Public Notice

U.S. Army Corps Of Engineers

Galveston District

Permit Application No: SWG-2019-00067

Date Issued: 1 August 2019

Comments Due: 30 August 2019

U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT
AND
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

PURPOSE OF PUBLIC NOTICE: To inform you of a proposal for work in which you might be interested. It is also to solicit your comments and information to better enable us to make a reasonable decision on factors affecting the public interest. The U.S. Army Corps of Engineers (Corps) is not the entity proposing or performing the proposed work, nor has the Corps taken a position, in favor or against the proposed work.

AUTHORITY: This application will be reviewed pursuant to Section 10 of the Rivers and Harbors Act of 1899 (RHA), Section 404 of the Clean Water Act (CWA), and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA).

APPLICANT:
Port of Corpus Christi Authority (PCCA)
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Corpus Christi, Texas 78401
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AGENT:
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LOCATION: The proposed Channel Deepening Project (CDP) is located within the existing channel bottom of the Corpus Christi Ship Channel (CCSC) starting at station 110+00 near the southeast side of Harbor Island, traversing easterly through the Aransas Pass, and extending beyond the currently authorized terminus Station -330+00 an additional 29,000 feet terminating out into the Gulf of Mexico at the proposed new Terminus Station -620+00, an approximate distance of 13.8 miles, in Port Aransas, Nueces County, Texas. The project can be located on the U.S.G.S. quadrangle map entitled: Port Aransas, Texas.

LATITUDE & LONGITUDE (NAD 83):
Latitude: 27.824019 North; Longitude: 97.054338 West

PROJECT DESCRIPTION: The applicant (PCCA) is proposing to deepen a portion of the CCSC to depths that vary from -75 to -77 feet mean lower low water (MLLW), plus 2 feet allowable over dredge, plus 2 feet advanced maintenance dredging, which ultimately totals -79 to -81 feet MLLW. The proposed CDP of the CCSC is approximately 1,778 acres and will create approximately 46 million cubic yards (MCY) of new work dredged material (17.1 MCY of clay and 29.2 MCY of sand). The proposed CDP is needed to accommodate transit of fully laden very large crude carriers (VLCCs) that draft approximately 70 feet. The proposed project does not include widening the channel; however, some minor incidental widening of the channel slopes is expected to meet side slope requirements and to maintain the stability of the channel. The applicant is proposing to dispose of the material in several ways. Approximately 13.8 MCY of the clay portion of the new work dredged material located in the offshore reaches between Stations -620+00 to -72+50 would be placed at CCSC Improvement Project (CCSCIP) New Work (NW) Ocean Dredged Material Disposal Site (ODMDS). The clay portion of new work dredged material from Stations -72+50 to Station 110+00 would be used beneficially where possible to create perimeter dikes.

Regulated Activities for the proposed CDP consists of:

1. Activities subject to Section 10 of the RHA:
    a. Deepening a portion of the CCSC between Station 110+00 to the proposed extension Station -620+00 by conducting “new work” dredging activities in navigable waters of the US:
        i. Stations 110+00 to -72+00: -79 feet MLLW (-75 feet MLLW plus two feet of advanced maintenance and two feet of allowable overdredge).
        ii. Stations -72+00 to -330+00: -81 feet MLLW (-77 feet MLLW plus two feet of advanced maintenance and two feet of allowable overdredge).
        iii. Stations -330+00 to Station -620+00: This section represents the expansion of the CCSC an additional 29,000 feet from Station -330+00. This proposed expansion would be dredged to -81 MLLW (-77 feet MLLW plus two feet of advanced maintenance and two feet of allowable overdredge) to reach the -80-foot MLLW bathymetric contour in the Gulf of Mexico.
        iv. The existing Inner Basin at Harbor Island will be expanded as necessary to allow VLCC turning. This modification will also include a flare transition from the CCSC within Aransas Pass to meet the turning basin expansion.
2. Activities subject to Section 404 of the CWA:
    a. The proposed placement of new work dredged material into waters of the US for Beneficial Use (BU) sites located in and around Corpus Christi and Redfish Bays which also includes the Redfish Bay State Scientific Research Area.
    b. The dredged material may also be used for dune restoration on San Jose Island (SJI).
    c. Proposed feeder berms (B1 – B9) for beach restoration along SJI and Mustang Island are proposed.

3. Activities subject to Section 103 of the MPRSA:
    a. Transportation of new work dredged material to the CCSCIP NW ODMDS.

The proposed total estimated adverse impact to special aquatic sites, specifically wetlands, resulting from the placement of dredged material totals 185.9 acres. The proposed adverse impacts to submerged aquatic vegetation total 58.5 acres. As of the date of this Public Notice, the Corps has not received special aquatic site delineations for wetlands or surveys for submerged aquatic vegetation (SAV).

The following tables represent the proposed placement options and its impacts to waters of the US including aquatic sites from the proposed CDP:

Table 1: Proposed Restoration Sites to for the Placement of the Proposed BU Sites

Placement Option	Description	Placement Capacity (CY)	Proposed Restoration
M3	Estuarine/aquatic habitat creation adjacent to Pelican Island	3,798,000	This option will convert featureless bay bottom to approximately 300 acres of estuarine/aquatic habitat.
M4	Restoring historic land and marsh loss at Dagger Island	867,000	This option will restore eroding marsh habitat for native shorebirds and coastal wildlife. Design of project elements will be coordinated to support TPWD's existing permitted project.
PA9-S	Upland Placement Site Expansion behind PA9	9,000,000	This option does not restore aquatic habitat; it will convert featureless bay bottom to upland.
M10	Estuarine/aquatic habitat creation adjacent to PA10	10,933,600	This option will convert featureless bay bottom to approximately 770 acres of estuarine/aquatic habitat.
PA6	5 foot levee raise and fill	1,796,400	This option does not create any environmental benefit.
SS1	Restoring eroded and washed out shoreline	4,800,000	This option restores an eroded shoreline landmass and provides protection to Harbor Island Seagrass area.
SS2	Restore shoreline washouts along Port Aransas Nature Preserve as a result of Hurricane Harvey	669,700	Shoreline restoration that fills in the washouts caused by Hurricane Harvey that protects Piping Plover critical sand flat habitat.
PA4	Reestablish eroded shoreline and land loss in front of PA4	3,020,000	This option provides protection to Harbor Island Seagrass area.
HI-E	Bluff and Shoreline restoration with site fill	1,825,000	This option restores an eroding bluff and shoreline to its historic profile.
SJI	Dune and beach restoration San Jose Island	4,000,000	This option restores several miles of beach profile that was washed away as a result of Hurricane Harvey.
NW ODMDS	Place on New Work ODMDS (Homeport)	13,800,000	This option does not create any environmental benefit.

B1-B9	Feeder berms offshore of SJI and Mustang Island	8,100,000	This option will nourish beach shoreline by natural sediment transport processes.
MI	Beach Nourishment for Gulf side of Mustang Island	2,000,000	This option will nourish beach shoreline by direct sediment placement.
Scenarios for new work placement capacity provided and needed.		64,609,700	Total Capacity Provided
		60,609,700	Total capacity less SJI (should that option become unavailable)
		46,283,590	Total NW placement capacity required for Channel Preferred Alternative – Base Option
		14,326,110	Additional Capacity less SJI (should that option become unavailable)

Table 2: Impacts to Aquatic Sites Resulting from the Proposed Placement of Dredged Material

Placement Option	Total Site Acres	Acres	Predominant Type	Comment	Impact Review Adjust	Est Adverse Impact
B1	80.0	-	-	-	-	-
B2	80.5	-	-	-	-	-
B3	83.8	-	-	-	-	-
B4	83.8	-	-	-	-	-
B5	83.8	-	-	-	-	-
B6	83.8	-	-	-	-	-
B7	124.0	-	-	-	-	-
B8	124.0	-	-	-	-	-
B9	124.0	-	-	-	-	-
HI-E	138.7	36.2	Estuarine and Marine Wetland	Features appear to have eroded away	-7.7	28.6
M3	332.6	-	-	-	-	-
M4	702.6	68.9	Estuarine and Marine Wetland	Interior wetlands that would be avoided, and exterior would be integrated with through placement	-68.9	0.0
PA9-S	329.3	-	-	-	-	-
M10	769.9	-	-	-	-	-
MI	362.2	211.7	Estuarine and Marine Wetland	Consists entirely of unconsolidated shoreline to be restored	-211.7	0.0
NW ODMDS	1180.4	-	-	-		
PA4	163.1	51.5	Freshwater Emergent Wetland	Identified within active PA or Feature appear to have eroded away	-51.5	0.0
PA6	269.8	143.0	Lake	Identified within active PA. Feature appears associated with earlier filling of this PA and is no longer apparent in current aerials.	-143.0	0.0
SJI	593.0	279.4	Estuarine and Marine Wetland	Consists entirely of shoreline to be restored	-279.4	0.0

SS1	307.6	157.3	Estuarine and Marine Wetland	Would be replaced by created upland to protect seagrass area behind it from future loss	0.0	157.3
SS2	94.8	36.5	Estuarine and Marine Wetland	Unconsolidated shoreline that eroded away during Harvey. Placement would restore protective shoreline for interior sand flats.	-36.5	0.0
TOTALS	6111.7	984.5				185.9

Table 3: Impacts to Submerged Aquatic Vegetation Resulting from the Proposed Placement of Dredged Material

Placement Option	Total Site Acres	Acres	Comment	Impact Review Adjust	Est Adverse Impact	Open Water
B1	80.0	-	-	-	-	80.0
B2	80.5	-	-	-	-	80.5
B3	83.8	-	-	-	-	83.8
B4	83.8	-	-	-	-	83.8
B5	83.8	-	-	-	-	83.8
B6	83.8	-	-	-	-	83.8
B7	124.0	-	-	-	-	124.0
B8	124.0	-	-	-	-	124.0
B9	124.0	-	-	-	-	124.0
HI-E	138.7	0.0	-	0.0	0.0	3.3
M3	332.6	17.1	Restoration of larger area to create marsh. Elevation could be suitable for seagrass establishment too.	-9.5	7.6	332.6
M4	702.6	571.5	Interior acreage would not be impacted except at fringes. BU feature would protect this from further loss.	-571.5	0.0	546.3
PA9-S	329.3	3.1	Restoration of larger area to create uplands. In recent years aerials do not show evidence of seagrass stands. If in existence, seagrass is sparse and tenuous, most likely because of focused wave energy in the area.	-3.1	0.0	308.8
M10	769.9	2.5	Restoration of larger area to create marsh. Elevation could be suitable for seagrass establishment too. In recent years aerials do not show evidence of seagrass stands. If in existence, seagrass is sparse and tenuous, most likely because of focused wave energy in the area.	-2.5	0.0	752.9
MI	362.2	-	-	-	-	262.1
NW ODMDS	1180.4	-	-	-	-	1180.4
PA4	163.1	0.0	Minor fringe impact. BU would protect much larger seagrass area from future losses.	0.0	0.0	3.3
PA6	269.8	-	-	-	-	0.8

SJI	593.0	-	-	-	-	334.3
SS1	307.6	94.1	Restoration of shoreline to bolster against future erosion of much larger area of seagrass behind feature. Due to shifting uplands and erosion over recent years much of the seagrass no longer appears to be visible within aerials.	-43.3	50.8	81.4
SS2	94.8	688.3		-	-	-
TOTALS	6111.7				**58.5**	**4,673.9**

Table 4: Impacts Within the Channel to Waters of the US Resulting from the Proposed Dredging

	Channel Acres			**Channel Impact**		
Segment	Toe to Toe	Total Including Side Slope	Side Slope Acreage	Upland Acreage	Seagrass Acreage	WOUS (Deepwater)
Stations -620+00 to -330+00	455.4	588.8	133.4		-	588.8
Stations -330+00 to -210+00	146.9	260	113.1	-	-	260
Stations -210+00 to 100+00	518.9	734.8	215.9	2.00	0.11	732.69
Turning Basin and Flare Stations 19+48.10 to 38+16.42	56.68	82.42	25.74	-	-	82.42

ODMDS LOCATIONS AND DESIGNATIONS: The applicant is proposing to use an existing authorized Ocean Dredged Material Disposal Site (ODMDS) regulated under Section 103 of the MPRSA. Pursuant to the requirements to initiate a public notice listed in 33 CFR 325.3(a)(17), for Section 103 activities:

CCSC ODMDS No. 1 is located approximately 1.5 miles offshore and about 1,000 feet southwest of the centerline of the Outer Bar Channel. The site is rectangular in shape with corner coordinates located at:

ODMDS No.1	Latitude	Longitude
North Corner	27°49'11.0994"N	97°01'09.9546"W
East Corner	27°48'43.1022"N	97°00'21.9522"W
South Corner	27°48'07.1064"N	97°00'48.9528"W
West Corner	27°48'34.1136"N	97°01'36.9654"W

CCSC NW ODMDS is located approximately 3.4 miles offshore and about 6,200 feet southwest of the centerline of the Outer Bar Channel, occupying an area of approximately 1.36 square nautical miles. Water depths range from 46 to 53 feet. The site is rectangular in shape with corner coordinates at:

NW ODMDS	Latitude	Longitude
North Corner	27°47'43.1052"N	97°0'12.9522"W
East Corner	27°47'16.1052"N	96°59'25.9512"W
South Corner	27°45'50.1084"N	97°0'25.9488"W
West Corner	27°46'18.1086"N	97°1'12.9512"W

The CCSC ODMDS No.1 received the administrator's final designation pursuant to section 102(c) on July 11, 1989. The CCSCIP NW ODMDS was originally designated for use for the US Navy Homeport Project; however, it has not been used because that project was not implemented. The CCSCIP NW ODMDS is currently authorized to use this site and work is currently underway.

CHARACTERISTICS AND COMPOSITION OF THE DREDGED MATERIAL: The *2003 CCSCIP Feasibility Report* tested the material that is within the footprint of the proposed CDP and found that the material was suitable for offshore disposal as well as BU. The proposed CDP dredged material is not expected to be different that the sediment material currently authorized to be dredged in the CCSCIP.

Table 5. New Work Testing History	
Date	**Type of Testing**
Dec-16/Jan-17	Toxicity and Bioaccumulation Assessment

PROPOSED LENGTH OF TIME DISPOSAL ACTIVITIES WILL OCCUR AT ODMDS: Following the authorization of the Federal CCSCIP, quantities for the use of this site for Jetty and Entrance Channels, and Entrance Channel Extension were expected to double, resulting in a use of the site every two years. The Corps also planned to use the site for other CCSIP segments less frequently for future suitable material. The following table represents the planned Federal maintenance frequency:

Table 6. PCCA Proposed Timeline			
Channel Segments	**Dredge Area Stations**	**Est Volume per Contract**	**Dredging Rate (Years)**
Entrance Channel	-210+00 to 36+00	1,000,000	2
Inner Basin to La Quinta	36+00 to 500+00	800,000	5
La Quinta to Beacon 82	500+00 to 1090+00	1,000,000	2
Beacon 82 to Viola TB (Inner Harbor)	1100+00 to 1587+00	1,500,000	4
La Quinta	0+00 to 382+00	500,000	3
Rincon	0+00 to 150+00	400,000	7

AUTHORIZED DISPOSAL EFFECTS: Dredged material deposited at the ODMDS No.1 disperse and erode quickly. There are no significant environmental resources delineated within or immediately outside of the designated ODMDS. Since this site is dispersive in nature, the primary concern of the use of the site is the potential short-term buildup of dredged material, such that a hazard to navigation is presented. Another concern is whether there is significant short-term transport of the dredged material beyond the

ODMDS boundaries; specifically, the benthic community can be impacted if significant rapid movement of material off the site occurs, resulting in burial of benthic populations outside the site.

CURRENT SITE CONDITIONS: The CCSCIP currently is authorized to extend from Stations -210+00 to -330+00 out into the Gulf of Mexico. This stretch of the proposed project as well as the potion that extends into the Aransas Pass inside the jetties is classed as a deep water marine habitat. The Entrance Channel segment of the CCSC is currently maintained to a depth of -49 feet MLLW and the Lower Bay segment to a depth of -47 feet MLLW. The CCSC has been federally authorized to a depth of -56 feet MLLW from the Gulf of Mexico to the end of the jetties in the Entrance Channel segment, and to -54.0 feet MLLW in the Lower Bay segment. Dredging work to reach the authorized depths is currently starting out in the Gulf on the entrance channel.

The proposed feeder berms (B1 – B9) will be placed in unvegetated ocean bottom nearshore to facilitate sediment transfer to the beaches that have been heavily impacted by Hurricane Harvey. Placement Option HI-E is located in the Mission – Aransas National Estuarine Research Reserve (MANERR). Placement options M10, PA9-S, M3, PA6, and SS2 occur in Corpus Christi Bay. Placement options M4, SS1, and PA4 occur in Redfish Bay State Scientific Research Area.

Harbor Island shoreline has slowly, but exponentially, eroded over the past 10 years. Recent aerial imagery indicates that a new channel has formed from within the tidal flat/historical spoil site and has separated the mangrove stand (*Avicennia germinans*) on the southern portion of the island from the northern developed portion of the island. Areas where the proposed BU placement would occur within Redfish Bay contains submerged aquatic vegetation (SAV), mainly *Halodule wrightii* (shoalgrass). Shoalgrass, as well as the fringed tidal *Spartina alterniflora* (cordgrass), intertidal mangrove stands, and fringed estuarine wetlands, is considered essential fish habitat for some or all life cycles of species that utilize these areas.

In the context of the geographic area, numerous important resources may be affected. The largest neighboring resource, located 20 miles south of the project site, is the Padre Island National Seashore, the largest stretch of undeveloped barrier island in the world and home to the National Park Service's Division of Sea Turtle Science and Recovery. Immediately to the north of the project site is San Jose Island, a privately-owned undeveloped barrier island known to be occupied by numerous Endangered Species Act (ESA) federally listed threatened and endangered sea turtle and bird species, including Whooping Cranes (*Grus americana*), Piping Plovers (*Charadrius melodus*), and Red Knots (*Calidris canutus*). Immediately behind San Jose Island is Redfish Bay State Scientific Area (RBSSA), a state-designated 14,000-acre area for the purpose of education, scientific research, and preservation of flora and fauna of scientific or educational value. In addition, the area includes the Mission-Aransas National Estuarine Research Reserve (MANERR), a state and federal partnership that conducts research, education, and stewardship programs funded by the National Oceanic and Atmospheric Administration (NOAA). The MANERR is the third largest National Estuarine Research Reserve (NERR) in the United States and the only NERR in Texas.

In addition to the potential direct, indirect and cumulative effects to these unique aquatic ecosystems, the proposed PCCA project will impact two ESA federally designated critical habitat units, one for piping plovers (*Charadrius melodus)* and the other for loggerhead sea turtles (*Caretta caretta*). This impact is in addition to proposed impacts to habitat occupied by piping plovers, Red Knot (*Calidris canutus rufa*), West Indian manatee (*Trichechus manatus*) green sea turtle (*Chelonia mydas*) hawksbill sea turtle (*Eretmochelys imbricate*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle that are not designated as critical.

AVOIDANCE AND MINIMIZATION: The following is the applicant's statement on how they have avoided and minimized the environmental impacts: PCCA understands that discharges into waters of the US should not occur unless it can be shown that the discharge would not result in an unacceptable adverse impact on the aquatic ecosystem. It is also understood that if there is a practicable alternative to the discharge, the discharge should not occur. A practicable alternative is not available that would meet the proposed project requirements and achieve the project purpose. The proposed project would increase crude oil export efficiency for the Nation, reducing trade deficits, and fostering economic development. The result of the proposed action would be a more efficient channel to export crude oil. The proposed project meets the project purpose and need. The placement alternatives were developed in coordination with resource agencies, and considered public input during open house meetings at the start of the project. The resultant proposed placement alternatives make extensive use of BU to address ecological restoration needs that the agencies desire. The volume of material and volume of sands are valuable assets, and the dredging and placement presents a unique and major opportunity to address restoration needs in this estuary and barrier island system.

COMPENSATORY MITIGATION: The Corps may incorporate consideration of proposed mitigation measures during various stages of its decision making. For instance, mitigation can play a role in the scope of the EIS, in the alternatives to the proposed action, the consequences to that action, and finally in the explanation of the decision rendered. Included in PCCA's application is the statement that impacts to seagrass or wetlands would be offset by reconfiguring the beneficial use (BU) placement sites to be able to host the impacted habitat.

NOTES: This public notice is being issued based on information furnished by the applicant. This project information has not been verified by the Corps. The applicant's plans are enclosed in 23 sheets.

A previous review of this application concluded that an Environmental Impact Statement (EIS) is required.

Our evaluation will also follow the guidelines published by the U.S. Environmental Protection Agency pursuant to Section 404 (b)(1) of the Clean Water Act (CWA).

OTHER AGENCY AUTHORIZATIONS:
Consistency with the State of Texas Coastal Management Plan is required. The applicant has stated that the proposed activity complies with Texas' approved Coastal Management Program goals and policies and will be conducted in a manner consistent with said program.

