. Maintenance dredging would utilize the same placement areas as those utilized for the existing project, and the duration and frequency of dredging events would be within the range occurring under current conditions. Dredging of the Entrance and Jetty Channels and the first 11,000 feet of the Main Channel (+11+000 to -17+000) would generally be performed by a hopper dredge, and material would be placed in the nearshore Feeder Berm Site 1A, located between 1.5 and 2.5 miles from the North Jetty and from 0.4 to 0.9 miles from shore. Sediment removed by maintenance dredging would therefore be regularly placed back into the littoral system, available for cross shore and longshore sediment transport.

The TSP avoids impacts to natural and cultural resources to the greatest degree possible. No significant adverse impacts to natural and cultural resources, with the potential exception of threatened and endangered sea turtles, have been identified and no mitigation is required. Section 7 consultation with National Marine Fisheries Service (NMFS) has been initiated, and it is anticipated that reasonable and prudent conservation measures will be identified to minimize potential impacts to sea turtles. Opportunities for beneficial use of dredged material were thoroughly evaluated. As a result, maintenance material from the Entrance and Jetty Channels, and the first 11,000 feet of the Main Channel will be routinely placed in the nearshore Feeder Berm, maximizing the return of beneficial sediments to the long shore current north of the jetties. The TSP is also the environmentally preferable alternative because it is the most efficient alternative in terms of minimizing damages to the biological and physical environment while providing the maximum economic benefit for the general welfare of the Nation.

c. Authority and Purpose

The Congress authorized the U.S. Army Corps of Engineers (USACE) to conduct a study of BIH, Texas to determine whether the project should be modified in any way, particularly with a view to widening and deepening the existing channels, pursuant to a resolution of the Committee on Public Works, U.S. House of Representatives dated May 5, 1966. The Feasibility Cost Sharing Agreement for the feasibility study was signed on June 28, 2006, with the Brownsville Navigation District (BND) acting as the financial representative for the Port of Brownsville.

The Water Resources Development Act (WRDA) of 1986 (Public Law 99-662) dated November 17, 1986, Section 105 established cost share requirements for this study. Additional legislation was passed in the Fiscal Year (FY) 2003 Omnibus Appropriations Bill, stating that any work performed by the BND as part of the restoration of wetlands in Bahia Grande will be used as credit towards the mitigation requirements of the BIH deepening project.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

Located in West Gulf Coastal Plain physiographic province, the study area topography developed from sediments deposited in a mostly marine environment and later uplifted and tilted toward the Gulf (Texas Water Development Board [TWDB], 1990). Surface soils are comprised of sand, silt, mud and clay deposits of Holocene and recent ages deposited by alluvial, eolian and marine processes (Brown et al., 1980; Page et al., 2005). In the area around Port Isabel and the barrier islands, landforms include beach ridges, tidal channels, tidal deltas, washover fans, sand and clay dunes, wind-tidal flats and marine-plain flats. Extending inland from the marine plain through the western edge of the study area are floodplain deposits of mud, silt and sand. Beneath the surface deposits lie the Beaumont Formation, a massive and complex alluvial deposit of clay, silt, sand and gravel deposited during the Pleistocene. Offshore, the Beaumont Formation lies beneath a thin mantle of sand and extends as far as the continental shelf, with thicknesses ranging from 450 to 900 feet.

Galveston District dredging records indicate that the average particle size in the offshore channel is 68 percent sand, 21 percent silt and 10 percent clay; in the Brownsville Main Channel, average particle size is 25.9 percent sand, 35.6 percent silt and 38.5 percent clay. A review of core borings of the sediments to be dredged for construction of the TSP confirmed that BIH new work sediments would be overwhelmingly consolidated clay (USACE, 1990; TWE, 2010).

(2) Quantity of Material

Construction of the TSP would generate 14.1 million cubic yard (mcy) of new work material. The term "new work" refers to the material below the existing navigation channel template, which is needed to be removed in order to increase to the new project depth. Maintenance dredging of the TSP is expected to consist of 61.7 mcy of shoaled material over the 50-year period of analysis.

