APPENDIX A

SECTION 404(b)(1) EVALUATION

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CORPUS CHRISTI SHIP CHANNEL, TEXAS, CHANNEL IMPROVEMENTS PROJECT
SECTION 404 (b) (1) EVALUATION

I. Project Description

a. Location

The study area for the Corpus Christi Ship Channel – Channel Improvements Project (CCSCCIP) encompasses Corpus Christi Bay, including the southern section of Redfish Bay and the northernmost section of the Laguna Madre, Nueces Bay, the lower Nueces River (12 miles), Tule Lake Channel, Viola Channel, La Quinta Channel, and the watershed surrounding these water bodies up to roughly ½ mile inland from all shorelines. The coastline of this area extends across Nueces and San Patricio counties and is adjacent to the cities of Corpus Christi, Portland, Ingleside by the Bay, and Port Aransas. The study area also includes the Gulf of Mexico to the end of the proposed channel and the offshore placement areas (PA). The existing authorized Federal navigation project consists of channels and turning basins suitable for oceangoing vessels, rubble-stone jetties, and a stone dike. The channel begins at deep water in the Gulf of Mexico about 4.3 miles offshore, passes through the jettied inlet, and extends about 21 miles westward to Corpus Christi. Continuing west, the channel extends about 8.5 miles through the harbor area before terminating at the Viola Turning Basin. The north and south jetties are 11,190 and 8,610 feet (ft) long and extend into the Gulf from San Jose and Mustang islands, respectively, and stabilize the natural inlet of Aransas Pass. The stone dike on San Jose Island connects with the north jetty and extends 20,991 ft up the island. The La Quinta Channel extends from the basin and mooring facilities at Ingleside Point, which is about half-way between the Gulf of Mexico and Corpus Christi, about 5.7 miles to La Quinta.

b. General Description

This Section 404 (b)(1) evaluation addresses the discharge of dredged or fill material into the waters of the United States. The objectives of the CCSCCIP include improvements to the efficiency and safety 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 the objectives, the following is proposed: (1) deepen the Corpus Christi Ship Channel (CCSC) from –45 ft MLT to –52 ft MLT, plus advanced maintenance and allowable over-depth, which will extend the channel roughly 10,000 ft into the Gulf of Mexico; (2) widen the CCSC from Port Aransas to the Harbor Bridge from 400 - 500 ft to 530 ft; (3) extend the La Quinta Channel 7,200 ft at a depth of –39 ft MLT and a width of 300 ft and include a turning basin; and (4) add 200-ft wide barge shelves (–12 ft MLT) on both sides of the ship channel from La Quinta Junction to the Harbor Bridge. The Beneficial Uses Plan will create roughly 1,035 acres of potential shallow-water, unvegetated, and seagrass habitat, including emergent, intertidal and marsh habitat as well as 40 acres of open-bay, upland habitat. All of the beneficial uses are with new work material. Mitigation will be provided for the loss of 5 acres of seagrass and 40 acres of shallow-bay bottom less than –4 ft MLT, which will be removed during construction of the La Quinta Extension. New work from the offshore reach will be used beneficially to create two areas of topographic relief, while maintenance material from the offshore reach will be placed in an existing designated offshore placement site.

c. Authority and Purpose

A congressional resolution was adopted 1 August 1990 by the committee on Public Works and Transportation, U.S. House of Representatives, which authorized the U.S. Army Corps of Engineers (USACE) to review the reports on the Port Aransas-Corpus Christi Ship Channel, Texas (45-foot project) published as House Document 99, 90th Congress, Second Session, and other pertinent reports to determine the feasibility of deepening the CCSC system to accommodate large vessels, increase shipping efficiency, and enhance navigation safety. The Port of Corpus Christi Authority (PCCA), local sponsor of the existing channel system, began consideration of additional channel improvements upon the 1989 completion of the 45-ft-deepening project. The USACE completed the reconnaissance study in 1994, concluding that the benefits of channel improvements would be 2.5 times greater than the project cost. Thus began a feasibility study, for the CCSCCIP, to determine if the Federal navigation project is justified and to provide documentation needed to request Congressional authorization and funding for construction of the project. In 1999, the USACE and PCCA signed an agreement to conduct a Feasibility Study, including an Environmental Impact Statement (EIS). The project is being led by the USACE, but cost shared with PCCA .