This project would result in a direct impact of greater than three acres of waters of the state or 1500 linear feet of streams (or a combination of the two is above the threshold), and as such would not fulfill Tier I criteria for the project. Therefore, Texas Commission on Environmental Quality (TCEQ) certification is required. Concurrent with Corps processing of this application, the TCEQ is reviewing this application under Section 401 of the CWA and in accordance with Title 30, Texas Administrative Code Section 279.1-13 to determine if the work would comply with State water quality standards. By virtue of an agreement between the Corps and the TCEQ, this public notice is also issued for the purpose of advising all known interested persons that there is pending before the TCEQ a decision on water quality certification under such act. Any comments concerning this application may be submitted to the Texas Commission on Environmental Quality, 401 Coordinator, MSC-150, P.O. Box 13087, Austin, Texas 78711-3087. The public comment period extends 30 days from the date of publication of this notice. A copy of the public notice with a description of work is made available for review in the TCEQ's Austin office. The complete application may be reviewed in the Corps office listed in this public notice. The TCEQ may conduct a public meeting to consider all comments concerning water quality if requested in writing. A request for a public meeting must contain the following information: the name, mailing address, application number, or other recognizable reference to the application; a brief description of the interest of the requester, or of persons represented by the requester; and a brief description of how the application, if granted, would adversely affect such interest.

The return water from the upland contained dredge material placement area(s) requires an independent certification by the Texas Commission on Environmental Quality (TCEQ). The applicant must obtain a Section 401-water quality certification from the TCEQ for the effluent or return water discharge. A copy of the 401-certification must also be furnished to the Corps of Engineers prior to the Corps making a decision on the proposed project.

Pursuant to 33 USC 408, the proposed project will require Section 408 coordination and review. This is a requirement for activities that seek permission, to temporarily or permanently, alter, occupy, or use a federally authorized United States Army Corps of Engineers civil works project. Changes to the proposed project, from the Section 408 process, may warrant additional coordination.

NATIONAL REGISTER OF HISTORIC PLACES: The staff archaeologist has reviewed the latest published version of the National Register of Historic Places, lists of properties determined eligible, and other sources of information. The following is current knowledge of the presence or absence of historic properties and the effects of the undertaking upon these properties: The proposed activity has the potential to adversely affect historic properties. Therefore, a cultural resources investigation is required to determine if historic properties exist within the permit area.

THREATENED AND ENDANGERED SPECIES: Threatened and/or endangered species or their critical habitat may be affected by the proposed work. Consultation with the U.S. Fish and Wildlife and/or the National Marine Fisheries Service will be initiated to assess the effect on endangered species.

ESSENTIAL FISH HABITAT: This notice initiates the Essential Fish Habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Our initial determination is that the proposed action would have a substantial adverse impact on Essential Fish Habitat or federally managed fisheries in the Gulf of Mexico.

Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the National Marine Fisheries Service.

PUBLIC INTEREST REVIEW FACTORS: This application will be reviewed in accordance with 33 CFR 320-332, the Regulatory Programs of the Corps of Engineers, and other pertinent laws, regulations and executive orders. The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people.

SOLICITATION OF COMMENTS: The Corps of Engineers is soliciting comments from the public, Federal, State, and local agencies and officials, Indian tribes, and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Impact Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

This public notice is being distributed to all known interested persons in order to assist in developing facts upon which a decision by the Corps of Engineers may be based. For accuracy and completeness of the record, all data in support of or in opposition to the proposed work should be submitted in writing setting forth sufficient detail to furnish a clear understanding of the reasons for support or opposition.

PUBLIC HEARING: The purpose of a public hearing is to solicit additional information to assist in the evaluation of the proposed project. Prior to the close of the comment period, any person may make a written request for a public hearing, setting forth the particular reasons for the request. The District Engineer will determine if the reasons identified for holding a public hearing are sufficient to warrant that a public hearing be held. If a public hearing is warranted, all known interested persons will be notified of the time, date, and location.

CLOSE OF COMMENT PERIOD: All comments pertaining to this Public Notice must reach this office on or before **30 August 2019**. Extensions of the comment period may be granted for valid reasons provided a written request is received by the limiting date. **If no comments are received by that date, it will be considered that there are no objections**. Comments and requests for additional information should reference our file number, **SWG-2019-00067**, and should be submitted to:

Regulatory Division, CESWG-RDP
U.S. Army Corps of Engineers
2000 Fort Point Road
Galveston, Texas 77550
361-814-5847 Phone
SWG201900067@usace.army.mil

DISTRICT ENGINEER
GALVESTON DISTRICT
CORPS OF ENGINEERS

SWG-2019-00067; PCCA
CDP Proposed Project Plans
Sheet 1/23

AECOM
5444 Westheimer Road, Suite 400
Houston, Texas 77056
Tel: 713-780-4100

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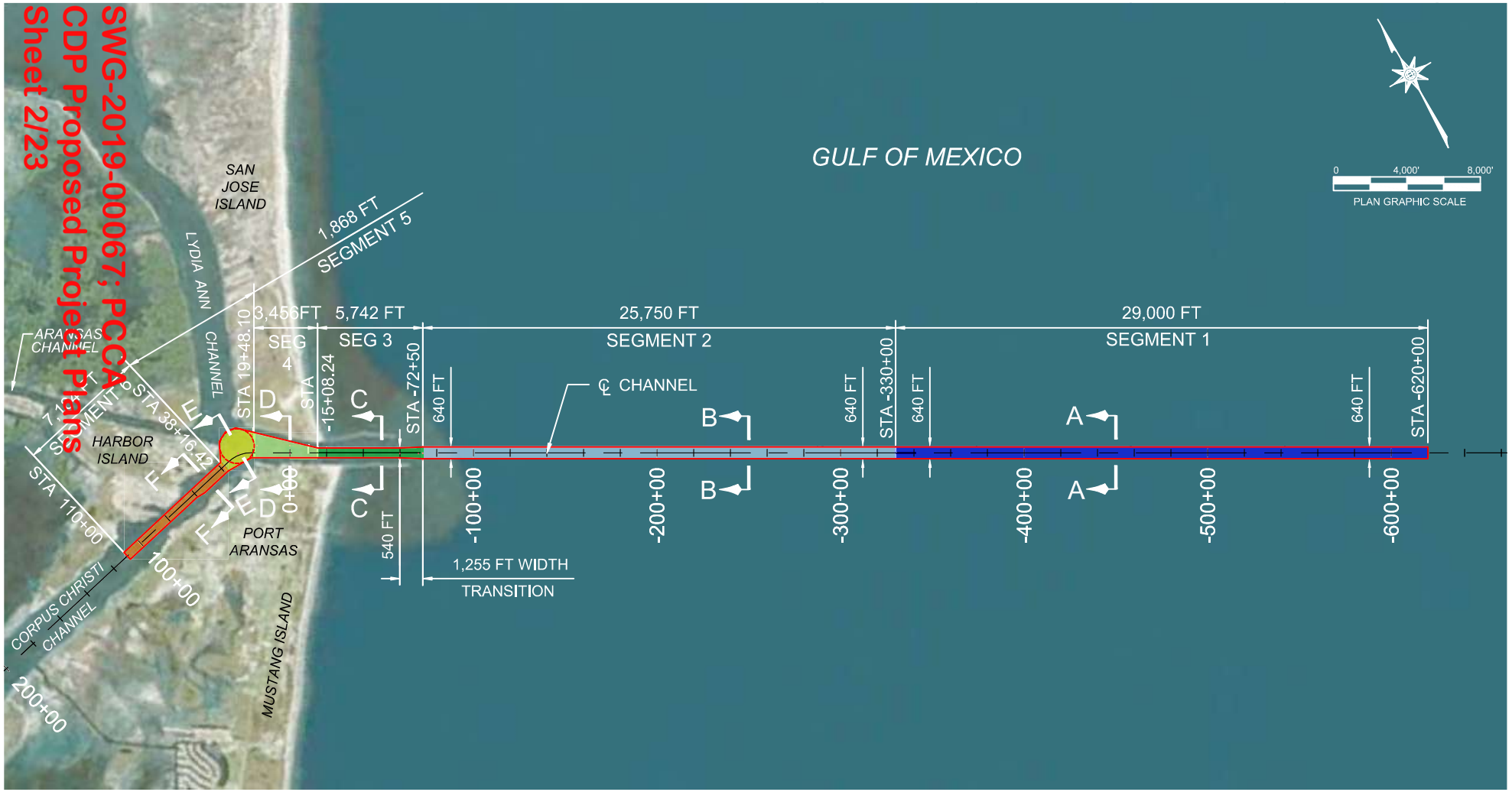
Legend

- Corpus Christi Ship Channel
- CCSC Deepening Extension
- Project Location
- Texas Coastal Boundary
- County Boundary

Vicinity Map

Project:	Corpus Christi Ship Channel Deepening Project
Client:	Port of Corpus Christi Authority
Drawn By:	DS
Date:	5/28/2019
Project No.:	60578532

SWG-2019-00067; PCCA
CDP Proposed Project Plans
Sheet 2/23



DREDGING PLAN

SCALE: 1" = 8000'

SEGMENT	STATIONING (@ CHANNEL CL) FROM	TO	*DEPTH (FT BELOW MLLW)	DESCRIPTION	PLAN VIEW LEGEND
1	STA -620+00	STA -330+00	-77.0	*Outer Channel*	
2	STA -330+00	STA -72+50	-77.0	*Approach Channel*	
3	STA -72+50	STA -15+08.24	-75.0	*Jetties to Harbor Island Transition Flare*	
4	STA -15+08.24	STA 19+48.10	-75.0	*Harbor Island Transition Flare*	
5	STA 19+48.10	STA 38+16.42	-75.0	*Harbor Island Junction*	
6	STA 38+16.42	STA 110+00	-75.0	*Corpus Christi Channel*	

* DESIGN DEPTH SHOWN. DOES NOT INCLUDE 2.0 FT ADVANCED MAINTENANCE DREDGING OR 2.0 FT ALLOWABLE OVER DREDGE.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

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CDP Proposed Project Plans
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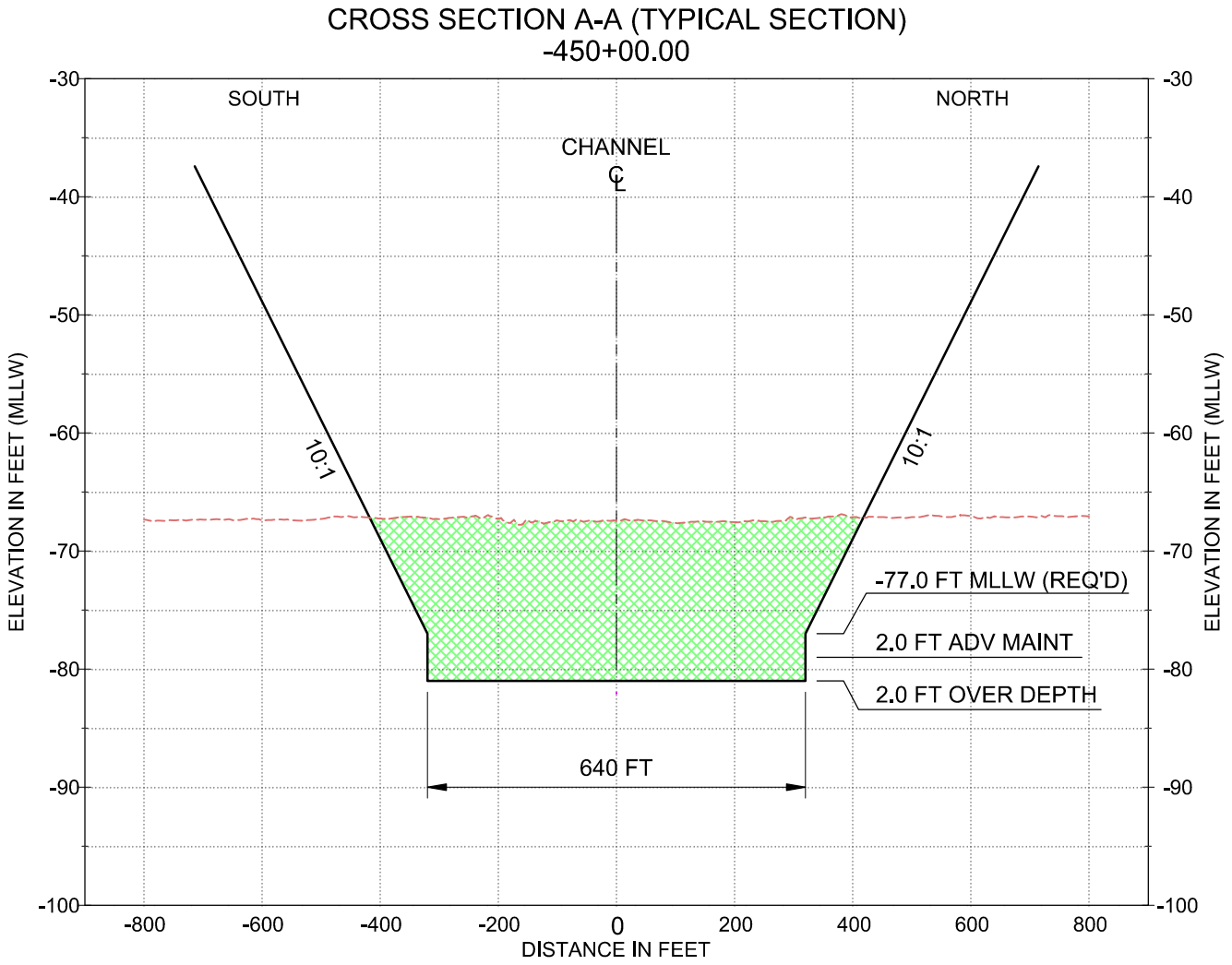

Sheet 3 of 23

CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

0 300'
HORIZONTAL: 1" = 300'

0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative Dredging Cross Section A-A STA -450+00.00

County: Aransas and Nueces
State: Texas
Application By: Port of Corpus Christi Authority
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
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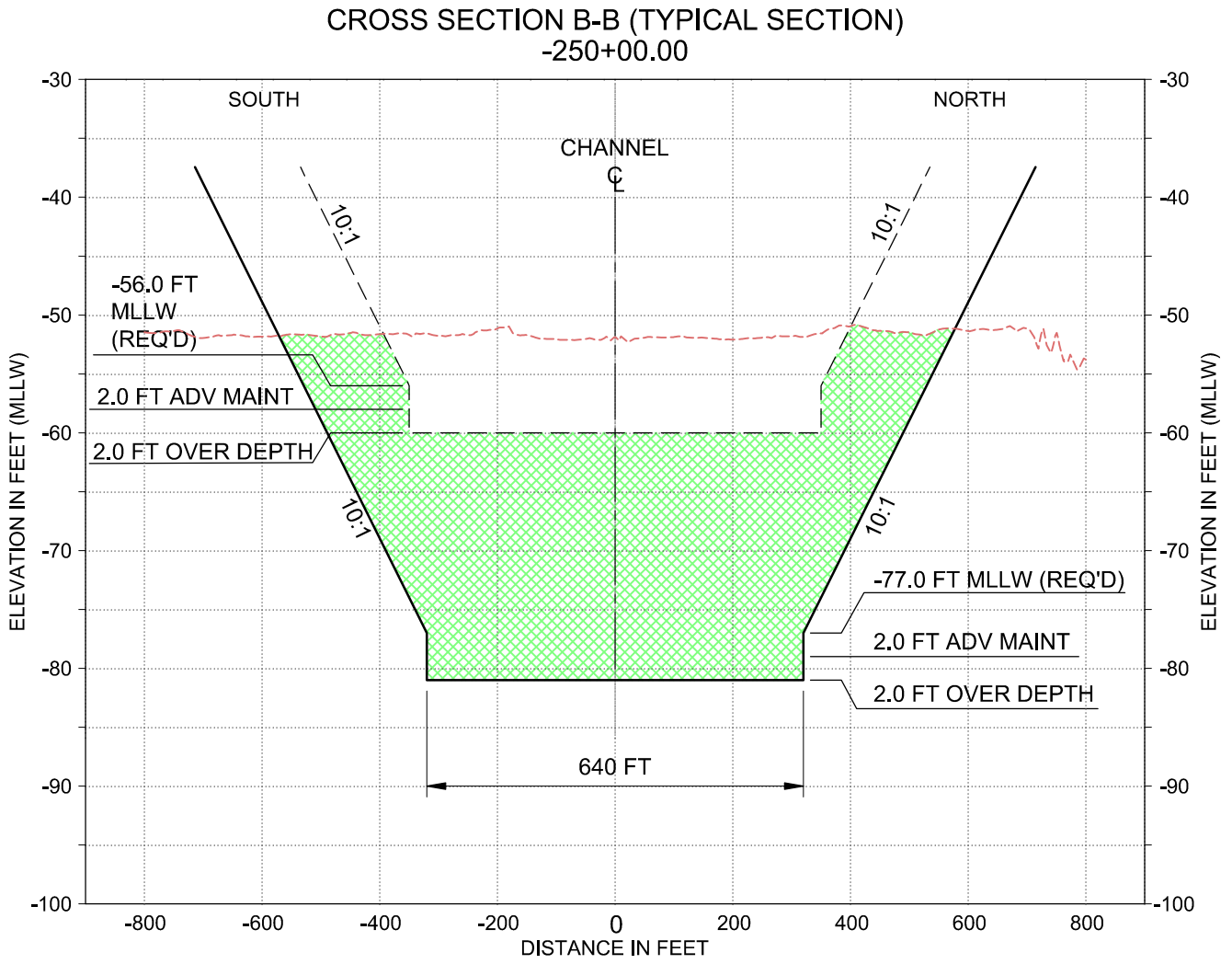


Sheet 4 of 23

CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

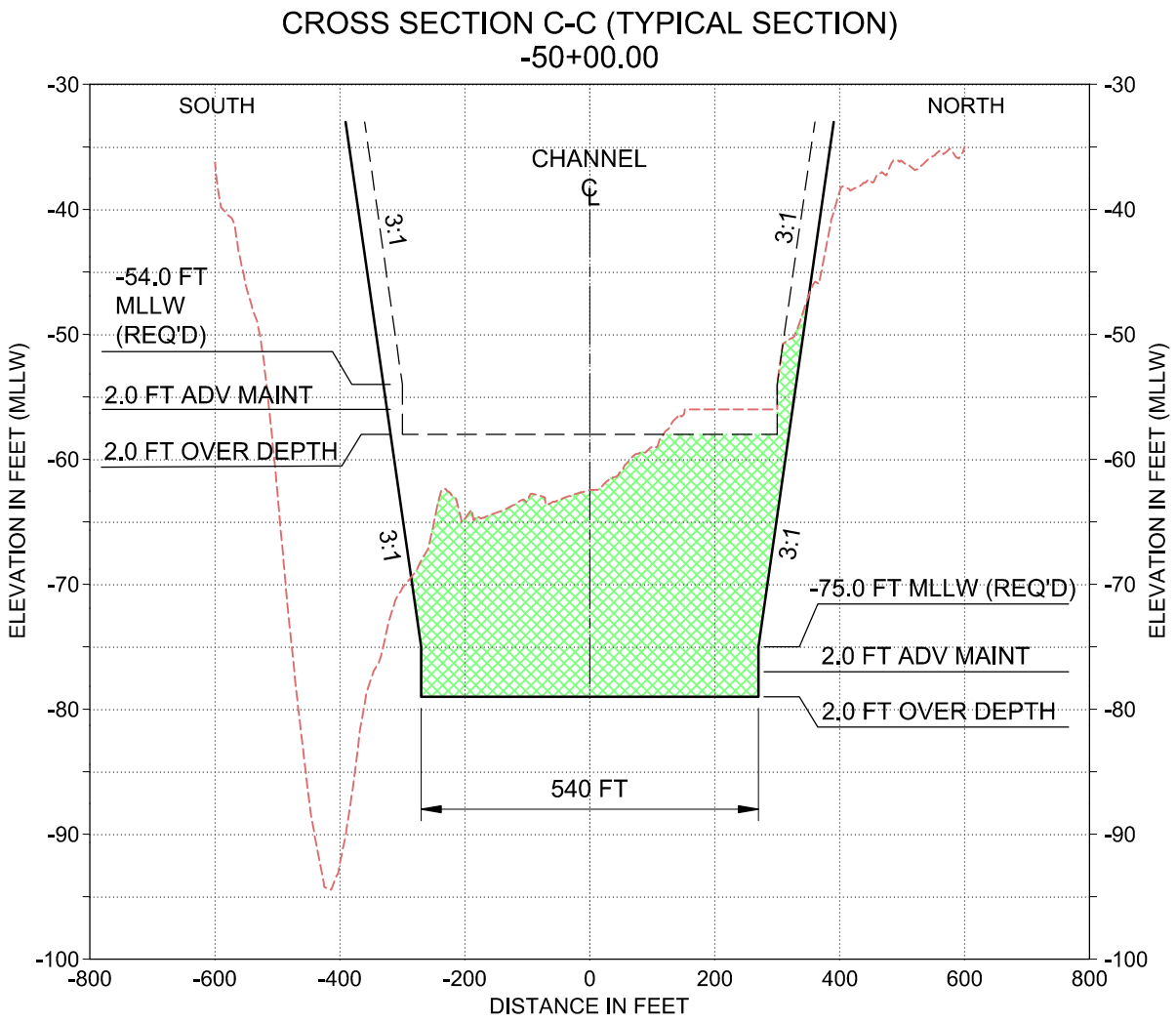
0 300'
HORIZONTAL: 1" = 300'

0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative Dredging Cross Section B-B STA -250+00.00