Table 1 – BIH Dredging Quantities			
Channel Stations		Channel Name	Dredge Quantity in Cubic Yards (cy)
New Work Dredging			
-17+000	0+000	Entrance and Jetty Channels	2,066,000
0+000	89+500	Main Channel through Turning Basin	12,027,000
		Total	14,093,000
Maintenance Dredging (50-year total)			
-17+000	0+000	Entrance and Jetty Channels	23,298,000
0+000	89+500	Main Channel through Turning Basin	38,376,000
		Total	61,674,000

(2) Source of Material

The source of material routinely dredged in the Entrance and Jetty Channels is the Gulf of Mexico. Redistributed Gulf of Mexico sediments settle in the channel as a result of migration by wind and wave actions. The source of material routinely dredged in the Main Channel is surface sediments from the adjacent uplands. Sediments are primarily blown or carried by sheet flow into the channel, and near the eastern end of the Main Channel, stream flow carries small amounts of sediment into the channel. All but the far western end of the lands adjacent to the channel are either in their natural state or are upland, confined placement areas. At the western end, docks and industries line the channel.

e. Description of the Proposed Discharge Sites

(1) Location

Ten placement areas (PAs) would be used to manage the CIP's new work and maintenance material over a 50-year period (seven upland, confined PAs, two Ocean Dredged Material Sites [ODMDS], and one nearshore Feeder Berm) (Figure 1). All are existing sites; none would need to be expanded and no new