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

New work material will be dredged to deepen the channel from the –56-foot isobath in the Gulf to the Inner Harbor. A complete description of the new work material and the existing maintenance material can be found in Sections 3.3.1 and 3.3.2 of the FEIS, respectively.

(2) Quantity of Material

Table 1 provides the quantities, by reach, of the new work and maintenance material expected from the preferred alternative.

Table 1. Quantities of New Work and Maintenance Dredged Material (MCY)

Reach	New Work Material	Maintenance Material (50 years)
Entrance Channel	4.337	62.0
Lower Bay	8.754	11.7
Upper Bay	14.419	82.2
Inner Harbor	6.916	24.1
La Quinta Channel	6.257	28.0
Barge Lanes	0.271	NA

(3) Source of Material

All dredged material will come from widening, deepening, and subsequent maintenance of the CCSC and the extension and maintenance of the La Quinta Channel.

e. Description of the Proposed Discharge

(1) Location

New work material from the outer half of the offshore reach (the Entrance Channel) will be used beneficially in an area that coincides with the designated Homeport ODMDS, referred to in this document as BU Site ZZ, and maintenance material will be placed in dredged

material placement area 1 (PA 1) (EPA designated ODMDS) (see FEIS Figure 1-3). New work material from the inner half of the Entrance Channel and the Jetty Channel will be placed in beneficial use (BU) Site MN; from the Lower Bay in BU Sites I, R, and S; from the La Quinta Channel in BU Sites E and GH and to improve the levees at PA 13; from the Upper Bay in BU Sites R, S, CQ, and PAs 14a – 17b; and from the Inner Harbor in a series of upland confined placement areas (UCPAs). Maintenance material from the Jetty Channel will be placed in offshore PA 1 (ODMDS) and/or in PA 2, beneficially, if it is of the correct grain size; from the Lower Bay on Pelican Island and PAs 9 and 10; from the La Quinta Channel in PA 13; from the Upper Bay in PAs 10 and 14a – 17b; and from the Inner Harbor in a series of UCPAs. Other PAs that have been used in the past may be used in the future, as is discussed in the FEIS and the DMM/BU Plan (Appendix F). However, these are not scheduled for use with the present project, are covered under other EISs, and are not addressed here.

(2) Size

Creation of all of the in-bay BU Sites will cover roughly 935 acres of unvegetated deep-water bay bottom and 120 acres of upland. The area of the offshore BU Sites MN and ZZ depends on the exact placement methods and equipment but will probably be 1,590 acres of Gulf of Mexico bottom, depending on the height of the berms. All PAs are currently in use and are designated as such although this appendix discusses the calculations required to determine the adequacy of the size of PA 1 (Attachment 1).

(3) Type of Site and Habitat

All BU sites, except BU Sites E, MN, and ZZ, will be located in shallow unvegetated bay bottom. BU Site E will be located upland. BU Site MN will be located in 20-30 ft of water and BU Site ZZ will be located in approximately 50 ft of water. The maintenance PAs are currently being used to receive maintenance material from the CCSC and La Quinta Channel.

(4) Time and Duration of Discharge

The BU sites will be constructed during the widening and deepening of the CCSC, the creation of the barge lanes, and the extension of the La Quinta Channel. Maintenance will be ongoing.

f. Description of Disposal Method

Hydraulic pipeline dredges will be used inshore of the jetties. The Entrance Channel will be dredged with an ocean-going hopper dredge.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

The completed elevation of most BU sites will be –1 to –2 ft MLT, to promote the growth of seagrasses. All BU Sites include breakwaters to an elevation of +6 ft MLT and most have fringes of dredged construction material around the inside of the breakwaters with a design elevation of around +2 MLT suitable for *Spartina* growth. Sites I and CG include interior islands to an elevation between +3 to +6 ft MLT, including an upland island +8 to +10 ft MLT in the southeast corner of Site I. Sites MN and ZZ, being topographic relief features, will likely have elevations around 6 ft above the bottom.

(2) Sediment Type

The new work material will range from mostly hard clay in the Inner Harbor and La Quinta Extension to mostly soft clays in the Upper Bay to medium to dense sand in the Lower Bays to very dense sand in the jetty reach of the Entrance Channel and dense clay in the outer portions of the Entrance Channel. The maintenance material is silt or sandy silt in the Inner Harbor, Lower Bay, and La Quinta Channel; fine or silty sand in the entrance channel; and a mixture of silt or sandy silt, fine or silty sand, and sand in the Upper Bay.