County: Aransas and Nueces
State: Texas
Application By: Port of Corpus Christi Authority
Date: May 2019



CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

0 300'
HORIZONTAL: 1" = 300'

0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative Dredging Cross Section C-C STA -50+00.00

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

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CDP Proposed Project Plans
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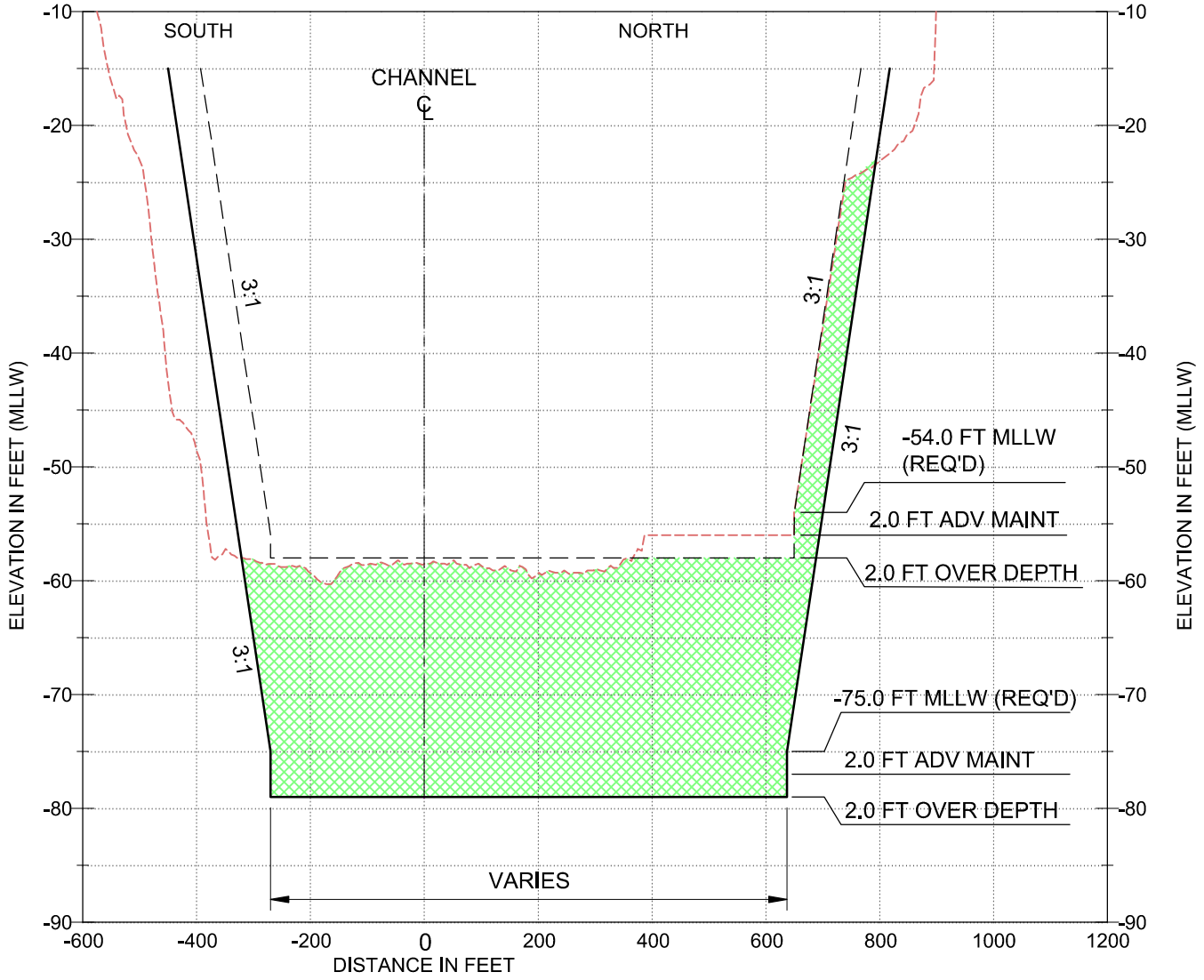
CROSS SECTION D-D (TYPICAL SECTION)
0+00.00



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CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

0 300'
HORIZONTAL: 1" = 300'

0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative Dredging Cross Section D-D STA 0+00.00

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

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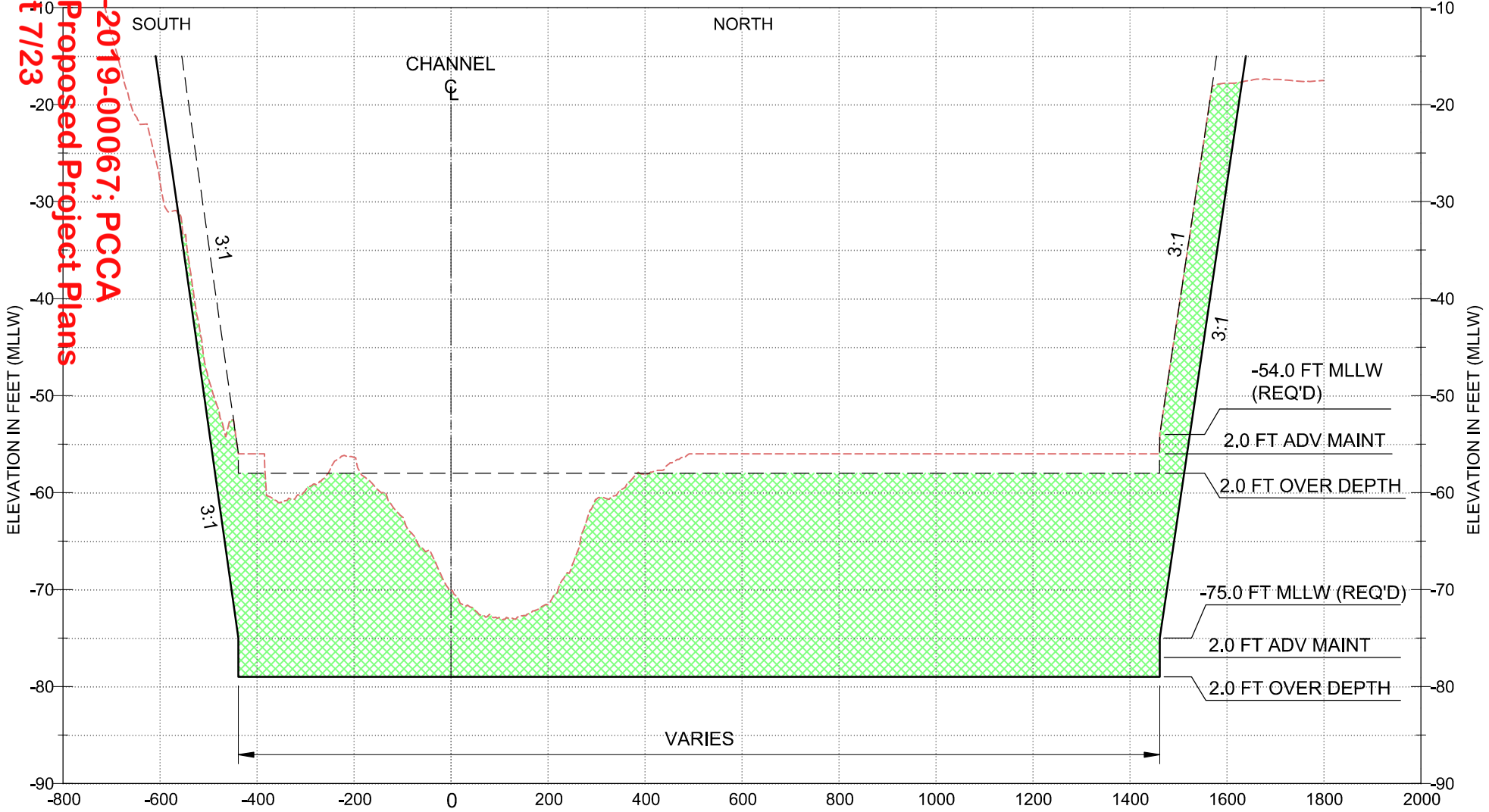
CROSS SECTION E-E (SECTION @ CENTER OF TURNING BASIN)
26+29.90



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CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

0 300'
HORIZONTAL: 1" = 300'

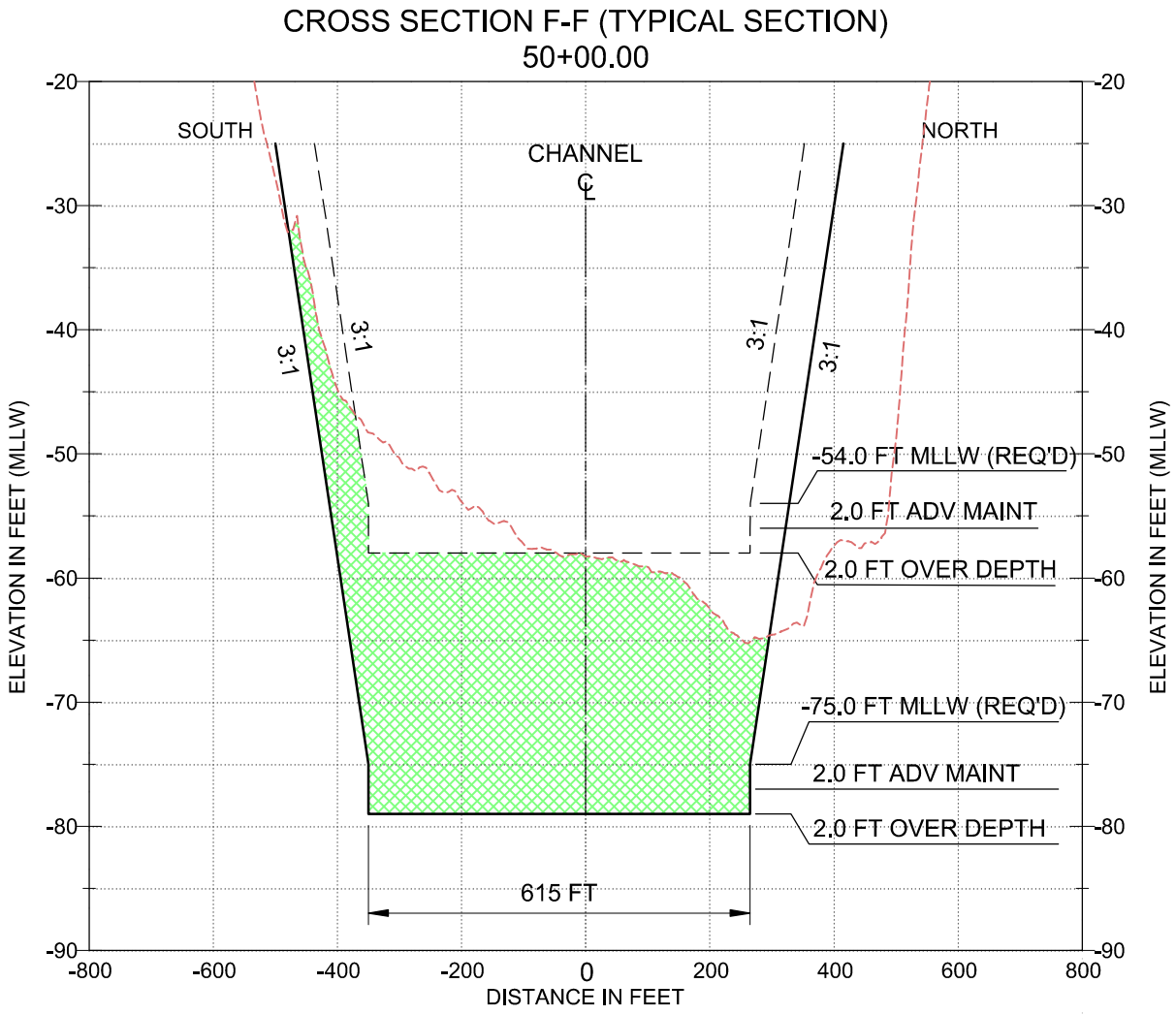
0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative
Dredging Cross Section E-E
STA 26+29.90

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019



CROSS SECTION LEGEND:

- EXISTING BOTTOM
- EXISTING CHANNEL DREDGE TEMPLATE
- PROPOSED CHANNEL
- PROPOSED AREA TO BE DREDGED

CROSS SECTION GRAPHIC SCALES:

0 300'
HORIZONTAL: 1" = 300'

0 15'
VERTICAL: 1" = 15'

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

Preferred Channel Alternative Dredging Cross Section F-F STA 50+00.00

County: Aransas and Nueces
State: Texas
Application By: Port of Corpus Christi Authority
Date: May 2019

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LEGEND

- DEEPENING IMPROVEMENTS (-75' / -77' MLLW)
- DREDGE MATERIAL PLACEMENT AREA
- EXIST OFFHORE PLACEMENT AREA
- EXIST SEAGRASS (RETRIEVED FROM NOAA CSC, 2007)
- EXIST OYSTER REEFS (RETRIEVED FROM TPWD, 2004)
- EXIST PIPELINES (SEE NOTE 4)

GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN MAY 2019 - LAST UPDATED IN SEPTEMBER 2018.
2. HORIZONTAL COORDINATE SYSTEM IS NAD83 TEXAS STATE PLANE, SOUTH ZONE, US FOOT.
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4. PIPELINE DATA FOR ARANSAS AND NUECES COUNTIES RETRIEVED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 19, 2018.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

OVERALL DREDGE MATERIAL PLACEMENT PLAN

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

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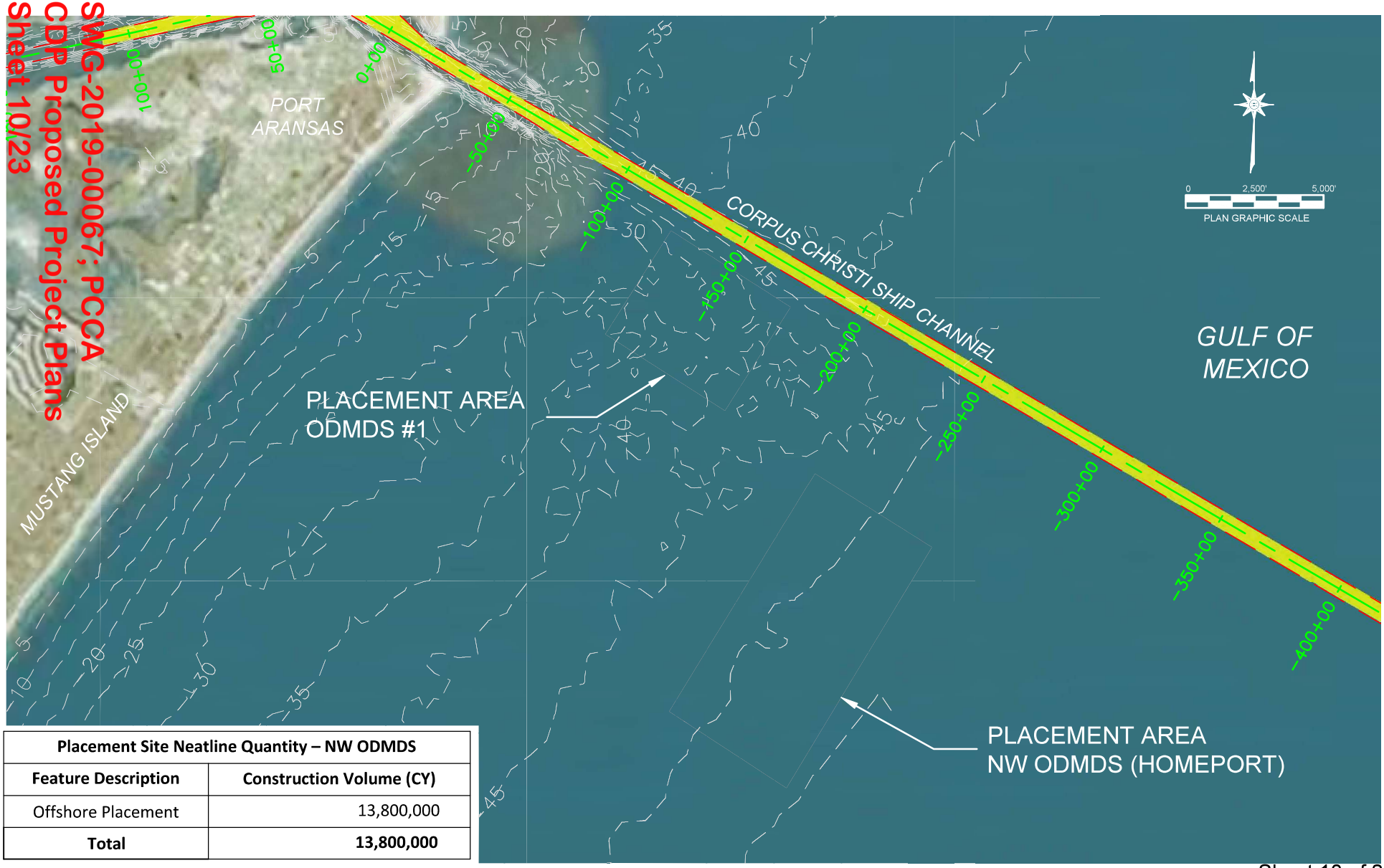

Placement Site Neatline Quantity – NW ODMDS	
Feature Description	**Construction Volume (CY)**
Offshore Placement	13,800,000
Total	**13,800,000**

LEGEND

- DEEPENING IMPROVEMENTS (-75' / -77' MLLW)
- EXIST OFFHORE PLACEMENT AREA
- -40- EXIST CONTOURS

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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

OFFSHORE DREDGE MATERIAL PLACEMENT NW ODMDS (HOMEPORT)

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

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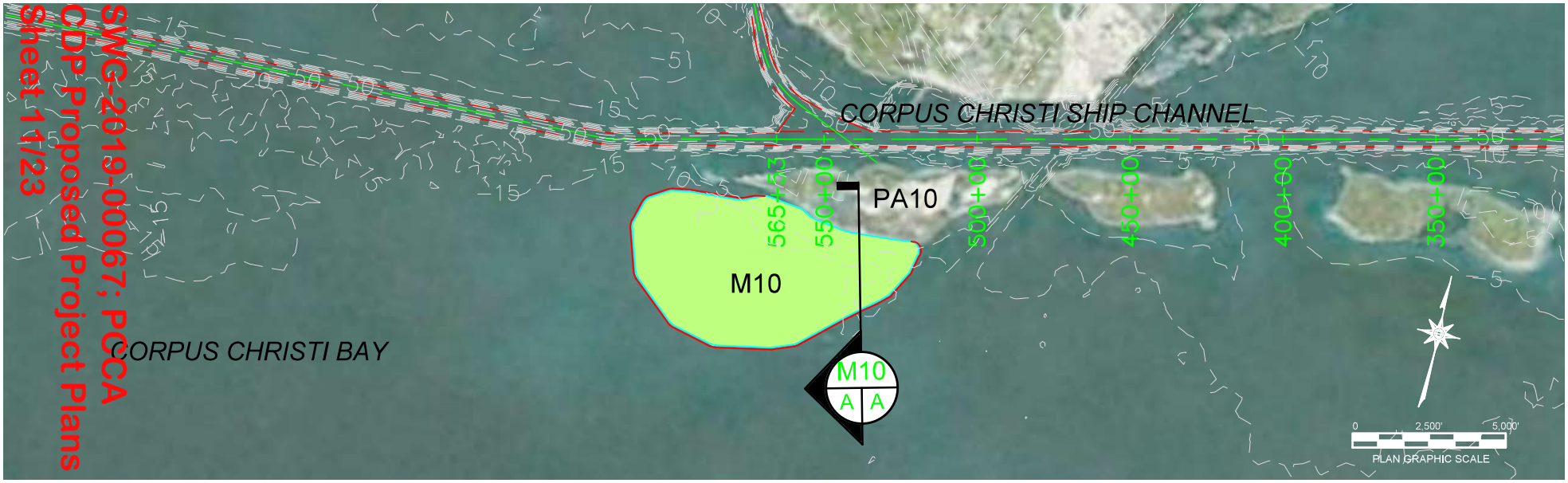
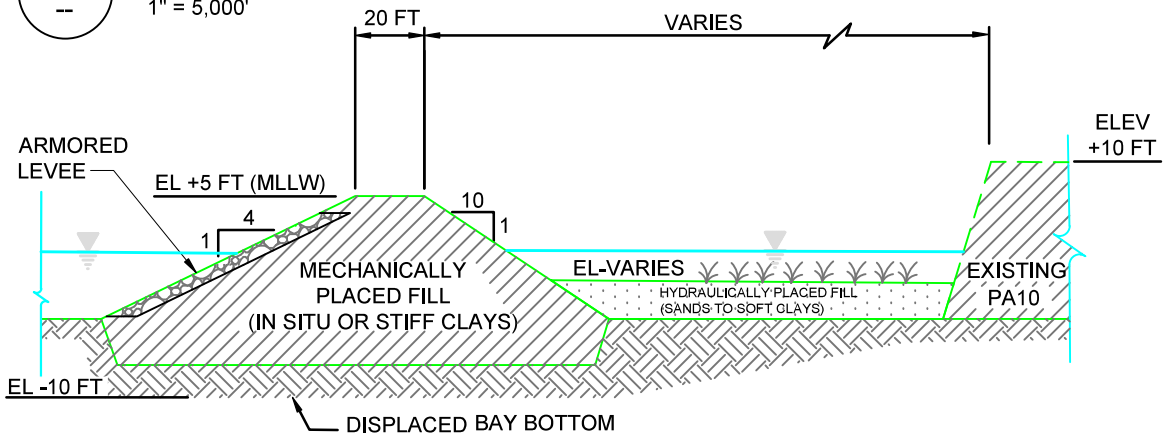