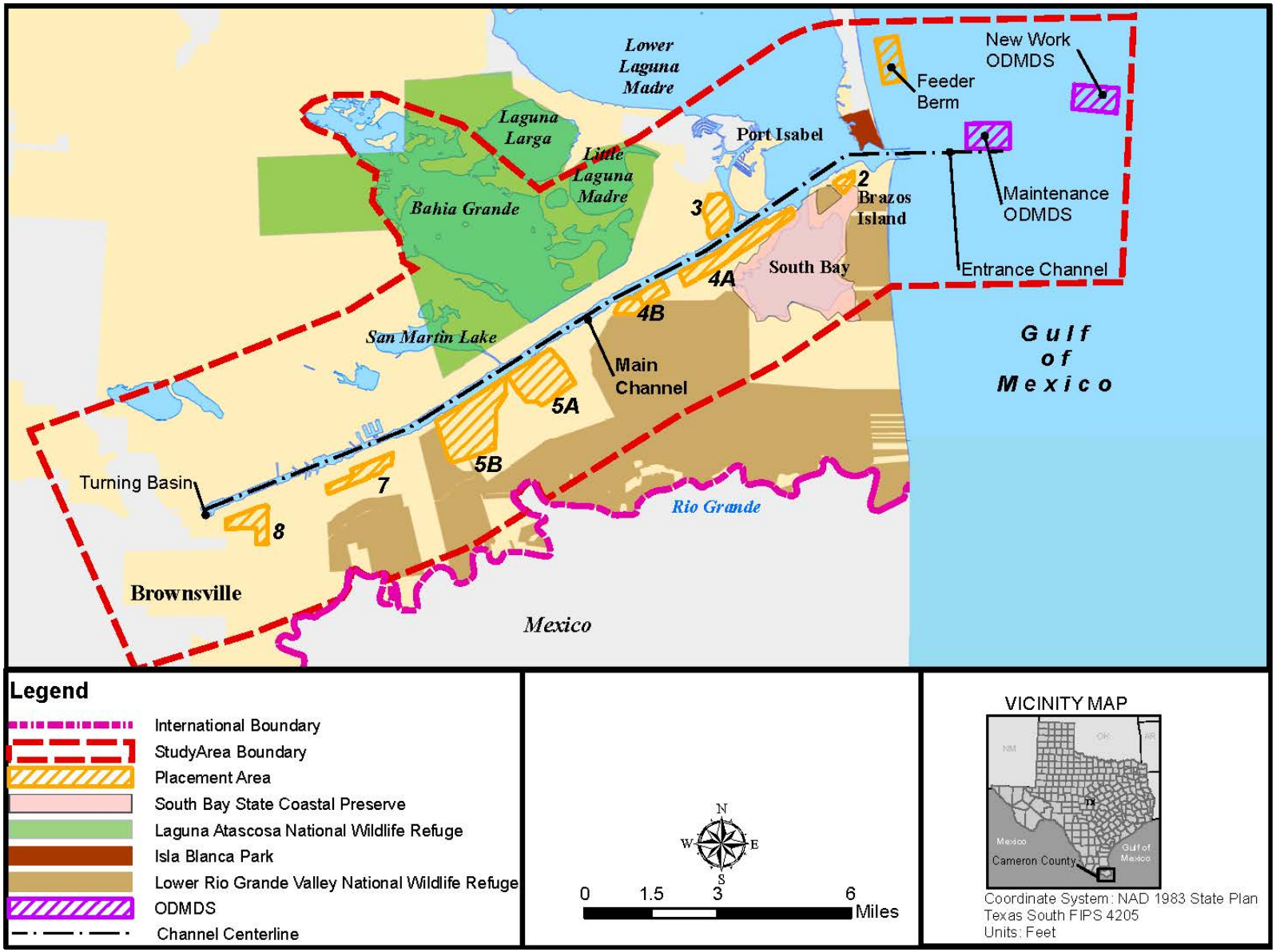

Figure 1 – Map of the Tentatively Selected Plan

PAs would be needed. All of the upland PAs are located along the Main Channel. They are confined with water discharged from the sites via controlled spillways to existing outfall canals and drainage ditches. The ODMDSs and Feeder Berm sites are unconfined and have unlimited capacities as they are located in dispersive environments. The New Work and Maintenance ODMDS are located an average of 4.4 and 1.9 miles from the Gulf shoreline, respectively, and the Feeder Berm is located from 0.4 to 0.9 mile from the shoreline of South Padre Island.

New work material volumes by reach and proposed PAs (the new work plan) are presented in Table 2. New work material from the Main Channel (stations 0+000 through 84+200) would be pumped from the dredges through a combination of fully submerged and floating hydraulic pipelines into existing upland confined PAs managed by the BND (PAs 2, 4B, 5A, 5B, 7 and 8). New work from the Entrance and Jetty Channels (station -17+000 to 0+000) would be placed by hopper dredge into the unconfined New Work ODMDS.

Table 2: BIH New Work Discharge Locations

Channel Stations		Placement Area (PA)	PA Size (acres)	Deepening Dredge Quantity in Cubic Yards (CY)
-17+000	0+000	New Work ODMDS	350	2,066,000
0+000	7+000	2	71	937,000
7+000	25+000	4B	243	2,689,000
25+000	50+000	5A	704	3,612,000
50+000	70+000	5B	1020	2,599,000
70+000	82+000	7	257	1,804,000
82+000	89+500	8	288	386,000

Maintenance dredging would generally be conducted by hopper and cutterhead dredges, with material being distributed among a nearshore Feeder Berm or the existing Maintenance ODMDS, and upland, confined PAs as shown in Table 3. Maintenance dredging would utilize the same placement areas as those utilized for existing conditions, and the duration and frequency of dredging events would be within the range occurring under current conditions. Dredging of the Entrance and Jetty Channels and the first 11,000 feet of the Main Channel (+11+000 to -17+000) would generally be performed by a hopper dredge, and material suitable for beach placement would be placed in the nearshore Feeder Berm Site 1A, located between 1.5 and 2.5 miles from the North Jetty and from 0.4 to 0.9 miles from shore (USACE, 1988). Sediment removed by maintenance dredging would therefore be regularly placed back into the littoral system, available for cross shore and longshore sediment transport to the beaches of South Padre