(3) Dredged/Fill Material Movement

The BU sites will be protected from erosion by breakwaters and islands and should be stabilized, in the long term, by seagrasses and *Spartina* and other estuarine organisms. The existing designated open-bay PAs are dispersive and the rest of the designated PAs are UCPAs, releasing no dredged material back into the environment, except small amounts of suspended solids. The offshore sites are dispersive, but BU Sites MN and ZZ are designed to provide bottom relief.

(4) Physical Effects on Benthos

Nonmotile organisms occurring in the sediments in the dredged areas will be placed in designated PAs or BU sites and will likely be buried. Benthos at the BU sites, existing designated open-bay PAs, and the offshore sites will be buried. However, the BU sites are designed to create more diverse and productive habitat than that presently existing in the open bay areas, resulting in benthos rapidly recovering to preplacement conditions (Ray and Clarke, 1999).

(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 fully considered and described in the BU plan. Any unavoidable losses were mitigated. The BU sites, including the offshore sites, are expected to lead to an overall increase in the diversity and productivity of habitat in the project area.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

The construction of the BU sites, the upland site, and 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 the FEIS.

(a) Salinity

Small reductions in salinity and small increases in tidal amplitude in the Bay are expected (FEIS section 4.1.2; Matsumoto, 2001). There will be no effect on Gulf salinity.

(b) Water Chemistry

Aside from a temporary increase in local suspended solids, no impacts are expected (FEIS Section 4.1.3).

(c) Clarity

There will be some temporary increase in local turbidity during dredging and placement operations. Water clarity is expected to return to normal background levels shortly after operations are completed.

(d) Color

Water immediately surrounding the construction area will become discolored temporarily due to disturbance of the sediment.

(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 open bay placement. There may be a short period when foul odors are emitted by the dredged material contained in the UCPAs.

(f) Taste

No detectable impacts in the marine environment.

(g) Dissolved Gas Levels

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

(h) Nutrients

Nutrient levels may be slightly and temporarily elevated near the BU sites since new work material is very low in organics. Some maintenance material will be dredged along with the new work material.

(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

The BU sites, including breakwaters and islands, were not shown (Matsumoto, 2001) to significantly affect currents or circulation patterns.

(a) Current Patterns and Flow

No impacts are expected.

(b) Velocity

No impacts are expected.

(c) Stratification

No impacts are expected.

(d) Hydrologic Regime

No impacts are expected.

(3) Normal Water Level Fluctuations

Minimal effects are expected (FEIS Section 4.1.1; Matsumoto, 2001).

(4) Salinity Gradients

No impacts are expected.

(5) Actions That Will Be Taken to Minimize Impacts

No actions required.

c. Suspended Particulate/Turbidity Determination

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

An increase in suspended particulates and turbidity levels is expected during dredging and placement operations of new-work and maintenance material and during creation of the BU sites. These are temporary and localized events.

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

(a) Light Penetration

Turbidity levels will be temporarily increased during dredging and placement operations of new-work and maintenance material and during creation of the BU sites.

(b) Dissolved Oxygen

No adverse impacts to dissolved oxygen are expected.

(c) Toxic metals and organics

No adverse impacts are expected (FEIS Section 4.1.3).

(d) Pathogens

None expected or found.

(e) Aesthetics

The BU sites have been designed and coordinated with the resource agencies to minimize environmental impacts and reduce or eliminate adverse aesthetic qualities. The BU sites will provide biological diversity and beneficial values to recreational fishermen. BU site E is designed to provide a buffer that was requested by the citizens of the area.

(f) Others as Appropriate

None known.

(3) Effects on Biota

Approximately 935 acres of seagrass habitat will be created with the BU sites, which will benefit most of the estuarine species. These species depend on seagrasses at some time in their life cycle for protection, food, and as a nursery site. No other impacts are expected on photosynthesis, suspension/filter feeders, and sight feeders, except for temporary impacts from placement operations, which will temporarily increase the local turbidity levels.

(4) Actions Taken to Minimize Impacts

Construction and placement plans for the materials have been closely coordinated with the resource agencies to assure minimal impacts.

d. Contaminant Determinations

No increase in contaminant levels is expected during construction and placement operations. The potential for contaminants has been evaluated through chemical analyses, grain-size analyses, and some bioassays and bioaccumulation tests. All material designated for the purpose is considered acceptable for beneficial uses and routine maintenance operations by the USACE after close coordination with the RACT and CW.