Placement Site Neatline Quantity – Site M10	
Feature Description	**Construction Volume (CY)**
Armoring*	10,667
Levee Creation	997,300
770 Acre Estuarine / Aquatic Habitat	9,936,300
Total	**10,933,600**
*Note: Quantity not included in CY total	

M10 -- PLAN
1" = 5,000'



M10 A A SECTION
NOT TO SCALE

LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- -40- EXIST CONTOURS

GENERAL NOTES

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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE
AND SECTION VIEW - M10
770 ACRE ESTUARINE / AQUATIC HABITAT

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

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CDP Proposed Project Plans
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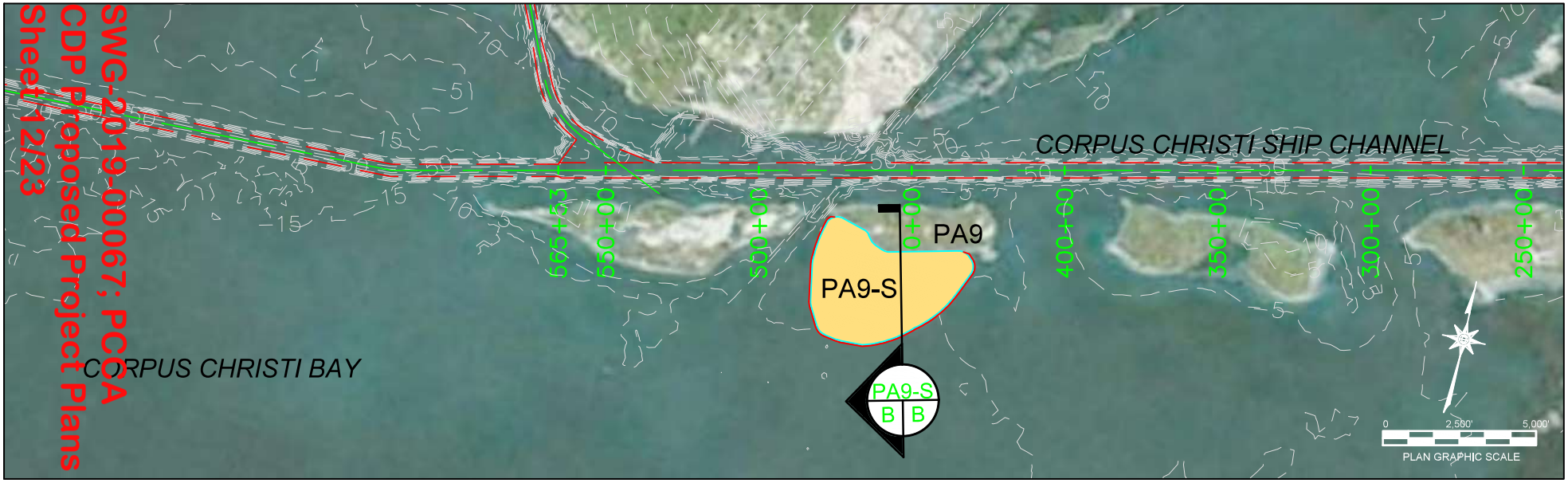
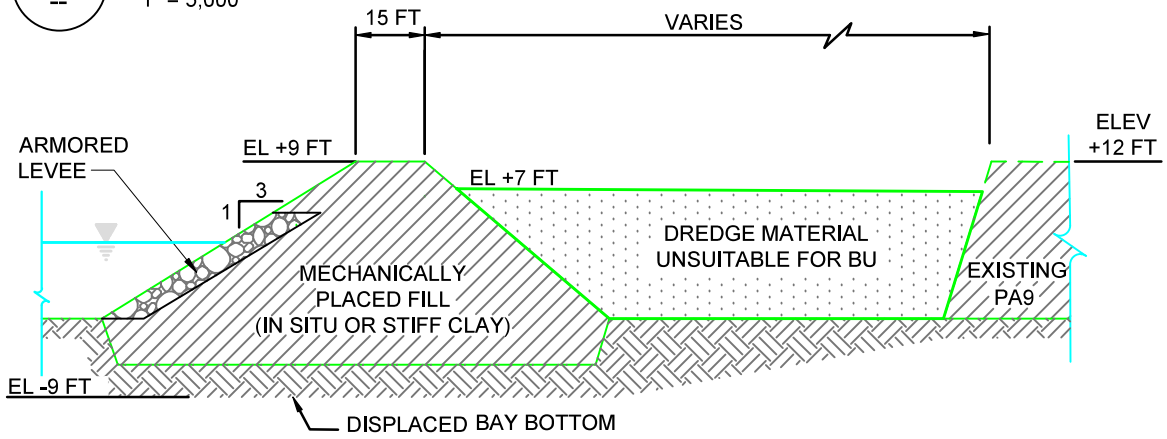


Placement Site Neatline Quantity – Site PA9-S	
Feature Description	**Construction Volume (CY)**
Armoring*	26,400
Levee Creation	500,000
Upland Placement	8,500,000
Total	**9,000,000**
*Note: Quantity not included in CY total	

PA9-S -- PLAN
1" = 5,000'



PA9-S B B SECTION
NOT TO SCALE

LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- -40- EXIST CONTOURS

GENERAL NOTES

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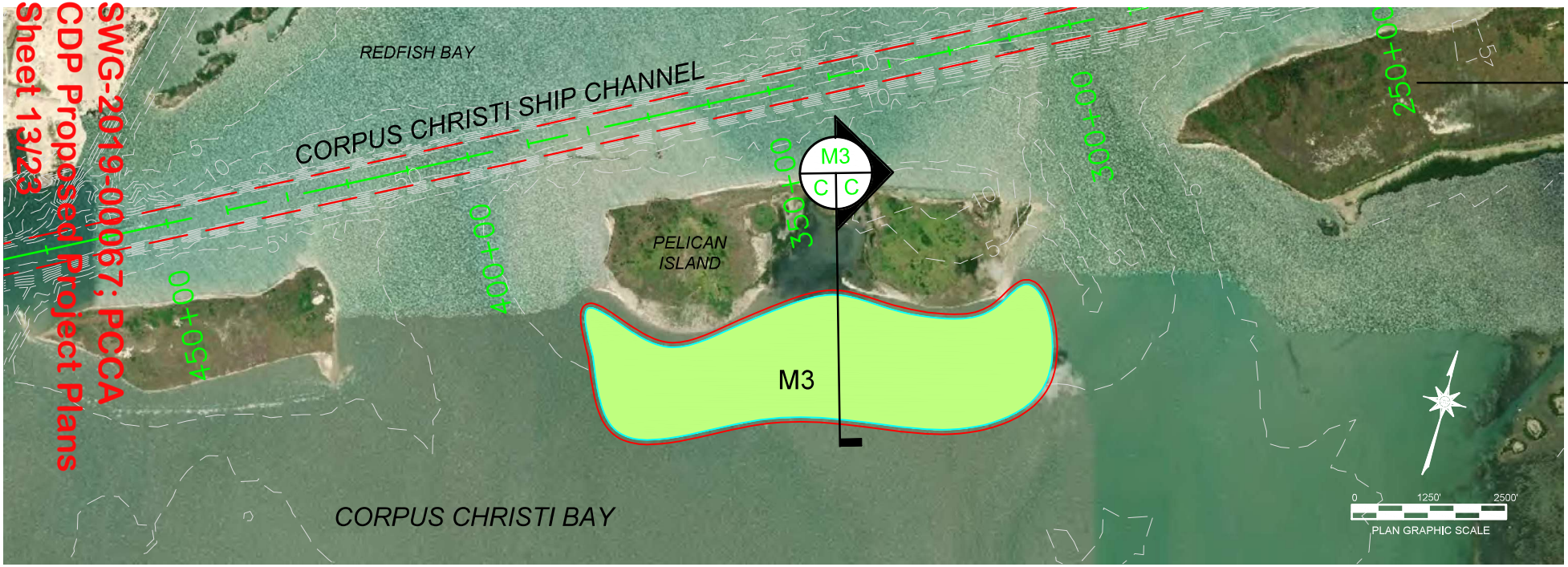
3. VERTICAL DATUM IS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PIPELINE DATA FOR ARANSAS AND NUECES COUNTIES RETRIEVED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 19, 2018.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

SITE AND SECTION VIEW PA9-S
PA9 UPLAND SITE EXPANSION

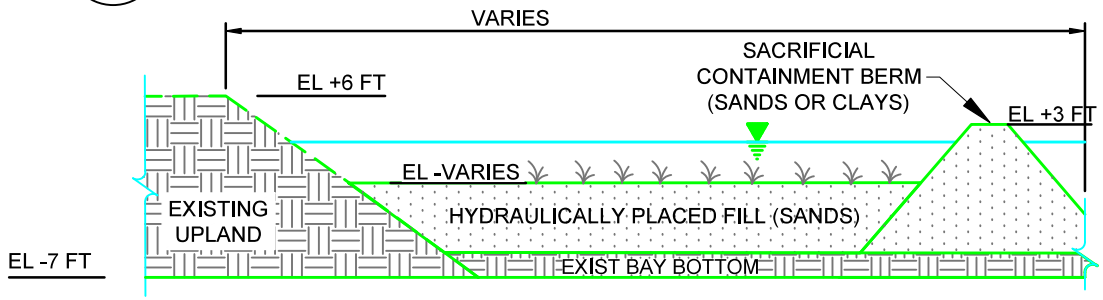
County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019



M3 -- PLAN
1" = 2,500'

Placement Site Neatline Quantity – Site M3	
Feature Description	**Construction Volume (CY)**
300-Acre Estuarine / Aquatic Habitat	3,798,000
Total	**3,798,000**



M3 C C SECTION
NOT TO SCALE

LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- -40- EXIST CONTOURS

GENERAL NOTES

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4. PIPELINE DATA FOR ARANSAS AND NUECES COUNTIES RETRIEVED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 19, 2018.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - M3
300 ACRE ESTUARINE / AQUATIC HABITAT

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

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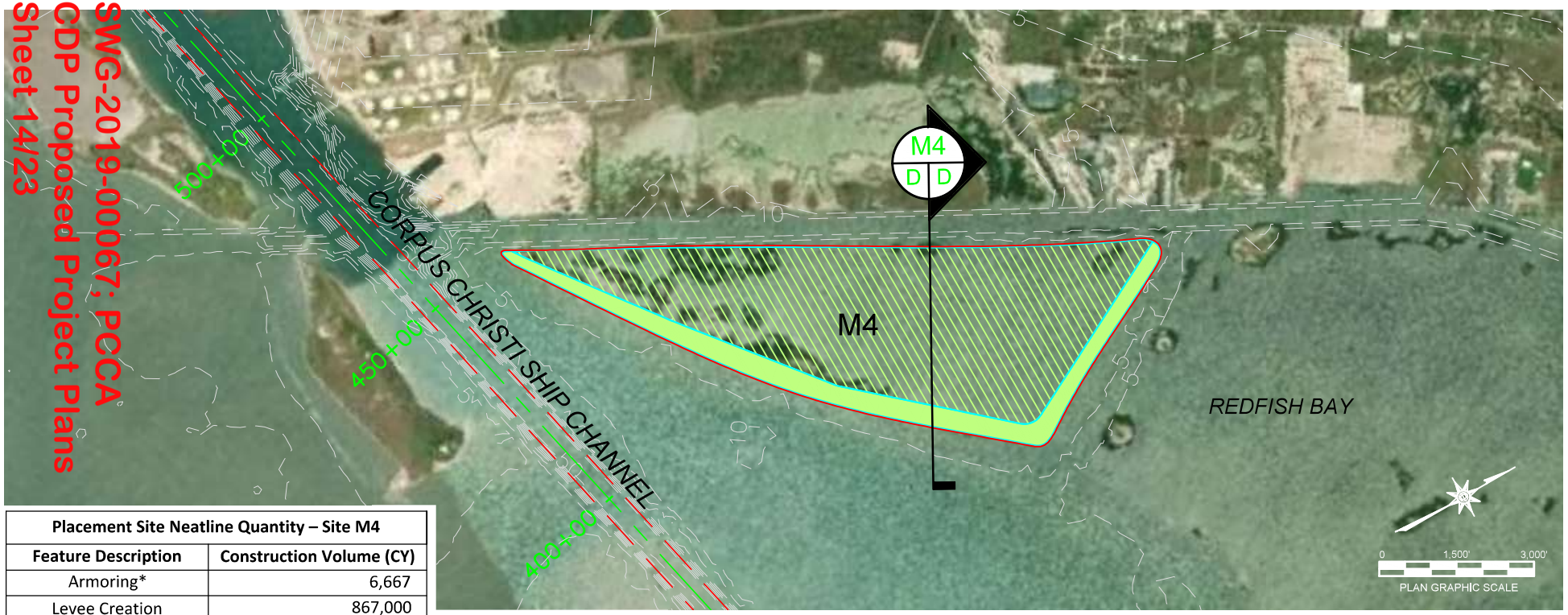
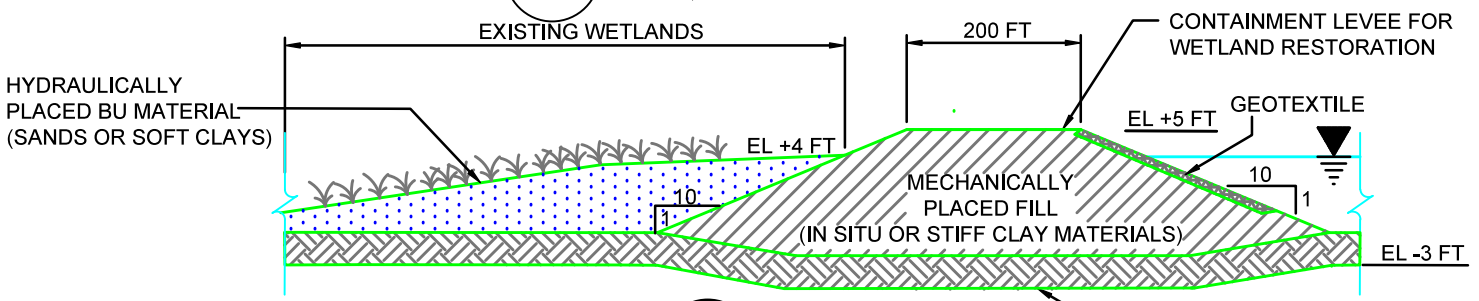


Placement Site Neatline Quantity – Site M4	
Feature Description	**Construction Volume (CY)**
Armoring*	6,667
Levee Creation	867,000
Total	**867,000**
*Note: Quantity not included in CY total	

M4 -- PLAN
1" = 3,000'

NOTE: UPDATES BASED ON EXIST TPWD PERMIT



M4 D D SECTION
NOT TO SCALE

LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- POTENTIAL WETLAND RESTORATION
- -40 EXIST CONTOURS

GENERAL NOTES

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2. HORIZONTAL COORDINATE SYSTEM IS NAD83 TEXAS STATE PLANE, SOUTH ZONE, US FOOT.
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4. PIPELINE DATA FOR ARANSAS AND NUECES COUNTIES RETRIEVED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 19, 2018.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - M4
DAGGER ISLAND LEVEE CREATION

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
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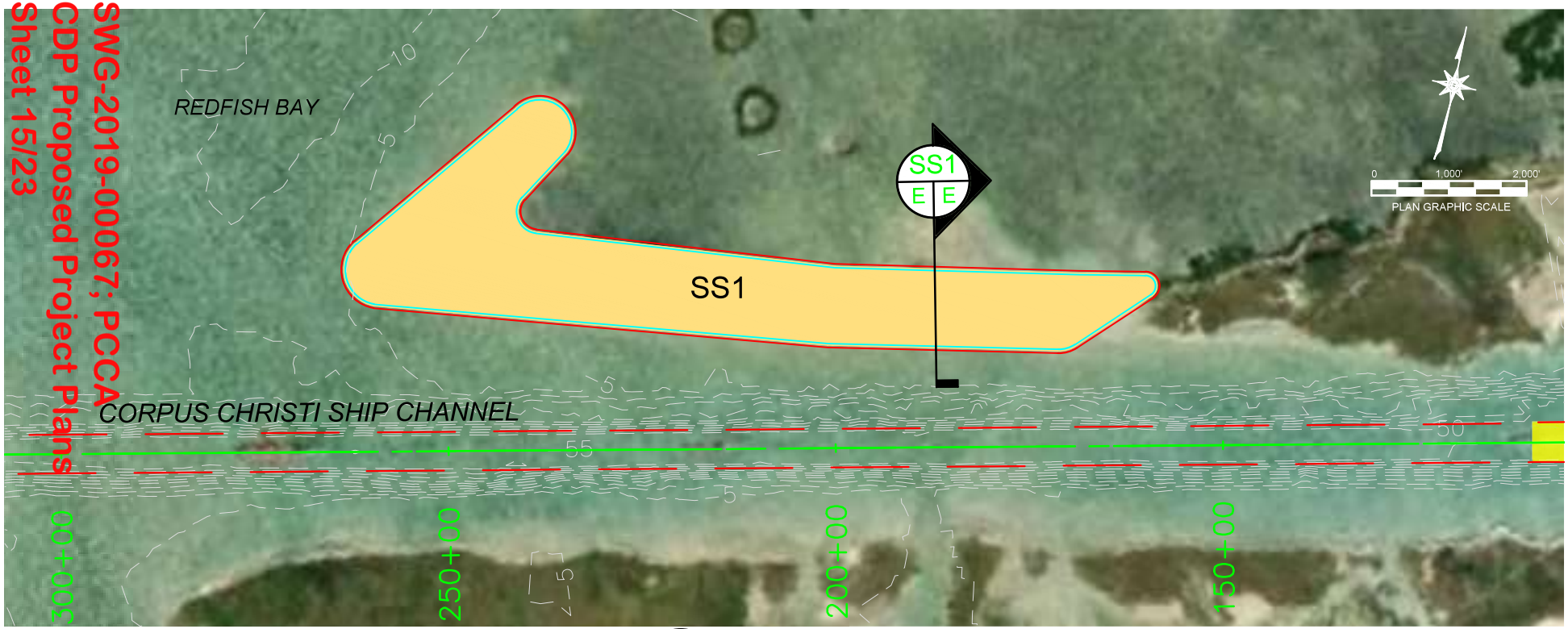
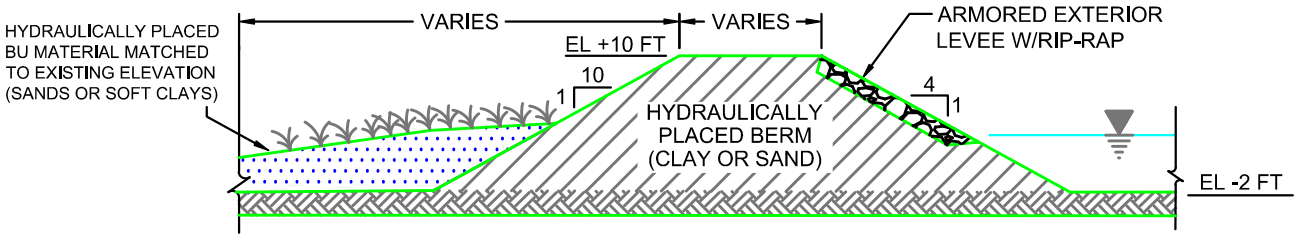


Placement Site Neatline Quantity – Site SS1	
Feature Description	**Construction Volume (CY)**
Armoring*	38,500
Berm Fill	4,800,000
Total	**4,800,000**
*Note: Quantity not included in CY total	

SS1 -- PLAN
1" = 2,000'



SS1 E E SS1
NOT TO SCALE

LEGEND

- EXISTING / PROPOSED SHIP CHANNEL DEEPENING
- DREDGE MATERIAL PLACEMENT
- -40- EXIST CONTOURS

GENERAL NOTES

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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - SS1 SHORELINE STABILIZATION