Table 3: BIH Maintenance Discharge Locations and Frequency								
Channel Stations		Shoaling Rate in Cubic Yards/Year (CY/YR)	PA	PA size (acres)	Dredge Cycle (years)	Number of Cycles in 50 years	Quantity per Cycle (CY/Cycle)	Total O&M Quantity in 50 years (CY)
-17+000	0+000	470,630	Nearshore Feeder Berm Site 1A	320	1.5	33	706,000	23,298,000
0+000	11+000	161,595			4.5	11	727,000	7,997,000
11+000	28+000	183,995	4A	469	4	12	736,000	8,832,000
28+000	34+000	43,047	4B	243	4	12	172,000	2,064,000
34+000	50+000	123,527	5A	704	4	12	494,000	5,928,000
50+000	65+000	143,577	5B	1020	5	10	718,000	7,180,000
65+000	79+000	98,637	7	257	6	8	586,000	4,688,000
79+000	89+500	30,377	8	288	7	7	241,000	1,687,000
							Total CY	61,674,000

Island. Monitoring of material placed at the Feeder Berm has demonstrated that it moves toward the beach and disperses with the major movement being in the alongshore direction (McLellan et al. 1997; USACE, 1989). If for some reason the Feeder Berm cannot be used, maintenance material from the Entrance and Jetty Channels (station -17+000 to 0+000) could be placed in the Maintenance ODMDS, which is located approximately 2.5 nautical miles from shore and north of the channel (USACE, 1975).

Maintenance material from the remainder of the Main Channel (stations 11+000 through 89+500) would be placed in existing PAs 4A, 4B, 5A, 5B, 7 and 8. Upland PAs and containment dikes are sized to accommodate total quantities over the 50-year period of analysis. None of the existing PAs would need to be expanded and no new PAs would be needed. Construction to raise the containment dikes to heights needed to accommodate the 50-year maintenance quantities would be done within the footprints of the existing PAs. Dikes would be raised incrementally as needed to contain maintenance quantities.

(2) Size

Sizes of all of the PAs, ODMDSs and Feeder Berm are shown in Tables 2 and 3.

(3) Type(s) of Sites and Habitats

The proposed project would utilize three types of sites – upland, confined PAs, a nearshore Feeder Berm, and ODMDS. The upland, confined PAs contain temporary, low quality habitats for small mammals, birds and insects between dredging cycles. These habitats are dependent upon a disturbance regime created by recurrent dredged material placement. Vegetation within the PAs consists of scattered grasses, cactus, and shrubs. Grasses include Gulf cordgrass (*Spartina spartinae*), silver bluestem *(Bothriochloa saccharoides),* curly mesquite *(Hilaria belangeri)* and the introduced species, guinea grass (*Urochloa maxima*). Salt cedar *(Tamarix ramosissima),* giant sumpweed (*Cyclachaena xanthifolia*), mesquite (*Prosopis glandulosa),* and prickly pear cactus (*Opuntia engelmannii)* are typical tree and shrub species found in the PAs. The PAs are not considered high quality wildlife habitat due to recurring disturbance and lack of established native vegetation. The sparse vegetation in the PAs consists mainly of opportunistic species that thrive on disturbed soils and do not contribute significantly as food or detritus sources or scrub habitat. The Feeder Berm is located in an area of open Gulf of Mexico habitat, a flat featureless slightly sloping seabed with surficial sandy sediment.

(4) Time and Duration of Discharge

Seven construction contracts are planned for dredging and discharging new work material (Table 4). Contract 1 would be constructed with a hopper dredge and contracts 2-7 with hydraulic pipeline dredges. The dredging contracts would be accomplished over a period of about 3.5 years, with most contracts occurring concurrently with at least one other contract. The proposed sequence for dredge and construction is shown in the following table. Construction would begin after the project is authorized by the U.S. Congress. The frequency of maintenance dredging contracts is shown in Table 3.

f. Description of Disposal Method

The construction and maintenance activities would utilize traditional 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 the offshore ODMDS. Disposal of the maintenance material would be by hopper dredge into the Feeder Berm or Maintenance ODMDS, and by hydraulic pipeline dredges into upland PAs. Best Management Practices (BMPs), such as silt curtains, may be implemented where appropriate to control and reduce turbidity during dredging and placement.