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

Project dredging, BU Site creation, and placement operations will bury roughly 935 acres of benthos. However, except for those lost during construction dredging, there will be quick recovery. Benthic organisms can migrate upward through placed material, if it not too thick. Plus, the BU sites will provide greater diversity of habitat and, therefore, likely a different

but more diverse benthos than is presently found. Routine maintenance dredging and placement operations will continue to have the same impacts as described in previous NEPA documents.

(3) Effects on Nekton

Creation of the breakwaters and islands for and in the BU sites will limit or eliminate the use of the water column by nekton. However, creation of seagrass meadows will benefit the nekton in the long term. The topographic relief features, BU Sites MN and ZZ, are designed to promote fisheries habitat. Routine maintenance dredging and placement operations will continue to have the same impacts as described in previous NEPA documents.

(4) Effects on Aquatic Food Web

The estuarine and Gulf food web will benefit from greater productivity associated with creation of the BU sites. 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

Aside from the 5 acres permanently lost, but mitigated for, there are no special aquatic sites to be affected by the proposed project. There are no coral reefs or riffle and pool complexes in the project impact area, mudflats will not be impacted, and wetlands will be protected by the breakwaters and created in the BU sites.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Testing (see Section 4.1.3, FEIS) has demonstrated that adequate mixing exists to dilute the concentrations of effluents from the UCPAs. Because of the lack of contamination, mixing is not required elsewhere.

(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 CCSC, indicating that water quality standards are being met.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply

The proposed project will not impact any municipal or private water supplies.

(b) Recreational and Commercial Fisheries

Recreational and commercial fishing in Corpus Christi Bay and the Gulf may be enhanced a result of the creation of the BU sites, which will enhance the marine food web. Local recreational fishermen requested BU Site CQ.

(c) Water Related Recreation

The project will improve overall safety of navigation traffic, which may improve water-related recreation. In addition, recreational fishing should be improved by enhancement of the marine food web from the creation of additional seagrass habitat in the BU sites.

(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 will be impacted by the project.

(4) BU Site ZZ

See Attachment 2, which addresses the criteria required for ocean placement of dredged material under the Marine Protection, Research and Sanctuaries Act. Even though this site is a Section 404 beneficial use site, the material must still meet the requirements of 40 CFR 220 before it can be transported for ocean placement.

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.

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 creation of the BU sites.

FINDINGS OF COMPLIANCE WITH
SECTION 404 (b) (1) GUIDELINES
FOR CORPUS CHRISTI SHIP CHANNEL – CHANNEL IMPROVEMENT PROJECT
CORPUS CHRISTI AND NUECES BAYS,
NUECES AND SAN PATRICIO 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 evaluation of a preliminary array of 23 alternatives and thorough evaluation of six.

3. The recommended plan will 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 will not adversely affect any State or Federally-listed threatened or endangered species or their critical habitat or violate any protective measures for any sanctuary.

5. The recommended plan will 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 new BU sites will provide additional habitat for life stages of marine species and additional habitat for colonial waterbirds. There are no significant adverse impacts expected for 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. Impacts to seagrasses and shallow bay bottom habitat affected by channel widening, deepening, and expansion will be mitigated.

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

Date: 31 May 2002

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ATTACHMENT

CALCULATION OF CAPACITY OF PLACEMENT AREA 1 (PA 1)

ATTACHMENT

CALCULATION OF CAPACITY OF PLACEMENT AREA 1 (PA 1)

The Offshore Ocean Dredged Material Disposal Site (ODMDS), PA 1, was designated by the EPA in 1989 (EPA 1989) to receive the maintenance material from the Corpus Christi Entrance Channel for the 45-foot project. Since PA 1 was designated based on a certain volume of maintenance material, the EPA required that a modeling effort be conducted to determine is there was sufficient capacity for the maintenance material from the proposed project. While the capacity of PA 1 is essentially infinite in the long term, there are restrictions on mounding that would have to be met for each dredging cycle. The limit is 5 feet and is set by the EPA/USACE ODMDS Management Plan for the Corpus Christi Ship Channel. If the capacity of PA 1 was insufficient to prevent unacceptable mounding, a new ODMDS would have to be designated by the EPA, or the existing PA 1 designation would have to be amended through EPA rulemaking, before maintenance dredging from the proposed project could be placed offshore. Since the source of the maintenance material from the proposed project is the same as the source of material from the 45-foot project, a re-evaluation of PA 1 was not needed if it had sufficient capacity. To make the capacity determination, the model MDFATE, prepared by the Waterways Experiment Station (WES) of the USACE, was used.