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
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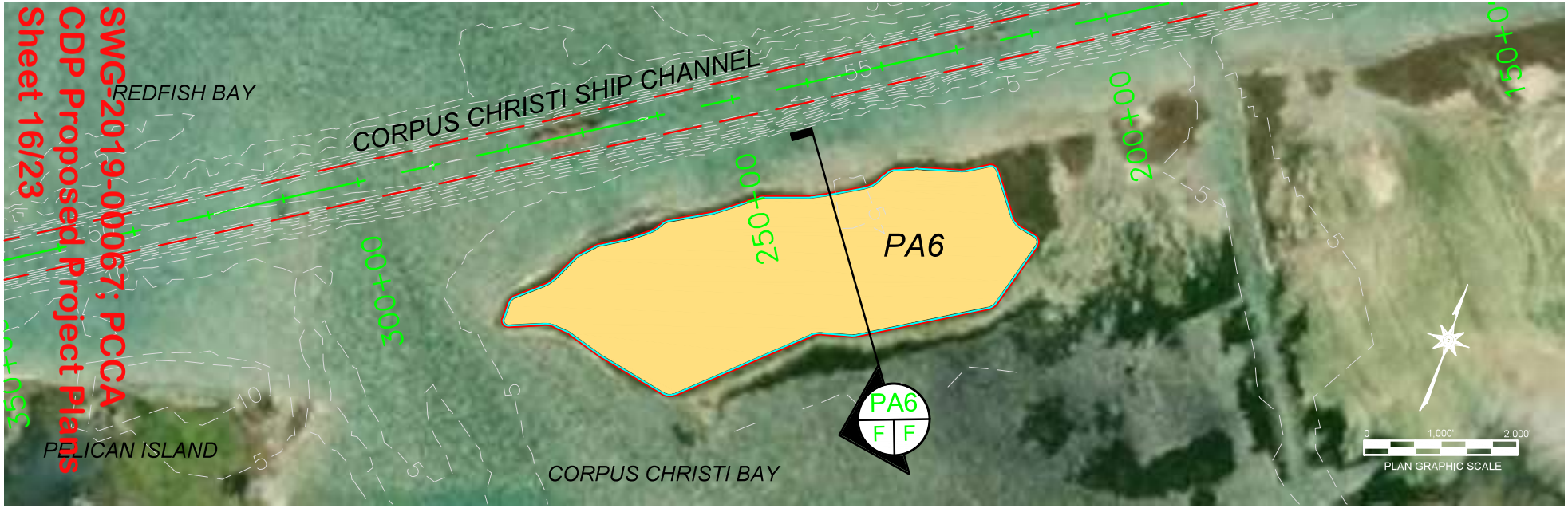
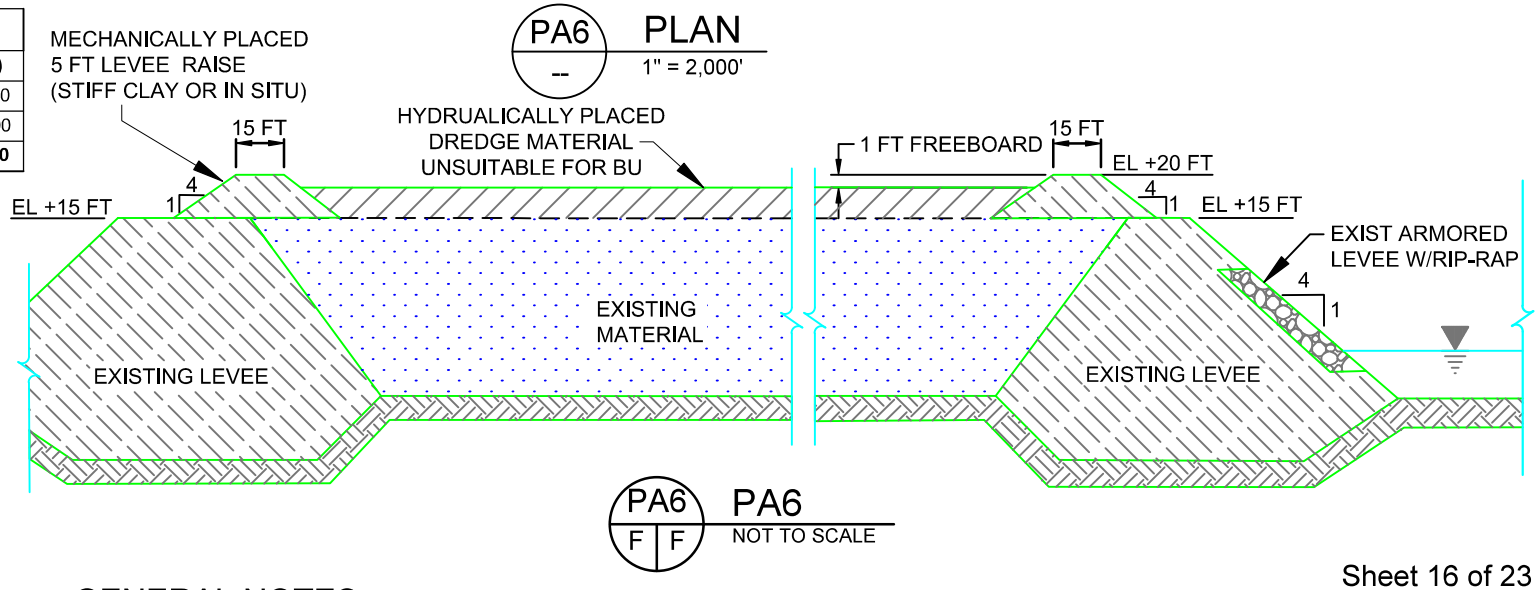


Placement Site Neatline Quantity – Site PA 6	
Feature Description	**Construction Volume (CY)**
5-ft Levee Raise	103,000
PA Fill	1,693,400
Total	**1,796,400**



LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- -40 EXIST CONTOURS

GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN MAY 2019 - LAST UPDATED IN SEPT 2018.
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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

DREDGE MATERIAL PLACEMENT SITE AND SECTION VIEW - PA6 5 FT LEVEE RAISE & FILL

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
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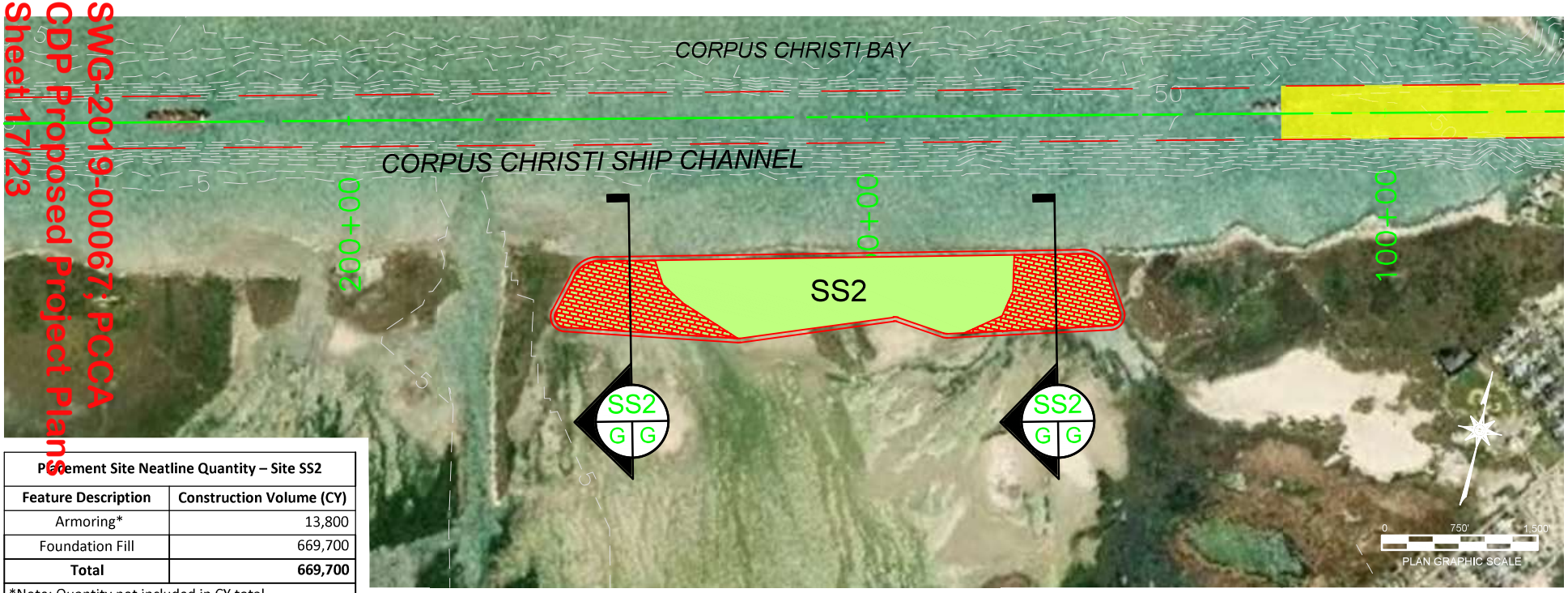
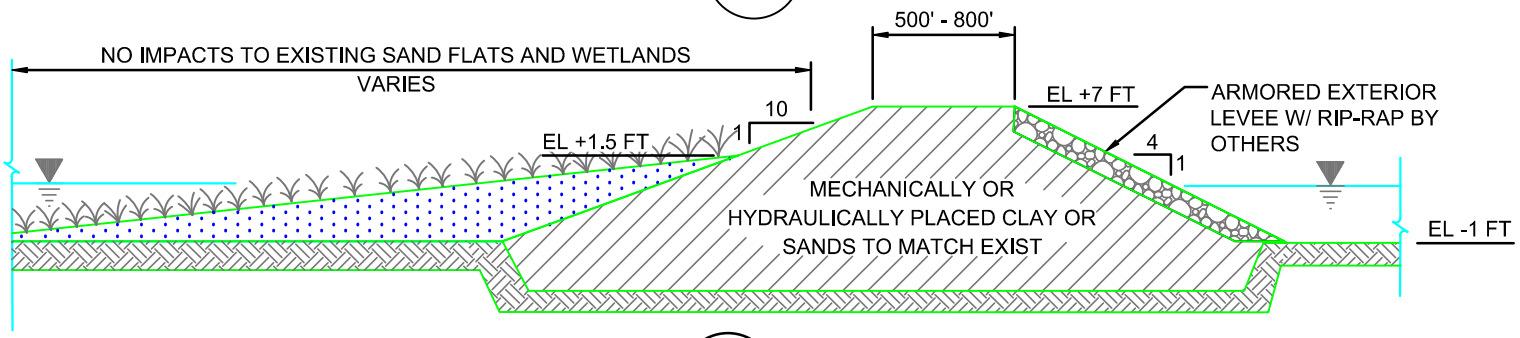


Placement Site Neatline Quantity – Site SS2	
Feature Description	**Construction Volume (CY)**
Armoring*	13,800
Foundation Fill	669,700
Total	**669,700**
*Note: Quantity not included in CY total	

SS2 -- PLAN
1" = 1,500'



SS2 G G SECTION
NOT TO SCALE

LEGEND

- EXISTING / PROPOSED SHIP CHANNEL DEEPENING
- DREDGE MATERIAL PLACEMENT
- -40- EXIST CONTOURS

GENERAL NOTES

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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - SS2 SHORELINE BREACH FILL IN

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
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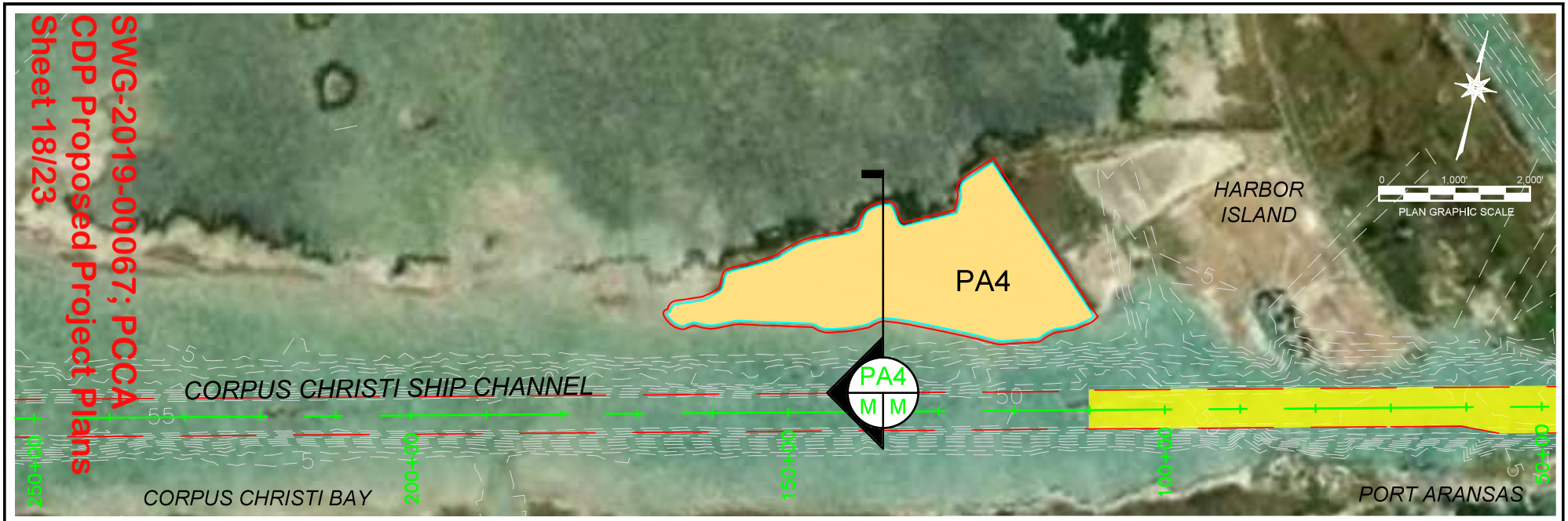
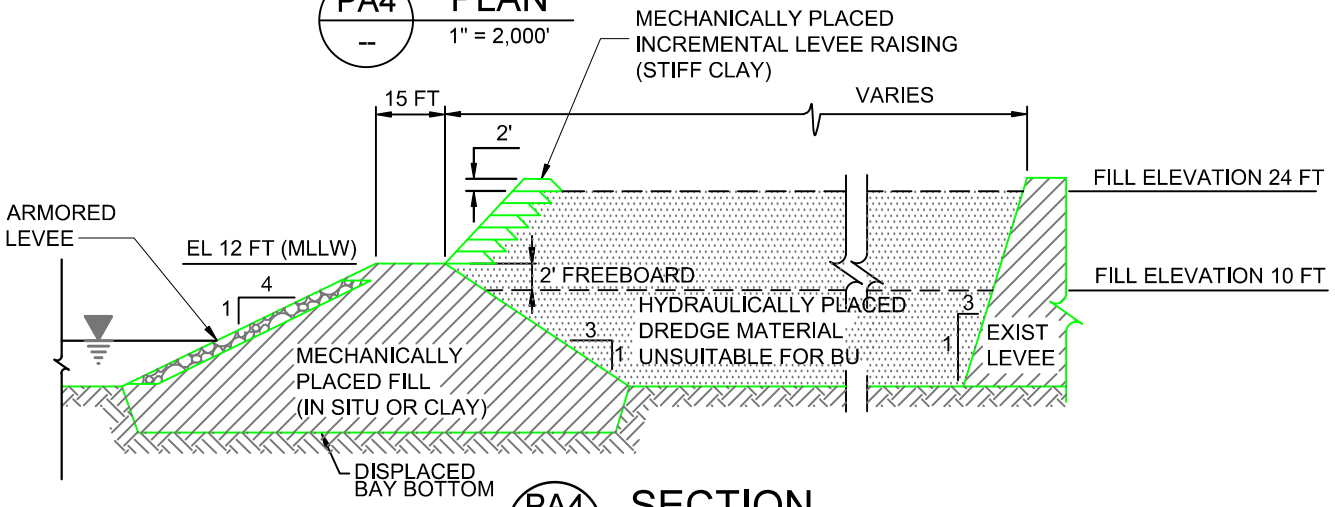


Placement Site Neatline Quantity – Site PA 4	
Feature Description	**Construction Volume (CY)**
Armoring*	17,100
Levee	158,600
PA Fill	2,861,400
Total	**3,020,000**
*Note: Quantity not included in CY total	

PA4 -- PLAN
1" = 2,000'



PA4 M M SECTION
NOT TO SCALE

LEGEND

- EXISTING / PROPOSED SHIP CHANNEL DEEPENING
- DREDGE MATERIAL PLACEMENT
- -40 EXIST CONTOURS

GENERAL NOTES

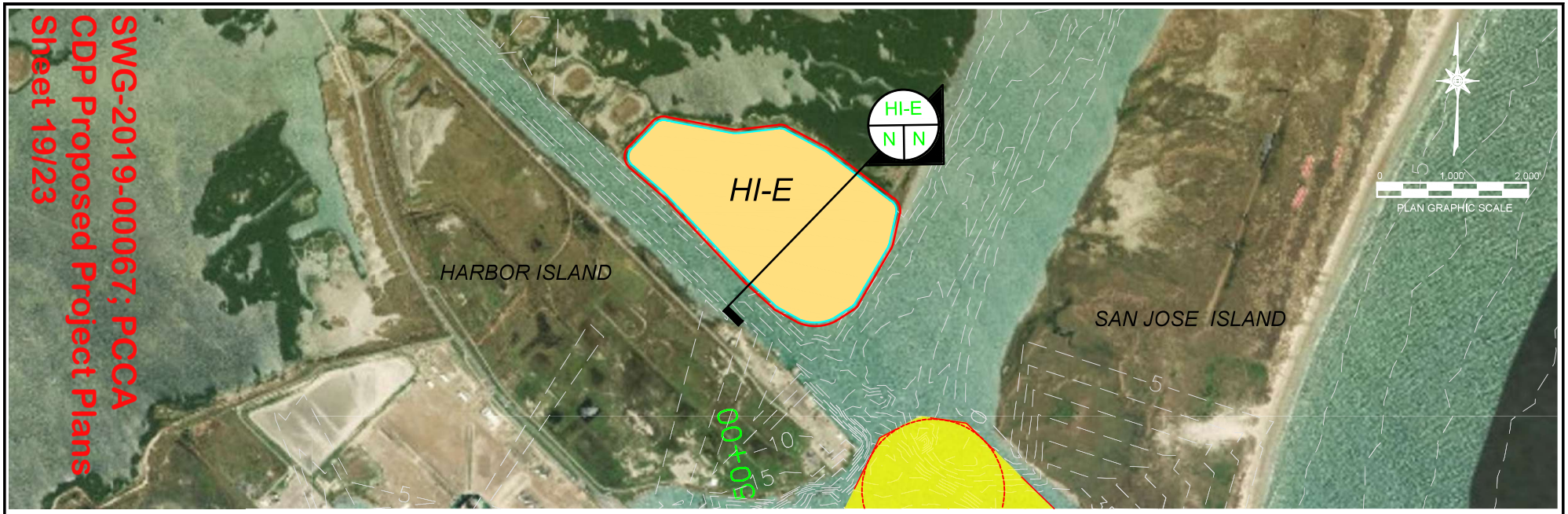
1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN MAY 2019 - LAST UPDATED IN SEPT 2018.
2. HORIZONTAL COORDINATE SYSTEM IS NAD83 TEXAS STATE PLANE, SOUTH ZONE, US FOOT.
3. VERTICAL DATUM IS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PIPELINE DATA FOR ARANSAS AND NUECES COUNTIES RETRIEVED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 19, 2018.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

DREDGE MATERIAL PLACEMENT SITE AND SECTION VIEW - PA4 LEVEE CONSTRUCTION & FILL

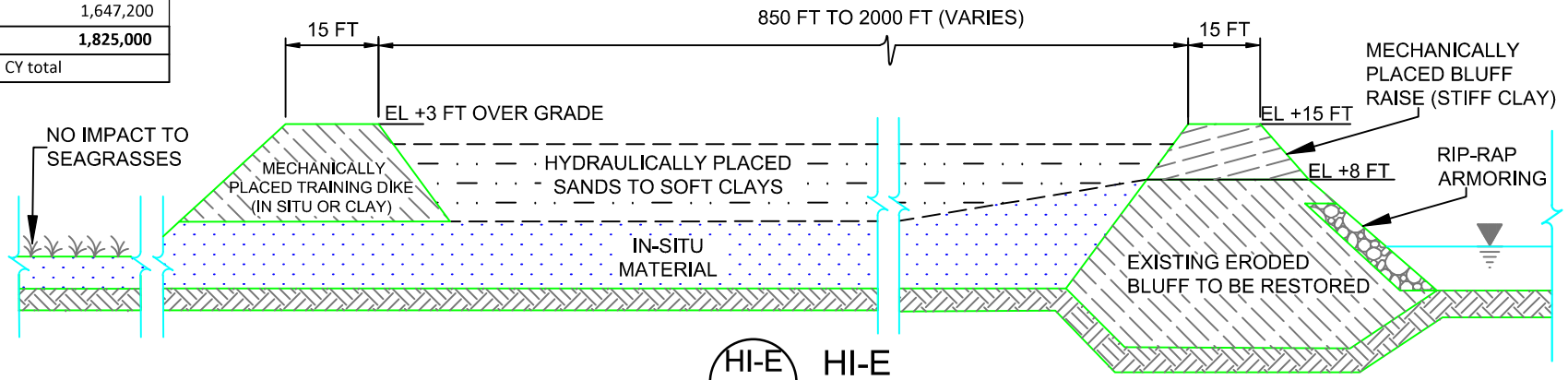
County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
Sheet 19/23



Placement Site Neatline Quantity – Site HI-E	
Feature Description	**Construction Volume (CY)**
Armoring*	23,400
Levee	177,800
Fill Placement	1,647,200
Total	**1,825,000**
*Note: Quantity not included in CY total	

HI-E -- PLAN
1" = 2,000'