Table 4: Timing and Duration of New Work Discharges			
Contract	Description	PAs	Duration (months)
1	Hopper Dredging Entrance & Jetty Channel (Stations -17+000 to 0+000)	New Work ODMDS	7
2	Dike Construction at PAs 4B and 5A	N/A	15
3	Dike Construction at PAs 8 and 7, and Cutterhead Pipeline Dredging of adjacent section of Main Channel	7 & 8	13
4	Cutterhead Pipeline Dredging of adjacent section of Main Channel	5A	16
5	Dike Construction at PA 2, and Cutterhead Pipeline Dredging of adjacent section of Main Channel	2	6
6	Cutterhead Pipeline Dredging of adjacent section of Main Channel	4B	11
7	Dike Construction at PA 5B, and Cutterhead Pipeline Dredging of adjacent section of Main Channel	5B	12

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

The nearshore feeder berm is located between the 19 and 30 foot contours with a gradual slope (less than 1°). The substrate is generally bathymetrically featureless.

(2) Sediment Type

Sediments at the Feeder Berm are sands similar in characteristics to maintenance material to be excavated from the BIH Entrance Channel.

(3) Dredged/Fill Material Movement

Monitoring of material placed at the Feeder Berm has demonstrated that it moves toward the beach and disperses with the major movement being in the alongshore direction (Aidala et al., 1992; McLellan et al., 1997; USACE, 1989). The longshore drift in this area generally flows from south to north, and thus most of the material would move toward the shore and to the north of the Berm location. Temporary mounding

of approximately 6 feet would occur as the material is being discharged, but the material would be quickly redistributed into the surf zone by the littoral current and wave action. Upland PAs would have containment levees to control fill movement after deposition; minor amounts of suspended solids may occur during construction.

(4) Physical Effects on Benthos

Temporary and localized impacts to benthic organisms and their Gulf water-bottom habitats would occur; however, benthic organisms are expected to quickly rebound from the short-term impacts of dredged material placement. At the upland, confined PAs, BMPs would be used where appropriate to contain and control sediment and dredged material movement.

(5) Other Effects

None known.

(6) Actions Taken to Minimize Impacts

Impacts to the physical substrate from discharge of dredged material were minimized by confining them to an existing nearshore Feeder Berm and existing upland, confined PAs.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

Increases in turbidity would occur at dredging locations during construction and maintenance dredging. Temporary increases in turbidity would also occur in the vicinity of the Feeder Berm when dredge material is placed at those locations. Temporary changes in turbidity have not been modeled however they are not expected to significantly impact water quality. The BIH Main Channel is a dead-end channel with low tidal exchange, little fresh water inflow and low velocities, all of which contribute to low dissolved oxygen in some areas at some times during the existing condition. This would be expected to continue. Analyses of water, sediment, and elutriate samples, combined with toxicity and bioaccumulation tests on sediments and suspended sediments, indicate no unacceptable negative impacts can be expected to water quality or sensitive marine organisms during dredging or dredged material placement (SOL and Atkins, 2013).

(a) Salinity. Deepening the Entrance and Jetty Channels at Brazos-Santiago Pass would only minimally increase water exchange between the Gulf of Mexico, South Bay, and the Lower Laguna Madre (Tate and Ross 2012). Recent data show southern portions of the formerly hypersaline Lower Laguna Madre now have salinities approximating those of the Gulf of Mexico (Basin and Bay Expert Science Team, 2012).

Hydrodynamic modeling has determined that no effect on tidal range in the Laguna Madre was discernible. However, the minor increase in circulation in those southern portions of the Lower Laguna Madre may slightly extend periods when salinities are similar to those of the Gulf of Mexico.

(b) Water Chemistry. There are no indications of water or elutriate problems, no impacts are expected.