PA 1 is approximately 1.5 miles from shore at its closest point and is bounded by the following coordinates:

27°49'11" N, 97°01'09" W; 27°48'44" N, 97°00'20" W;
27°48'06" N, 97°00'48" W; 27°48'33" N, 97°01'36" W.

The water depth ranges from 32 to 50 feet and the bottom topography is flat. Annual shoaling has historically been around 955,000 cubic yards (cy). The size of PA 1 is 5,200 feet in the direction parallel with the CCSC and 4,450 feet perpendicular to the CCSC, for a total area of 0.83 square miles. It is shown on Figure 1-2 of the FEIS.

Four dredges were selected, based on the recommendation of the Galveston District because of past usage in the Entrance Channel. All were hopper dredges; two were split hull hopper dredges and two were bottom-door hopper dredges. Hopper capacity ranged from 2,500 cubic yards (cy) to 3,360 cy. Draft of the loaded dredges ranged from 20 feet to 30 feet. As noted above, the water depth ranges from 32 to 50 feet in PA 1, but since mounding was the limiting criterion, a uniform depth of 30 feet was used for the model. Water currents for a 2-month period in 2000 were supplied by the Conrad Blucher Institute for Surveying and Science, and averaged to provide the data on currents required by the model. Grain size data from measurements taken by the USACE were used for the sand, silt, and gravel content and each load was assumed to be 20% solids and 80% water.

MDFATE is so titled for Multiple Dump Fate and is one of the FATE series of models produced by WES, the others of pertinence here being STFATE (Short Term Fate) and LTFATE (Long Term Fate). MDFATE "predicts the geometry (height, side slope, and footprint) of

dredged material mounds created by multiple placements of dredged material from hopper dredges or dump scows over time periods of weeks to months" (Clausner, et al., 2001). The model is designed to determine the mounding that will occur during and shortly after placement, by incorporation of a modified STFATE submodel, and over the longer term, by incorporation of a modified LTFATE submodel (Clausner, et al., 2001). However, when use of the model was attempted, it was discovered that MDFATE would not run for bottom-door hopper dredges, only for split-hull dredges and only for a single pass of placements, as discussed below.

Preliminary calculations indicated that a dredge with a capacity of 3,200 – 3,300 cy was needed. Those calculations are as follows:

> The total amount of maintenance material that would be dredged from the Entrance Channel was estimated for the 50-year project life to be 62 million cy (mcy). If it is assumed that the dredging frequency for the Entrance Channel is around three years, the maintenance material to be dredged, per dredging cycle, would be around 3.7 mcy. Based on the configuration of PA 1, using an 8-x-9 grid with 500-foot spacing and the capacity of the typical dredge, it was determined that roughly 71 dredge loads of maintenance material could be placed in PA 1 without overlap. One load at each grid point was designated as a dredging pass, and each pass with 71 dredge loads would allow placement of 52,394 cy of maintenance material. To place 3.7 mcy with 16 passes of 71 dredge loads per pass would require a dredge with a capacity of 3,275 cy.

Two split-hull hopper dredges had been recommended for the analysis, one with a capacity of 2,500 cy and the other with a capacity of 3,200 cy. Therefore, the model was run with the 3,200 cy dredge with 71 dredge loads per pass. As noted above, the model could not be made to run with multiple passes, so a single pass was modeled, for a time period of 45 days, and the cross sections of PA1 after that pass were graphed through the maximum mound (Figures 1 and 2). The cross sections were, of course, a series of peaks, where the dredge emptied, and valleys in between the peaks. The highest peak was 0.463 feet above the sea floor, and the highest valley near that peak was 0.083 feet above the seafloor (Figure 2). For multiple passes, a maximum mounding was calculated by assuming that placement was shifted slightly from pass to pass so the highest peak was placed in the highest nearby valley in the next pass, and so on until the 16 passes were complete. Conservatively assuming that no compaction would be caused by the overlying material from subsequent passes and that there would be no flow to smooth the mounding, the maximum height after the 16th pass was determined to be 4.4 feet above the seafloor. Therefore, mounding of less than 5 feet occurs during each cycle and the capacity of PA 1 is sufficient for the estimated amount of maintenance material to be dredged from the Corpus Christi Entrance Channel under the proposed project.