HI-E N N HI-E
NOT TO SCALE

LEGEND

- PROPOSED SHIP CHANNEL DEEPENING
- DREDGE MATERIAL PLACEMENT
- -40 EXIST CONTOURS

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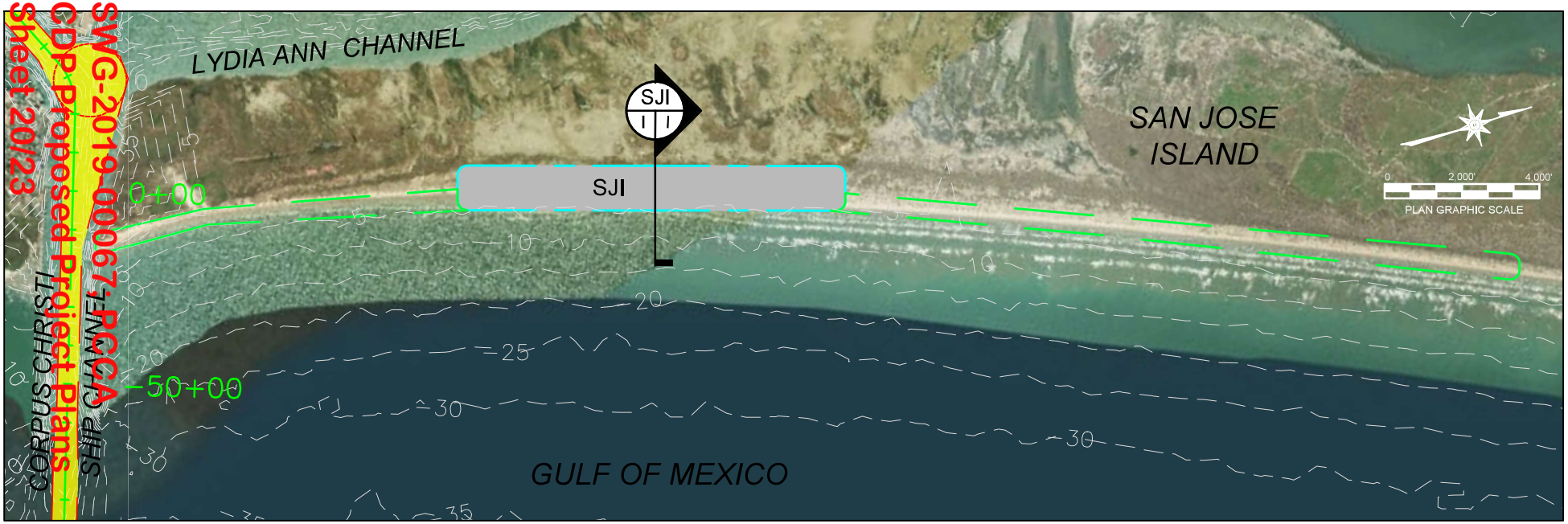
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

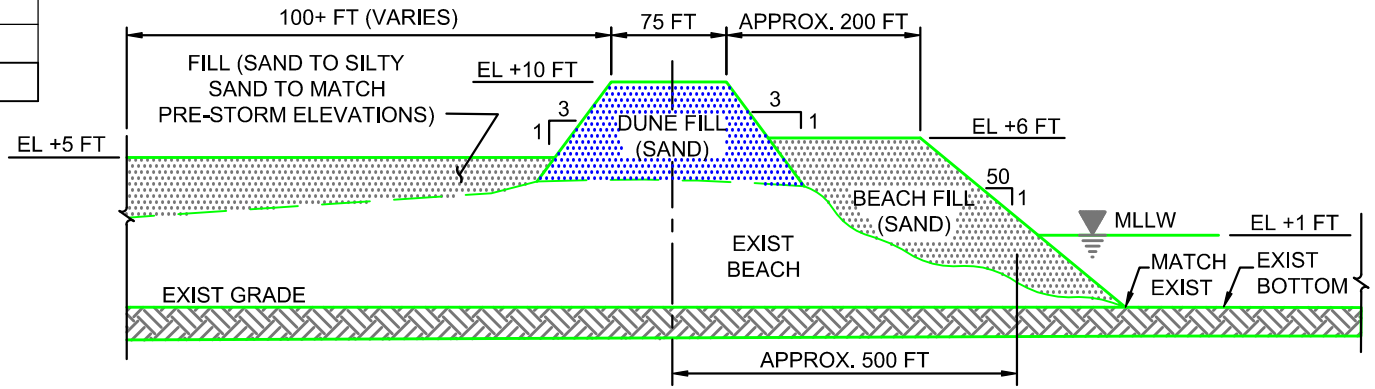
DREDGE MATERIAL PLACEMENT SITE AND SECTION VIEW HI-E SITE GRADING FILL AND SHORELINE RESTORATION

County: Aransas and Nueces
State: Texas
Application By: Port of Corpus Christi Authority
Date: May 2019



Placement Site Neatline Quantity – San Jose Island (SJI)	
Feature Description	**Construction Volume (CY)**
Dune Restoration	2,000,000
Beach Restoration	2,000,000
Total	**4,000,000**

SJI -- PLAN
1" = 4,000'



SJI -- SECTION
NOT TO SCALE

LEGEND

- PROPOSED SHIP CHANNEL DEEPENING
- -40- EXIST CONTOURS
- DUNE RESTORATION
- BEACH RESTORATION

GENERAL NOTES

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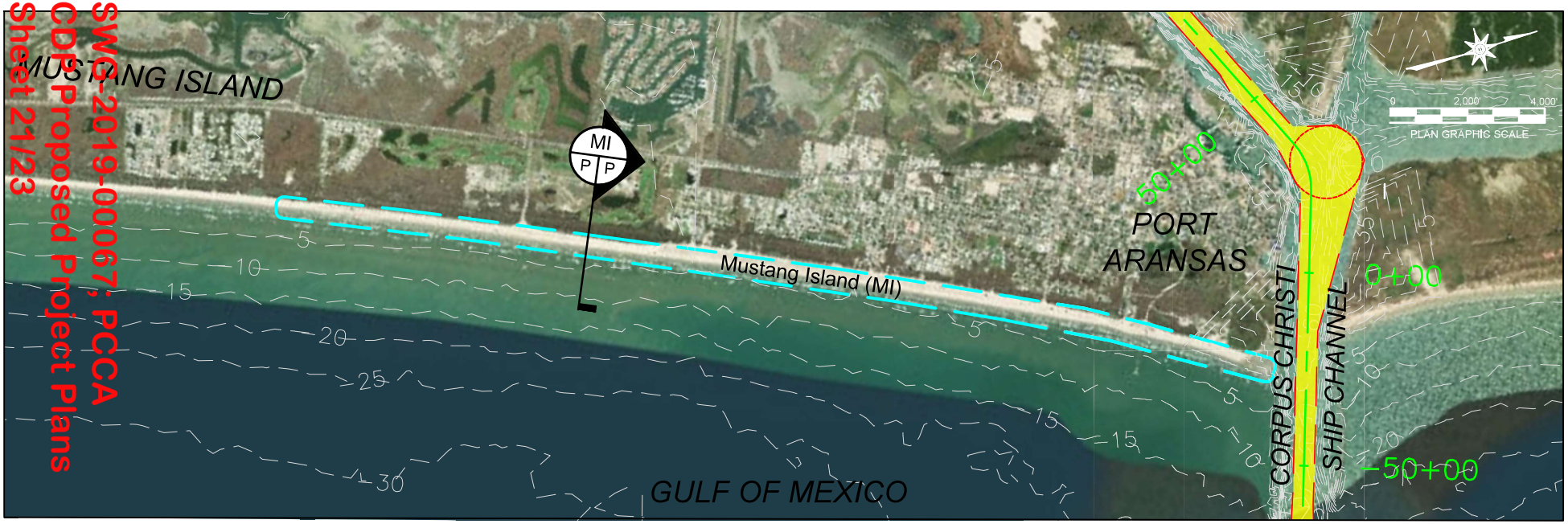
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - SJI DUNE AND BEACH RESTORATION

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

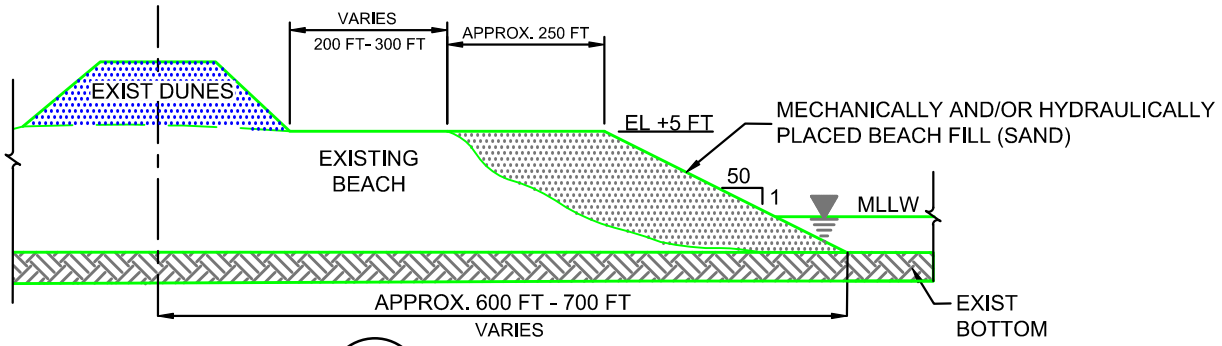
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
Sheet 21/23



Placement Site Neatline Quantity – Mustang Island	
Feature Description	**Construction Volume (CY)**
Beach Nourishment	2,000,000
Total	**2,000,000**

MI -- PLAN
1" = 4,000'



MI P P TYPICAL SECTION
NOT TO SCALE

LEGEND

- PROPOSED SHIP CHANNEL DEEPENING
- -40- EXIST CONTOURS
- BEACH NOURISHMENT

GENERAL NOTES

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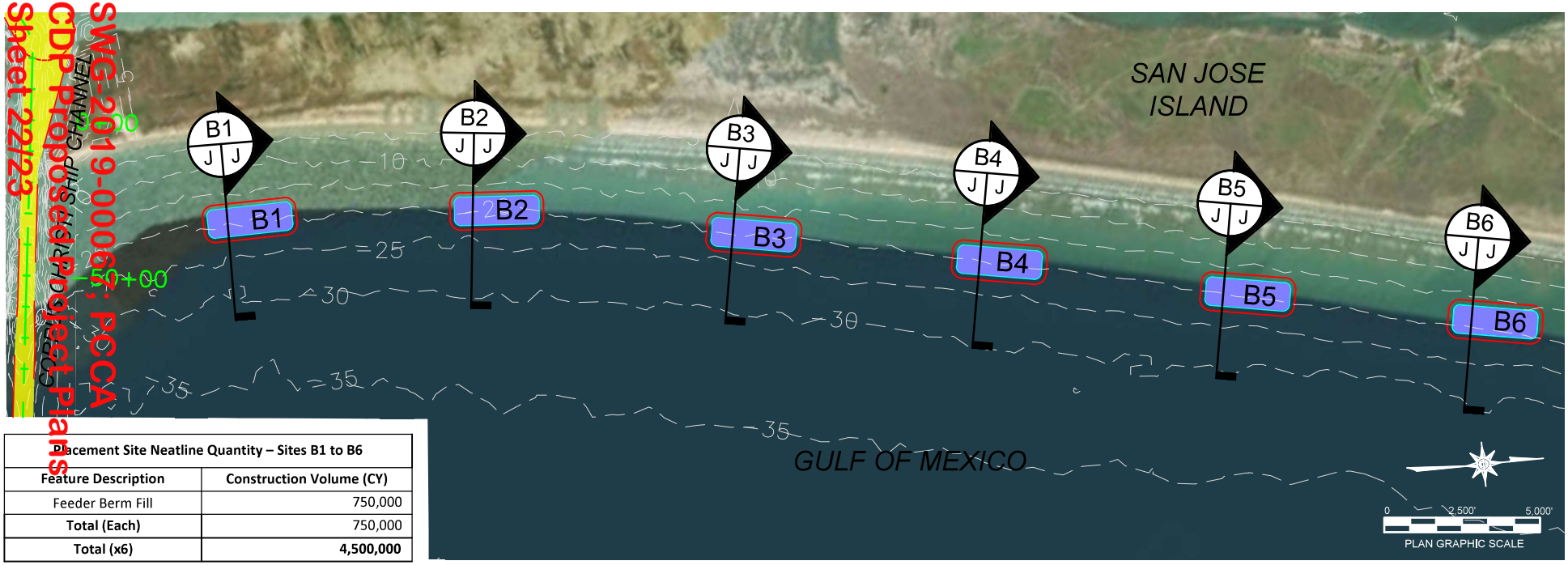
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - MI MUSTANG ISLAND BEACH NOURISHMENT

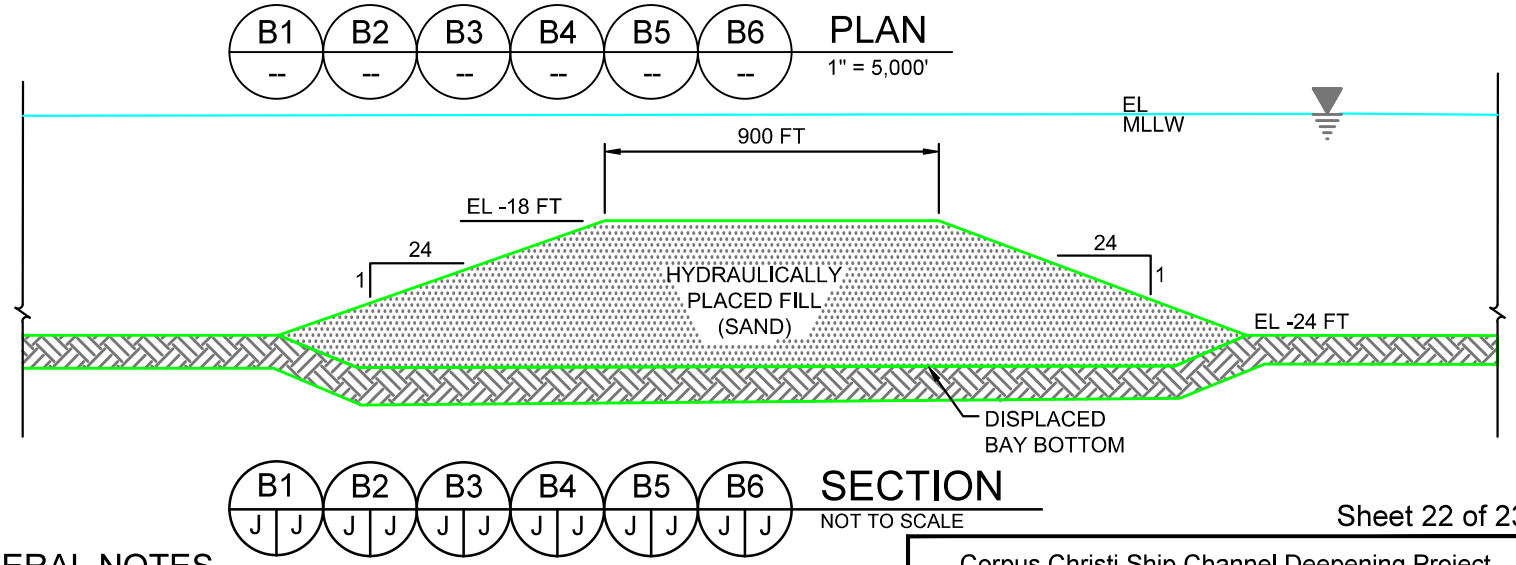
County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019



Placement Site Neatline Quantity – Sites B1 to B6	
Feature Description	**Construction Volume (CY)**
Feeder Berm Fill	750,000
Total (Each)	750,000
Total (x6)	**4,500,000**

BERM CONFIGURATION AND DESIGN TO BE FINALIZED IN P.E.D.

PLACEMENT QUANTITY NOT TO EXCEED AS SHOWN ABOVE.



LEGEND

- PROPOSED SHIP CHANNEL DEEPENING
- DREDGE MATERIAL PLACEMENT
- -40 EXIST CONTOURS

GENERAL NOTES

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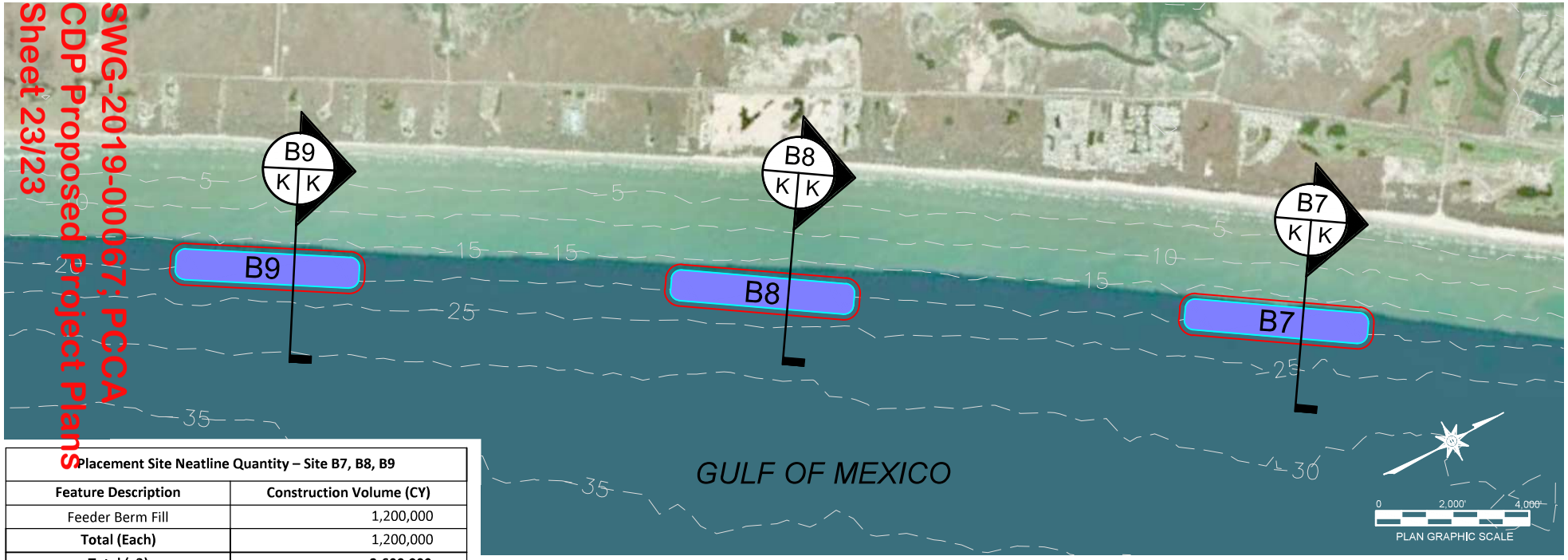
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - B1 TO B6 OFFSHORE FEEDER BERMS

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

SWG-2019-00067; PCCA
CDP Proposed Project Plans
Sheet 23/23

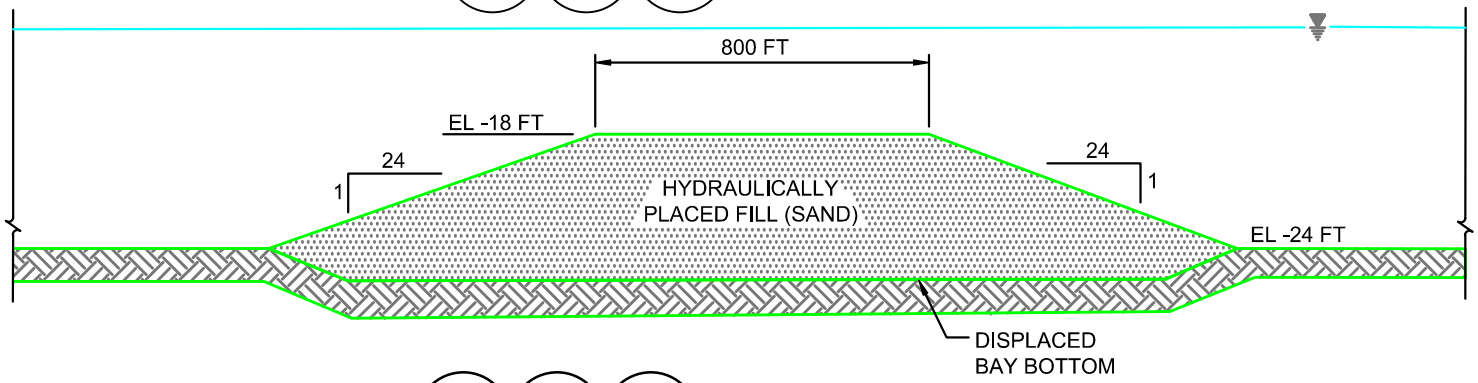


Placement Site Neatline Quantity – Site B7, B8, B9	
Feature Description	**Construction Volume (CY)**
Feeder Berm Fill	1,200,000
Total (Each)	1,200,000
Total (x3)	**3,600,000**

BERM CONFIGURATION AND DESIGN TO BE FINALIZED IN P.E.D.

PLACEMENT QUANTITY NOT TO EXCEED AS SHOWN ABOVE.