(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 at the upland, confined PAs to control and reduce turbidity during dredging and discharges. 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 as described above 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, nor are any expected from Feeder Berm placement. Negligible amounts of hydrogen sulfide may be expected. There should be no change in the maintenance material.

(f) Taste. No impacts are expected.

(g) Dissolved Gas Levels. Areas of low dissolve oxygen occur in the Main Channel under existing conditions. No change is expected with construction of the TSP.

(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

(a) Current Patterns and Flow. The TSP would not have an effect on freshwater inflows to the system. Negligible differences in water surface elevations would occur with construction of the TSP (Tate and Ross, 2012). No effect on tidal range in the Laguna Madre would be discernible. Placement at the Feeder Berm would not block or significantly effect longshore drift or currents. Salinity intrusion is not an issue because overall salinities are already high in this dead-end man-made channel and there is little vertical stratification.

(b) Velocity. Hydrodynamic modeling has determined that the deepening would result is a small change in phasing of flows and in the peak velocity magnitudes in the Main Channel, but velocities are quite low and therefore the increased velocity results in a negligible effect.

(c) Stratification. The Main Channel is well-mixed with little evidence of stratification. No change in this condition is expected with channel deepening (Tate and Ross, 2012).

(d) Hydrologic Regime. Hydrologic and tidal regimes would not be significantly altered (Tate and Ross, 2012).

(3) Normal Water Level Fluctuations

The average water surface elevation throughout the study area would largely be unaffected by the TSP.

(4) Salinity Gradients

Salinity intrusion is not an issue because overall salinities are already high in this dead-end man-made channel and there is little vertical stratification.

(5) Actions That Will Be Taken to Minimize Impacts

Changes in channel depth and width were minimized to the greatest extent possible, such that TSP impacts to water circulation, fluctuation, and salinity would be negligible.

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 placement of maintenance material at the Feeder Berm. BMPs would be implemented at upland, confined PAs to minimize suspended particulates and turbidity levels near effluent discharge sites. The upland confined placement area will be designed and operated with the goal of achieving an effluent TSS concentration of not more than 300 mg/L.

(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* (SOL and Atkins, 2012; SOL and Atkins, 2013) 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 existing BIH Channel, and these sediments were always found to be acceptable for ocean placement.

(d) Pathogens. None expected or found.

(e) Aesthetics. No new upland, confined PAs would be constructed, and the Feeder Berm is located in open Gulf waters.

(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).

(4) Actions Taken to Minimize Impacts

Changes in channel depth and width were minimized to the greatest extent possible, such that TSP impacts to suspended particulates and turbidity levels would be negligible.

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. Based on available data, there is no indication of current water or elutriate contaminant problems along the BIH Channel.

Extensive chemical analyses, bioassays, and bioaccumulation studies of offshore sediment material were conducted in accordance with EPA Regulations and the *Ocean Testing Manual* (SOL and Atkins, 2012; SOL and Atkins, 2013) Results indicate that there are no causes for concern related to chemical contaminants and that these sediments are suitable for ocean placement.

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 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

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

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 TSP is not expected to have detrimental effects on special aquatic sites in the study area (i.e., sanctuaries and refuges, wetlands, mudflats, vegetated shallows). There are no coral reefs or riffle and pool complexes in the study area.

(6) Threatened and Endangered Species

Potential TSP effects on threatened and endangered species have been assessed and coordinated with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). The Biological Assessment is provided in Appendix I of the DIFR-EA.

For the species under the jurisdiction of NMFS, USACE has concluded that hopper dredging to construct the proposed project is likely to adversely affect federally-listed endangered swimming Kemp's ridley and hawksbill sea turtles, and the threatened swimming green and loggerhead sea turtles. USACE has also concluded that the project may affect, but is not likely to adversely affect the endangered swimming leatherback sea turtle. The TSP would have no effect on the listed blue whale, finback whale, humpback

whale, sei whale, or sperm whale, or on the following Candidate species and Species of Concern - scalloped hammerhead shark, boulder star coral (subspecies *annularis* and *franksi*), elliptical star coral, Lamarck's sheet coral, mountainous star coral, pillar coral, rough cactus coral, dusky shark, sand tiger shark, opossum pipefish, warsaw grouper and speckled hind (USACE 2013; USFWS 2013).