B7 -- B8 -- B9 -- PLAN
1" = 4,000'



B7 K K B8 K K B9 K K SECTION
NOT TO SCALE

LEGEND

DREDGE MATERIAL PLACEMENT

-40- EXIST CONTOURS

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Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

BENEFICIAL USE SITE AND SECTION VIEW - B7, B8 & B9 OFFSHORE FEEDER BERMS

County: Aransas and Nueces
Application By: Port of Corpus Christi Authority
State: Texas
Date: May 2019

2.0 PURPOSE AND NEED FOR PROJECT

The purpose of the proposed project is to construct a channel with the capability to accommodate transit of fully laden Very Large Crude Carriers (VLCCs) from multiple locations on Harbor Island into the Gulf of Mexico. Factors influencing the Applicant's need for the project include:

- Allow for more efficient movement of U.S. produced crude oil to meet current and forecasted demand in support of national energy security and national trade objectives,
- Enhance the PCCA's ability to accommodate future growth in energy production, and
- Construct a channel project that the PCCA can readily implement to accommodate industry needs.

Currently, crude oil is exported using Aframax and Suezmax vessels. The Suezmax vessels are sometimes light loaded (lightered) due to depth restrictions in the existing CCSC, and would continue to be light loaded when the current federally-authorized CCSC deepening project is completed. Reverse lightering translates into additional vessel trips, cost, man hours, operational risk, and air emissions. To efficiently and cost effectively move crude oil cargo, oil exporters are increasingly using fully loaded vessels, including VLCCs. Non-liquid commodity movements are also trending toward larger, more efficient vessels. In order to fulfill its mission of leveraging commerce to drive prosperity in support of national priorities, the PCCA must keep pace with the global marketplace.

The need for the proposed project is driven by the considerations below, which are explained in the following paragraphs:

- Pipelines from Eagle Ford and Permian Basins are being constructed to the Port of Corpus Christi and to Harbor Island. Crude oil terminals are also being planned at Harbor Island using the Federally-authorized -54-foot deep channel that limits the ability to fully load VLCCs, decreasing efficiency by requiring reverse lightering of these vessels.
- Bolstering national energy security through the growth of U.S. crude exports.
- Protecting national economic interests by decreasing the national trade deficit.
- Supporting national commerce by keeping pace with existing and expanded infrastructure being modified or already under development to export crude oil resulting from the large growth in the Permian and Eagle Ford oil field development, which has helped the U.S. recently become the top oil-producing nation in the world.
- Improve safety and efficiency of water-borne freight movements.

The infrastructure and proximity to the major Texas shale plays makes the Port an attractive location for efficiently exporting crude oil by VLCC vessels. The PCCA has received interest from new and existing customers for developing crude oil export terminals and facilities. Production and export of crude oil and natural gas have greatly increased over the years and are providing an economic boom to the Port and the region.

Investments at the PCCA that are directly aimed at product from the Eagle Ford Shale are over $100 million. In the latter part of July 2018, the PCCA sold more than $216 million in bonds to fund energy export products. A portion of this money will be used for the authorized deepening of the CCSC, but

also will help fund other improvements, including a crude oil export terminal under design at Harbor Island. The new oil export terminals being planned at the Port will have loading arms, handling equipment, storage tanks, and other related facilities for larger ships including VLCCs. Similar crude export facilities are being planned by multiple other entities at Harbor Island.

More efficient transport of crude in greater volumes is the impetus for the PCCA to deepen the channel to accommodate fully loaded VLCCs. Presently, the existing channel depth requires that current crude carriers, whether VLCCs or other vessels, not depart fully loaded from the Port, or that VLCCs remain offshore while smaller tankers transfer their cargo to the larger VLCCs, a process known as reverse lightering. The inefficiency of this process is compounded by some of these smaller vessels not being able to be fully loaded while moving through the Port.

Production from the Permian and Eagle Ford basins continues to increase, and several of the major midstream companies are currently undergoing major expansions to facilitate the export of greater volumes of crude. As these exports increase, the number of lightering vessels and product carriers will also increase, adding to shipping delays and congestion inside and outside of the Port. These delays and congestion will increase the cost of transportation, which in turn will increase the cost of crude oil with the ultimate consequence of making U.S. crude less competitive in the global market.

3.0 SITE ANALYSIS

The proposed project is located in the Gulf of Mexico, the southern portion of Corpus Christi Bay, and Redfish Bay near Port Aransas as shown in Sheet 1 of 23. The Port is located in Corpus Christi Bay on the south-central portion of the Texas coast, approximately 200 miles southwest of Galveston and approximately 150 miles north of the mouth of the Rio Grande. The CCSC provides deep water access from the Gulf of Mexico to the Port via Port Aransas, through Corpus Christi Bay. The CCSC extends from deep water in the Gulf of Mexico approximately 4.3 miles offshore through the Port Aransas jettied entrance, then continues for 21 miles westward to the Inner Harbor. The proposed project would be constructed within the limits of the CCSC from the Gulf of Mexico to Harbor Island, which comprises the Entrance Channel segment and approximately 2,000 linear feet of the Lower Bay segment of the CCSC. The Entrance Channel segment of the CCSC is currently maintained to a depth of -49 feet MLLW, and the Lower Bay segment to a depth of -47 feet MLLW. The CCSC has been federally authorized to a depth of -56 feet MLLW from the Gulf of Mexico to the end of the jetties in the Entrance Channel segment, and to -54.0 feet MLLW in the Lower Bay segment. Dredging work to reach the authorized depths is scheduled to begin in mid-2019.

Affected Waters

The proposed improvements to the CCSC would take place in the open water marine environment of the Gulf of Mexico and Corpus Christi Bay. Waters in the project area are navigable waters of the United States (WOUS) regulated by the USACE under Section 10 of the Rivers and Harbors Act of 1899. The areas of proposed channel deepening are unvegetated. Deepening of the CCSC would take place in WOUS, and the proposed improvements were detailed in Section 1.1 above, and were shown in Sheets 2 through 8 of 23. The estimated amounts of new work dredging and maintenance dredging were also listed in Sections 1.1 and 1.2. Similarly, waters occurring in the areas of proposed dredged material placement, whether for upland placement or for BU, are also navigable waters of the United States (i.e. subject to the ebb and flow of the tide) regulated by the USACE. The channel amounts were determined using Computer Aided Design (CAD) and Geographical Information System (GIS) analysis with proposed channel widths and projected daylight lines (where channel template meets existing bathymetry) using the most current bathymetric data available from the USACE and surveyed for this project. The estimated amount of WOUS was 1,664 acres between the projected side slopes of the

deepened channel. Of that, a very small patch of seagrass is mapped in the Aransas Pass within the jetties. Approximately two acres of upland at the southwest corner of San Jose Island falls within the daylight of the projected side slope of the turning basin expansion. The expansion footprint was based on empirical design criteria in Engineer Manual (EM) 1110-2-1613 *Hydraulic Design of Deep Draft Navigation Projects*, and without consideration of the potential use of sheet piling to reduce the side slope required. Additional ship simulation will be conducted in 2019 to determine if the required turning basin diameter can be reduced. A summary of potential impacts of the channel WOUS including wetlands is summarized in Table 3.1.

For placement impacts, GIS features based on the proposed template extent using existing National Oceanic and Atmospheric Administration (NOAA) bathymetry and CAD analysis were used in conjunction with existing seagrass and oyster habitat mapping downloaded from NOAA, Texas General Land Office (TGLO) and Texas Parks & Wildlife Department (TPWD). The National Wetland Inventory (NWI) data was used to identify potential mapped wetland habitat. Open water acreage was derived using a land, shoreline and water data set sourced from ESRI and Texas Department of Transportation (TXDOT), which was found to match aerial imagery well. Habitat features were clipped using the placement footprints and review of the mapped habitat was conducted using a current ESRI aerial (2018) to verify the nature of mapped features. A summary of potential impacts of the placement plan to WOUS including wetlands, and other special aquatic sites is provided in Table 3.2. The comments in the table show individually the results of aerial review in examining the nature of the mapped habitat. In several cases, the NWI identified ponded features early in the life of an active PA that have since been filled. In others, the feature had eroded away. In various cases, the BU feature is a shoreline restoration that would protect resources in the interior of the BU feature, such as M4, and not impact all the interior mapped acreage. Reductions of these acreages from being counted as adverse impacts are shown in the adjustment column, and the net result is shown as the estimated adverse impact. The bottom of the table summarizes the acreage that after considering the aerial review would likely be adversely impacted. For each impact at each site, measures that could minimize or replace the impacted habitat are identified

The PCCA's environmental precepts include a) wildlife habitat development, improvements, and replacement when modification to existing habitat is necessary and b) environmental sustainability in the development of PCCA facilities and in ongoing port operations. The PCCA's goal is to execute projects in a manner that restores resources impacted by a project, and to contribute to resource restoration as a result of project actions even if the project impacts are minimal. The PCCA's practice is to consider and incorporate BU activities where practicable in managing dredged material generated by channel projects.

Table 3.1: Channel Impacts to Gulf and Estuarine Bottom (See Sheet 2 through 4 of 23)

Channel Impacts to Waters of the U.S.		Channel Acres			Channel Impact		
Segment	**Impact**	**Toe to Toe**	**Total Including Side Slope**	**Side Slope Acreage**	**Upland Acreage**	**Seagrass Acreage**	**WOUS (Deepwater)**
New Entrance Channel Extension	Deepening from natural depth (varies -62 ft to -81 ft MLLW) to -77 ft MLLW + 2 ft adv. maint.+ 2 ft overdredge **(-81 ft MLLW)**	455.4	588.8	133.4	-	-	588.8
54-foot Authorized Entrance Channel Extension	Deepening from -56 ft MLLW to -77 ft MLLW + 2 ft adv. maint + 2 ft overdredge **(-81 ft MLLW)**	146.9	260	113.1	-	-	260
Existing Channel	Deepening from -56 ft MLLW to -77 ft MLLW +2 ft adv. maint +2 ft overdredge (-81 ft MLLW) and from -54 ft MLLW to -75 ft MLLW +2 ft adv. maint +2 ft overdredge **(-79 ft MLLW)**	518.9	734.8	215.9	2.00	0.11	732.69
Turning Basin (area outside of the existing basin footprint) and Flare	Deepen portions of the Lydia Ann Channel from between -54 ft MLLW to **-75 ft MLLW**	56.68	82.42	25.74	-	-	82.42
TOTAL		1,178	1,666	488	2.00	0.11	1,664

Table 3.2: Impacts to Mapped Aquatic Habitat (See Sheet 9 of 23)

Placement Option	Total Site Acres	Mapped Habitat									Open Water WOUS (ac.)
		Wetland					Seagrass				
		Acres	Predominant Type	Comment	Impact Review Adjustment	Est. Adverse Impact	Acres	Comment	Impact Review Adjustment	Est. Adverse Impact	
B1	80.0	-	-	-	-	-	-	-	-	-	80.0
B2	80.5	-	-	-	-	-	-	-	-	-	80.5
B3	83.8	-	-	-	-	-	-	-	-	-	83.8
B4	83.8	-	-	-	-	-	-	-	-	-	83.8
B5	83.8	-	-	-	-	-	-	-	-	-	83.8
B6	83.8	-	-	-	-	-	-	-	-	-	83.8
B7	124.0	-	-	-	-	-	-	-	-	-	124.0
B8	124.0	-	-	-	-	-	-	-	-	-	124.0
B9	124.0	-	-	-	-	-	-	-	-	-	124.0
HI-E	138.7	36.2	Estuarine and Marine Wetland	Features appear to have eroded away	-7.7	28.6	0.0	-	0.0	0.0	3.3
M3	332.6	-	-	-	-	-	17.1	Restoration of larger area to create marsh. Elevation could be suitable for seagrass establishment too.	-9.5	7.6	332.6
M4	702.6	68.9	Estuarine and Marine Wetland	Interior wetlands that would be avoided, and exterior would be integrated with through placement	-68.9	0.0	571.5	Interior acreage would not be impacted except at fringes. BU feature would protect this from further loss.	-571.5	0.0	546.3
PA9-S	329.3	-	-	-	-	-	3.1	Restoration of larger area to create uplands. In recent years aerials do not show evidence of Seagrass stands. If in existence seagrass is sparse and tenuous, most likely because of focused wave energy in the area.	-3.1	0.0	308.8
M10	769.9	-	-	-	-	-	2.5	Restoration of larger area to create marsh. Elevation could be suitable for seagrass establishment too. In recent years aerials do not show evidence of Seagrass stands. If in existence seagrass is sparse and tenuous, most likely because of focused wave energy in the area.	-2.5	0.0	752.9

Placement Option	Total Site Acres	Mapped Habitat									Open Water WOUS (ac.)
		Wetland					Seagrass				
		Acres	Predominant Type	Comment	Impact Review Adjustment	Est. Adverse Impact	Acres	Comment	Impact Review Adjustment	Est. Adverse Impact	
MI	362.2	211.7	Estuarine and Marine Wetland	Consists of entirely of unconsolidated shoreline to be restored	-211.7	0.0	-	-	-	-	262.1
NW_ODMDS	1180.4	-	-	-			-	-	-	-	1180.4
PA4	163.1	51.5	Freshwater Emergent Wetland	Identified within active PA or Feature appear to have eroded away	-51.5	0.0	0.0	Minor fringe impact. BU would protect much larger seagrass area from future losses.	0.0	0.0	3.3
PA6	269.8	143.0	Lake	Identified within active PA. Feature appears associated with earlier filling of this PA and is no longer apparent in current aerials.	-143.0	0.0	-	-	-	-	0.8
SJI	593.0	279.4	Estuarine and Marine Wetland	Consists of entirely of shoreline to be restored	-279.4	0.0	-	-	-	-	334.3
SS1	307.6	157.3	Estuarine and Marine Wetland	Would be replaced by created upland to protect seagrass area behind it from future loss	0.0	157.3	94.1	Restoration of shoreline to bolster against future erosion of much larger area of seagrass behind feature. Due to shifting uplands and erosion over recent years much of the seagrass no longer appears to be visible within aerials.	-43.3	50.8	81.4
SS2	94.8	36.5	Estuarine and Marine Wetland	Unconsolidated shoreline that eroded away during Harvey. Placement would restore protective shoreline for interior sand flats.	-36.5	0.0	-	-	-	-	-
TOTALS	**6111.7**	**984.5**				**185.9**	**688.3**			**58.5**	**4,673.9**
								Sum of all Habitat Acreage			6,346.7
									Estimated Adverse Impacts (Seagrass & Wetlands)		All Habitat
								Sum of all Impacted Mapped Habitat Acreage	244.4		4,918.2

4.0 PROJECT ALTERNATIVES FOR CHANNEL IMPROVEMENTS

4.1 Evaluation Criteria

Preliminary criteria were developed to evaluate how well initial alternatives fulfilled the purpose and need of the proposed project. The initial alternatives were screened using the following general criteria:

1) Increase Export Efficiency – Key factors that affected the ability to fully load vessels with crude oil due to constraints of the existing channel and authorized channel were considered. This included draft limitations along the CCSC segments between the Entrance Channel and Harbor Island. This criterion considered whether the alternative allowed a VLCC to move more fully loaded and whether it eliminated or reduced lightering. Lightering would be eliminated for vessels using Harbor Island and lightering would be reduced for vessels using docks at other locations within the CCSC system.

   Due to recent exponential growth in crude oil export, the Port of Corpus Christi has seen an increase in vessel tonnage. Several stakeholders' forecasts indicate that this trend will continue for a foreseeable future and beyond. As a result of PCCA's past investments in marine infrastructure and available capacity, PCCA has been capable of accommodating the recent historical shift in oil traffic from import to export. This trend is expected to continue as long as the Port's infrastructure allows it. There are concerns about future limitation to U.S. oil exports due to lack of or insufficient infrastructure capable of handling the export volumes. Lack of adequate infrastructure at U.S. ports including the Port Corpus Christi may lead to inefficient

shipping and ensuing crude price increase which may weaken the U.S.'s competitive edge (EIA 2018).

2) Ability to Serve Multiple Tenants – Part of the PCCA's mission is to meet the demand of commerce in the Coastal Bend region and throughout the world. To that end, PCCA plans its infrastructure to accommodate the needs of different stakeholders. PCCA has the ability to plan, fund, build and maintain marine infrastructures for common use such as navigation channels and dock infrastructure. PCCA owns and operates several public oil docks and bulk docks that are leased and used by different tenants. The ship channel is a common use infrastructure that is designed and operated to accommodate the different types of vessels used by PCCA's tenants. As cargo volume and vessel traffic increase, larger vessels are being used to improve shipping efficiency and reduce costs. To keep up with these trends, PCCA has undertaken several channel improvement programs. One is the dredging of the CCSC to a depth of 54-foot MLLW for which construction is imminent and will serve tenants all the way to the Inner Harbor. The other is this study to evaluate deepening up to the full depth required to accommodate fully loaded VLCCs. The terminal being planned by the PCCA at Harbor Island could be operated as a facility open for use to several users or companies, and the ability of a common use navigation channel can provide access for separate, multiple users. This criterion evaluates to what degree the alternative can benefit multiple tenants.

3) Flexibility to Accommodate Future Growth/ Expansion – This criterion considers the flexibility the alternative provides in being able to accommodate future growth in crude oil export tonnage and future growth in other sectors as well. Crude oil exports have exponentially increased in the last two years and are on pace to exceed the growth rate in 2018. Various long term projections predict much larger export tonnage if export infrastructure and the present bottlenecks in the supply chain end are improved. To that end, the ability to accommodate delivery from new crude export terminals or add capacity for exporting crude oil is important. In addition to crude oil, PCCA seeks to anticipate and be ready to accommodate all other future cargo needs and long term growth.

4) Minimize Environmental Impacts – All alternatives considered are located in the open waters of Corpus Christi Bay and the Gulf of Mexico. Therefore, environmental impacts would be limited to open water marine habitat and would primarily not involve terrestrial, wetland, or near-shore (tidal flats, beach, dunes etc.) impacts. Potential impacts to the marine environment are discussed below:

   Impact to Marine Habitats: Existing marine habitat mapping information including seagrasses, tidal wetlands, and oyster reef from TPWD, NOAA and TGLO were obtained and used to gauge the potential for impacts. As environmental marine field surveys were reviewed, preliminary site-specific habitat locations were identified. Because the channel will be constructed within the footprint of an existing channel, no new impact to undisturbed habitat would occur within that footprint. The incremental widening that may be required to maintain the recommended design slope would be minimal and would limit undisturbed habitat impacts.

   Other environmental impacts: Other environmental aspects that are considered for this criteria include potential impact of oil spills and air emissions from vessels and fuel transfer operations as described below. In conjunction with considerations of risk in criteria #5 below, potential impacts to environmental resources considers the location of major habitat resources (coastal shore, seagrass etc.), climatic (e.g. prevailing wind), and spill response factors. Impacts on air emissions considers how the alternative reduces transit and loading emissions from what would occur during lightered crude oil transfer operations.

5) Risk, Safety and Security – Safety and security are primary concerns for all vessels operating at the Port of Corpus Christi. Safety and security concerns include risk and challenges associated with oil spills and ensuing responses, fire and fire suppression activities as well as worker safety as they relate to offshore and onshore operations. Security also considers vulnerability to challenges to physical and operational security such as sabotage, and vandalism. Vulnerability to weather related events including wave height, winds and hurricanes is considered as well.

6) Ability to Contribute to Beneficial Uses – PCCA's environmental precepts include a) wildlife habitat development, improvements, and replacement when modification to existing habitat is necessary, and b) environmental sustainability in the development of port facilities and in ongoing port operations. Although this is normally in the context of executing projects in a manner that restores resources from the impacts of a project, the ability to contribute to resource restoration as a result of project actions regardless of project impact can be considered also. Continuing the practice of considering and incorporating BU where practicable in managing dredged material of its channel projects, as was done in the currently authorized -54-foot project, is desirable. The ability to do this under a given alternative is considered for this criterion.

4.2 Initial Alternatives Considered

The existing channel dimensions and the authorized channel dimensions are summarized as follows. As of July 2018, the CCSC has a dredged depth of -47 feet MLLW and plans are currently underway to dredge the channel to the authorized -54-foot MLLW depth, which would constitute the "No-Action" condition for the proposed channel deepening project. The CCSC is also planned to be extended into the Gulf of Mexico by 1.4 miles to the -56-foot MLLW contour as part of the federally-authorized project. The width of the channel varies as follows: from the current outer limit of the dredged channel (in the Gulf) to the Port Aransas jetties, the CCSC Entrance Channel is -47 feet MLLW deep with a width of 700 feet, and is authorized to -54 feet MLLW with a width of 700 feet. From the jetties to Harbor Island, the CCSC Entrance Channel is 600-feet wide. The remainder of channel to the La Quinta Junction has a width of 500 feet and is authorized to a width of 530 feet. It was against the limitation of the existing and authorized channel dimensions that initial alternative concepts were developed.

Initial alternatives considered to meet the project purpose included deepening the existing channel and offshore options that pump crude oil from onshore storage to offshore loading facilities. There are two basic types of such facilities: the simpler offshore single point mooring (SPM) buoy system, and the larger, more complex offshore platform or terminal system. An SPM system consists of onshore storage tanks (i.e. above ground storage tank farm) and pumps connected to pipelines leading offshore and terminating at an offshore buoy. The buoy is anchored to the seafloor that has floating loading hoses and mooring lines for the VLCC to hook up to and conduct loading operations. An SPM-based system can be built to provide loading abilities to a few vessels by adding SPMs, but would potentially require multiple pipelines depending on pipeline size and onshore pump capacity. An offshore platform or terminal system similarly uses onshore storage and pumps like the SPM, but the pipeline terminates into a pile-driven platform with conventional manifolds, loading arms and pipe racks, often with berths for several vessels. It is more complex and expensive than SPMs but typically provides more loading capacity. For both these options, the SPM or platform would have to be located in sufficiently deep offshore waters to account for draft, under keel and sea state. This would be between 13 or more miles offshore of Corpus Christi Bay at minimum considering the design depth. The following were the initial alternatives considered:

- **Alternative A – No Action**. No channel improvements and maintaining the channel at its existing depth. This option is equivalent to continuing with lightering and reverses lightering operations to offload and top off large vessels including VLCC's.