For the species under the jurisdiction of USFWS, USACE has concluded that the TSP would have no effect on threatened or endangered nesting sea turtles, South Texas ambrosia, Texas ayenia or piping plover critical habitat. USACE has determined that the TSP may effect but is not likely to adversely affect the federally-listed piping plover, Northern Aplomado falcon, Gulf Coast jaguarundi, ocelot, and West Indian manatee. The BIH TSP will also have no effect on Candidate bird species potentially present in the study area - the red knot, red-crowned parrot, Sprague's pipit.

(7) Other Wildlife

No significant TSP impacts to other wildlife species are anticipated.

(8) Actions to Minimize Impacts

USACE has requested formal Section 7 consultation with NMFS regarding potential TSP impacts to threatened and endangered swimming sea turtles, and will apply reasonable and prudent conservation measures to minimize impacts to these species. In addition, the USACE will implement USFWS conservation recommendations to minimize impacts to the piping plover, Northern Aplomado falcon, Gulf Coast jaguarundi, ocelot, and West Indian manatee. These conservation measures are described in section 7.4 of the DIFR-EA.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Mixing is not required due to the lack of contaminated sediments that would be associated with construction of the TSP. At the Feeder Berm, widespread dispersion by the longshore littoral current w spread the dredged material naturally over a large area of substrate.

(2) Determination of Compliance with Applicable Water Quality Standards

In the No Action Alternative (FWOP condition) condition, water and sediment quality are not expected to substantially change in the BIH channel, its surrounding waters, and the near-shore Gulf of Mexico. The Gulf of Mexico should continue to dominate water quality in the study area. TCEQ water quality standards should continue to be met in South Bay, the Lower Laguna Madre, and the near-shore Gulf of Mexico. Episodes of low dissolved oxygen and occasional elevated levels of *Enterococcus* bacteria in the BSC, believed to result from nonpoint source pollution, would probably continue to occur (TCEQ, 2011). Three decades of water and chemistry data from the BIH have documented no concerns with

contaminated sediments in the project area. Information describing in the results of water, sediment, and elutriate water testing under current conditions are available upon request.

For the future with project alternative, no violation of water quality standards is anticipated. Sediment analyses of material that would be dredged in the Entrance and Jetty Channels, and testing of elutriates prepared with shoaled material from the Main Channel have been performed, and neither have demonstrated any violation of applicable water quality standards. Material that would be dredged with TSP deepening is expected to be overwhelmingly impervious clay sediment. Analyses of recent water, sediment, and elutriate samples, combined with toxicity and bioaccumulation tests on sediments and suspended sediments, indicate no unacceptable negative impacts can be expected to water quality or sensitive marine organisms during dredging or dredged material placement (SOL and Atkins, 2012; SOL and Atkins, 2013).

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply. The TSP would not impact any municipal or private water supplies.

(b) Recreational and Commercial Fisheries. No impacts to recreational and commercial fishing in the lower Laguna Madre and the immediate Gulf are anticipated as there are no expected impacts 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 TSP is expected to have negligible impacts to the environment and therefore would not add to negative cumulative impacts in the aquatic ecosystem.

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 TSP.

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FINDINGS OF COMPLIANCE WITH
SECTION 404(b)(1) GUIDELINES
FOR
BRAZOS ISLAND HARBOR CHANNEL IMPROVEMENT PROJECT
CAMERON COUNTY, TEXAS

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

2. The TSP is the result of thorough evaluation of thirteen proposed alternatives (including the No-Action Alternative).

3. The TSP 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 TSP 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. The US Fish and Wildlife Service and National Marine Fisheries Service 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 TSP 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. 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.

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

Carolyn Murphy

30 Oct 13
Date

Carolyn Murphy
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U.S. Army Corps of Engineers, Galveston District