- **Alternative B – Channel Deepening**. This alternative consists of deepening the CCSC to -81 feet MLLW from the Gulf of Mexico to station 110+00, including the approximate 10 mile-extension to the Entrance Channel necessary to reach sufficiently deep waters. As a result of one-way transit assumed for VLCCs, the planned widths for the -54-foot MLLW currently authorized project are nominally sufficient. Therefore, no widening other than the minor incidental widening to keep these bottom widths and existing channel slopes at the proposed deeper depths, would occur. Deepening would take place largely within the footprint of the currently authorized -54-foot MLLW channel. As discussed in the purpose and need in Section 2.0, multiple entities including the PCCA are planning and permitting development of crude export terminals at Harbor Island. These terminals are being planned independently of this proposed deepening project. Therefore, they would be used to accommodate partially loaded VLCCs even if the deepening project were not implemented. It is assumed 2 to 3 berths would be built at PCCA's Harbor Island terminal, and two other facilities being planned, would be expected to provide between three and four more berths. Existing VLCC berth plans at Ingleside would provide three berths. Under this alternative, light-loaded VLCCs at Ingleside would top off at Harbor Island rather than lightering.

- **Alternative C – Offshore Single Point Mooring (SPM) Facility**. This alternative is an SPM-based system consisting of constructing onshore storage facilities, shore-to-SPM pipelines, and a series of SPMs to load several vessels simultaneously. Conceptually, the onshore storage could be those that would be installed in any one of the marine terminal facilities at Harbor Island or Ingleside if they were converted to offshore delivery, or it could be a new location on other undeveloped property. For purposes of the initial screening, it is assumed 3 to 4 SPMs, and the requisite onshore storage, pumps, and pipelines would be built to load 3 to 4 VLCCs. This number is in the range of facilities built in past offshore terminal projects such as the Louisiana Offshore Oil Platform (LOOP), Iraq's Al Basra Oil Terminal (ABOT), and Bulgarian/Greek Burgas-Alexandroupolis SPM facilities (Trans-Balkan Pipeline B.V.). This alternative would be located somewhere between 13 to 15 miles offshore.

- **Alternative D – Offshore Platform**. This alternative would be similar to Alternative C, except it would be constructed as an offshore platform or terminal. With a more complex system of pile-driven structures and loading arms, it is assumed that pipelines, arms, and berths to service a minimum of 4 vessels simultaneously would be constructed. A four-berth terminal was the constructed capacity of the ABOT. Similar to Alternative C, this alternative would be located in the 13 to 15 miles offshore band, and conceptually could rely on pumping from existing/planned storage either at Harbor Island or Ingleside, or a new location.

4.3 Performance of Alternatives

Alternative A (No Action) would not meet the purpose of the project, as it would neither provide for the short term need to more efficiently export crude oil, or provide the Port the capacity to respond to long term changes and future economic growth. However, it is retained only for NEPA purposes to compare action alternatives.

Alternative B (Channel Deepening) does respond to both the short term and long term aspects of the purpose. It most directly addresses the purpose by providing a channel capable of accommodating transit of fully laden VLCCs from multiple locations on Harbor Island, providing full vessel draft access

to export facilities already being planned there. It improves the efficiency of crude transport by enabling full loading of VLCCs and eliminating or reducing lightering, and provides a deeper channel that could accommodate vessels for other commodities should tenants, cargo, and shipping needs change. The existing or planned terminals would provide more loading berths than the typical size of multiple point/berth offshore options, although offshore options that match the onshore berth numbers could be built at greater cost. The capacity to accommodate growth in crude is more flexible as new tenants or terminals can be developed on remaining water frontage near the channel. Onshore loading (as would be used in Alternative B) is generally faster due to the greater flow rates of loading arms achievable at onshore berths compared to pumping 13 or more miles to SPM loading hoses under Alternative C. Pumping and loading arms under Alternative D, offshore platform can be made to provide high capacity loading. Dredging approximately 46.3 MCY would be required for Alternative B within the existing channel and proposed extension. Most of the impact would occur in already deepened channel, and approximately 588.8 acres of undredged Gulf bottom would be dredged to provide the entrance extension. Benthic impacts would be temporary and benthic communities would be expected to recover within 1-2 years. No oyster reef or wetland and very minimal seagrass (0.11 acres) would be impacted. This option would provide ample material to beneficially use in the many seagrass, and shoreline, habitat sites impacted by Hurricane Harvey and long term erosion. The option could potentially reduce more than 485,000 metric tons (MT) of CO_2 emissions by eliminating or reducing reverse lightering when annual export rate averages additional 3.5 MMBPD. This option could reduce between approximately 38 and 112 tons of oxides of nitrogen (NO_x), and between 2,200 and 9,270 tons of volatile organic compounds (VOC), both USEPA criteria pollutants, depending on whether elimination of lightering at current (approximately 1.5 VLCCs/week serviced) or potential future export rates (4 to 8 VLCCs per week) is assumed.

Offshore Alternatives C (SPM) and D (Offshore Platform) do respond to the short term need of the purpose by enabling full loading of VLCCs and partially eliminating or reducing lightering. However, they are limited in responding to the longer term needs of future economic growth and changes in port tenants and shipping needs, because they are less flexible in accommodating different grades of crude due to pump distances and flushing that could be required to switch grades. The capacity to accommodate growth in crude would require building not only more onshore storage and pumps, but new pipelines and SPMs or platforms, which would tend to be more costly and difficult to add. These options could similarly reduce CO_2, NO_x and VOC emissions through lightering elimination or reduction, as Alternative B. However, more vessel hoteling and pumping emissions would be produced due to the offshore location. In contrast to Alternative B, for Alternatives C and D, offshore operations in the Gulf would present more safety and spill risk challenges. The main concern are proximity of these operations to sensitive receptors and coastal habitats such as the Padre Island National Seashore, San Jose Island, and the associated Kemp's ridley turtle nesting grounds and Piping plover critical habitat, and greater exposure to wind and wave climate of the open Gulf, which would make spill containment more difficult. These options would also be in a location where response times would be greater, and access by unauthorized personnel would be greater, again due to distance from the onshore location, further increasing the national security risk.

A summary of the initial screening of alternatives is provided in Table 4.1.

4.4 Screening and Selection of Channel Alternatives

The project alternatives were assessed using the screening criteria of increasing export efficiency, serving multiple tenants, accommodating future growth and expansion, and minimizing environmental impacts. The alternatives were compared with respect to their ability to meet the project need and purpose. Following the screening of possible action alternatives, the PCCA identified the No Action and the proposed channel deepening to Harbor Island as the alternatives to be evaluated for this project. The channel deepening project alternative would be completed primarily within the footprint of the existing CCSC, maintaining the same channel bottom width and necessitating only minor incidental

widening to maintain the required side slopes. The proposed channel deepening alternative would meet the purpose and need of the project compared to the No Action alternative, as described below.

No Action Alternative: No channel improvements would be constructed and the existing channel would be maintained at its width and depth following the completion of the ongoing -54-foot deepening project. This alternative would not meet the need and purpose of the proposed project, as it would neither provide for the short-term need to more efficiently export crude oil, or provide the PCCA the capacity to respond to long-term changes and future economic growth. The No Action alternative is retained for comparison against the proposed action alternative.

Channel Deepening to Harbor Island: The action alternative would be the deepening of the CCSC to a depth of -81 feet MLLW (-77 feet MLLW plus two feet of advanced maintenance and two foot of allowable overdredge) from the Gulf of Mexico to Harbor Island. This alternative would meet the project need and purpose by providing a channel with the capability to accommodate transit of fully laden VLCCs from multiple locations on Harbor Island, supporting the efficient export of crude products from the Port through the elimination or reduction of reverse lightering operations. The channel deepening is proposed to be constructed primarily within the footprint of the existing CCSC. The incremental widening expected to be required to maintain the recommended design slope would be minor, and impacts to undisturbed habitat in the Gulf of Mexico would be limited.

Table 4.1: Alternative Performance

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
1) Increase Export Efficiency	• No increase in export efficiency. Inefficient lightering process, involving more vessel calls, transit, and longer VLCC loading process will still occur • Would involve light-loaded VLCC transit on lower 3rd of CCSC • Increase in congestion with future growth from more lightering vessels	• Lightering can be eliminated or reduced, decreasing vessel traffic and shortening the duration of VLCC loading process • Would still require VLCC transit on lower 3rd of CCSC, but elimination or reduction of lightering transit would free up channel availability for future growth. • Multiple tenant accommodation discussed below would allow more fully loaded VLCC participation, increasing efficiency for more exporters	• Lightering can be eliminated or reduced, thereby reducing vessels involved and shorten VLCC loading process • Would eliminate VLCC transit. • Exporting participants would be more limited than channel option, and exporting nonparticipants who couldn't fully load VLCCs would resort to smaller vessels or lightered VLCCs, leaving this congestion component in place as growth occurs. See multiple tenant and future growth discussion below.	• Same as SPM for all attributes except where noted
2) Ability to Serve Multiple Tenants	• No Change	• Port can operate VLCC berths as public docks, servicing multiple tenants and shipping lines, encouraging healthy competition and raising revenue for the Port and local communities. • Centralized and integrated land use planning of developable land assets at Harbor Island. • Loading of different grades from onshore terminals would be easier compared to offshore options	• Difficult to plan multiple offshore SPMs connected individually to individual tank farms. • Accommodating different grades from different customers would be more cumbersome, requiring flushing of longer lengths of line to switch grades, compared to onshore terminals.	• Same as SPM for all attributes except where noted
3) Ability to Accommodate Future	• No accommodation of future growth • Vessel draft limitations	• Local and regional economy is enhanced as revenues are collected for ships calling at	• Multiple single SPMs may need to be planned by the industry. Multiple permits	• Same as SPM for all attributes except where noted • Expansion of platform to add

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
Growth/Expansion	• Increased vessel traffic due to large increase in reverse lightening	and products moving through the PCCA. • Efficient use of capital to achieve growth and meet overall crude export forecast for the nation • Allows for future growth within the PCCA under a single permitting process for deepening the channel	required for each individual project. • Future expansion of offshore SPM facility more difficult to accommodate new users. Limited users can access the facility at any one time due to complex financing and project development challenges.	more users even more difficult and costly than SPM
4) Environmental Impact	• No habitat impact • Increase in air emissions due to increase from reverse lightering activities. • CO_2 emissions would be greater than other options due to continuing lightering activities	• Construction largely being undertaken within existing channel limits. • New entrance channel extension would temporarily disturb 770.3 acres of 60-ft deep Gulf bottom, convert it to deeper bottom, but benthos would recolonize within a year, and water column would remain. Amount of conversion to deeper bottom would be insignificant compared to available Gulf Habitat. • Dredged material will be evaluated for beneficial use and building resilient community. • Potential to reduce more than 485,000 MT of CO_2 emissions by eliminating or reducing reverse lightering when annual export rate averages additional 3.5 MMBPD.	• Puts active loading facility and new pipelines in previously undisturbed part of Gulf of Mexico. • Permanent but negligible size (compared to available Gulf Habitat) of conversion of Gulf bottom and water column to SPM platform • No potential beneficial use of dredged material • Similar potential to reduce CO_2, NOx, and VOC from eliminating or reducing lightering vessel emissions. • Spillages are more likely to happen and not as easily confined or cleaned up. • Potential for higher vapor emissions and higher CO_2 emissions from vessels hoteling due to reduced loading rates. • Tugs needed for hose tending and VLCC	• Same as SPM for all attributes except where noted • Permanent but negligible size of conversion of Gulf bottom and water column to SPM platform – larger than SPM, but still negligible

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
		• Potential to eliminate 38-112 tons annual NOx and 2,200- 9,270 tons of VOC from elimination of some lightering activity • Enables faster loading rates than SPM, reducing CO_2 emissions from hoteling vessels. • Ability to provide vapor recovery system and shore power to operate vessel systems for reduced emissions.	positioning during loading will have to transit over 30 miles (assuming support facilities are home based at Port Aransas) from the CCSC to service the platform increasing air emissions generated. • No technically feasible method for providing vapor recovery of vapour combustion systems for reducing emissions.	
5) Risk, Safety and Security	• More vessels in Harbor will make monitoring harder	• Severity of accidental spills would be reduced compared to offshore options as facilities and vessels are in a more controlled Port environment. • Environmental accidents better controlled at onshore facilities in protected waters. • Comprehensive spill response would be quicker than offshore options due to proximity to response resources • Incidents at onshore terminal can be more easily contained to avoid affecting other users. • Risk of in-channel vessel incident or allision present, but would be reduced greatly by slow vessel speed, multiple tug assist, and one way transit when bringing VLCCs in the	• Damage to subsea pipelines or the platform will render the facility unusable until repaired. • Environmental conditions such as high winds, high waves, and strong currents can be designed for, however potential is there for conditions that could restrict use of the facility. • Avoids potential for in-channel vessel incident, but trades it for more risk of pipeline failures due to miles of multiple necessary pipelines. • Comprehensive spill response times to address environmental accidents longer compared to onshore terminals	• Same as SPM for all attributes except where noted

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
		Port. • Loading spill incident would be closer to Redfish Bay seagrass and marsh areas, but would not significantly expose National Seashore or San Jose Island beaches to impact - Prevailing SE winds directed towards terminal shore which would help containment - Tidal transport may vary however • Strong security presence within the port environment to protect against deliberate damage and sabotage.	• Loading spill incident would not significantly expose Redfish Bay seagrass and marsh areas to impact, but an offshore facility may be potentially expose National Seashore or San Jose Island beaches to impact depending on the location - Prevailing SE winds directed towards beaches which would hamper containment • More accessible by non-authorized persons; can lead to accidental damage, deliberate damage and sabotage. • Higher risk to human safety with offshore operations. • Response time to the facility by emergency services will be greater and more costly due to offshore location.	
6) Ability to Contribute to BU	• Beneficial use occurring under the -54 foot project would continue. As before, since there would be no change in dredging or other actions that could contribute.	• New work dredging would provide 46.3 MCY of varying sandy, clayey and some silty material some of which could be used for ecological or construction BU. Channel maintenance material could also be used long term for future BU such as restoring subsided or submerged marsh.	• Would require virtually no dredging, and therefore would not provide material that could be used to construct BU features.	• Would require virtually no dredging, and therefore would not provide material that could be used to construct BU features.

5.0 ATTEMPTS TO AVOID JURISDICTIONAL AREAS AND MINIMIZE WATER QUALITY IMPACTS

The proposed project would require the dredging of earthen material from the existing CCSC and from the bottom of the Gulf of Mexico to create a channel of sufficient depth to allow for the operation of VLCCs. Because the purpose of the proposed project is to deepen the current CCSC to reduce navigation inefficiencies associated with the current channel, the proposed channel improvements must occur in navigable waters of the U.S. Alternatives to achieve the need and purpose of the proposed project that would avoid jurisdictional waters of the U.S. are not available.

The proposed channel deepening activities represent the minimum impact to the Gulf of Mexico and Corpus Christi Bay to achieve the proposed project objective of increasing navigational efficiency of the CCSC. The proposed project alternative is the least environmentally damaging practicable alternative. This alternative meets the proposed project need and purpose with the least impact to the Gulf of Mexico and Corpus Christi Bay environments. The proposed depth and channel dimensions were optimized by taking several factors into consideration. First, world fleet registry data from IHS Fairplay was used to analyze and identify the appropriate target vessel dimensions (including draft) from the variation in size among the VLCC fleet to identify the majority of vessels expected rather than the maximum possible. Second, the fully loaded draft for the design vessel was calculated assuming the American Petroleum Institute gravity for West Texas Intermediate (WTI) crude oil, which will be the predominant controlling grade of crude oil exported from the Port of Corpus Christi. This was done in lieu of assuming the largest VLCC carrying the heaviest crude oil possible for this Port (heavy sour). Appropriate under keel clearance in consideration of sea state and climatic factors and guiding navigation standards (USACE and World Association for Waterborne Transport Infrastructure [PIANC]) was added. Ship simulation was accomplished in December 2018 at the Maritime Institute of Technology and Graduate Studies (MITAGS) to verify the depths and under keel clearances were navigable under a range of conditions. Therefore, the depth of the proposed deepening has been optimized. Another factor that will be considered under 33 U.S.C. Section 408 approval and coordination with USACE Operations is to use the steepest channel side slopes and narrowest bottom width allowable for one way passage. December 2018 ship simulation at MITAGS also examined alternate channel bottom widths for one way VLCC transit. This is also being coordinated with the USACE for acceptability under 33 U.S.C. Section 408 approval. If approved and possible, steeper side slopes and narrower bottom widths will be planned for implementation.

Dredged material generated from the project is proposed to be placed within an ODMDS adjacent to the CCSC, and, for material judged by the project engineer to be suitable, would be placed in several locations along the coast and within Corpus Christi and Redfish Bays for BU. The new work and maintenance dredged material from the proposed project would be placed in an environmentally acceptable and economically feasible manner, considering technical and logistical feasibility. The section below describes the process of the identification and evaluation of the dredged material placement alternatives that meet these requirements and represent the least environmentally damaging practicable placement alternative(s).

5.1 Initial Placement Alternatives Considered

To help meet the planning objective of identifying practicable dredged material placement that considered engineering, economics and the environment, initial alternatives ranging from use of existing PAs and surrounding uplands, to potential BU concepts were considered.

5.1.1 New Terrestrial Sites

New terrestrial sites are more constrained by available contiguous land and parcel size, easement and access across roads, properties etc. needed for hydraulic pipelines. Near Harbor Island, surrounding uplands are limited, as they consist of Mustang Island and San Jose Island. Mustang Island has no sizable contiguous tracts within 10 miles that are not developed or are not natural barrier island, State or National refuge/parks, or aquatic habitat. The preponderance of tracts is small waterfront parcels. San Jose Island is a privately owned island that is almost entirely undeveloped natural barrier island and beach. Along with the planned crude terminal, Martin Midstream, and Gulf Copper are located on Harbor Island at the channel entrance which leave no available tracts for placement of dredged material. Therefore, BU and offshore placement in this vicinity was planned.

The next nearest mainland with larger tracts of land is Ingleside, 8 miles farther in, where several crude oil export facilities are being planned on the land nearest water. Flint Hills Resources, OXY Ingleside Energy Center, Kiewit Offshore, Chemours, Oxychem, Ingleside Ethylene, Cheniere, and Voestalpine Texas are existing facilities located along Ingleside. These limit upland placement options, and options to use material beneficially would be cost competitive due to the distance. New upland sites at farther distances would be less cost effective due to farther distances required to reach sizable contiguous tracts of land, could involve impacts to terrestrial wetlands, would require new property purchases, and routing and burial of temporary hydraulic pipelines across existing roads and properties. Depending on land elevation, pumping hydraulic pressure head limitations could be reached, which would force less cost effective transport by truck. These factors would complicate the usability and viability of terrestrial sites.

5.1.2 Initial Concepts

Therefore, initial planning efforts focused on existing PAs and potential BU, as new upland placement opportunities were limited. Initial BU concepts were generated by considering existing agency restoration plans such as TGLO's Texas Coastal Resiliency Master Plan, recent storm damage caused by Hurricane Harvey, and BU features implemented elsewhere on the Gulf Coast. Since the proposed action consists entirely of dredging the CCSC, practical limitations associated with placement of dredged material were a primary constraint. For dredged material placement, distance over which material must be pumped or transported by scow, required water depths for hopper or scow use, and access to stage and route hydraulic pipelines, all constrain where cost effective dredged material placement can be achieved. For hydraulic dredging, most cost effective dredging occurs within 5 miles, requiring one to multiple booster pumps beyond this distance which rapidly diminishes the cost effectiveness. An initial cost effectiveness limit of 10 miles was considered. Use of hoppers and scows can achieve placement over greater distances, but this is primarily in water and requires minimum depths for vessel draft. These technological constraints factored in planning dredged material placement. The major component of dredging driving placement capacity needed is the new work dredging to construct the Proposed Action. Initial planning focused on accommodating projected new work dredging volumes.

To help, further develop dredged material placement that considered environmental impact and BU opportunities, the Applicant conducted an initial agency coordination meeting held in Corpus Christi Texas on September 21, 2018 to obtain the input of Federal, State and local resource agencies including the USACE Galveston District. Representatives from the following agencies participated in the meeting and provided input on the initial planned PA use and preliminary BUs concepts presented during the meeting:

- University of Texas Marine Science Institute (UTMSI)
- UTMSI/Mission-Aransas National Estuarine Research Reserve
- Coastal Bend Bays and Estuaries Program
- Texas Parks and Wildlife Department (TPWD)
- Texas General Land Office
- Natural Resources Conservation Services
- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (USEPA) Region 6
- U.S. Fish and Wildlife Service (USFWS)
- Texas Department of Transportation

At the time that initial placement alternatives were originally conceived, only the new work quantities generated from the proposed project were considered to devise placement concepts. Figure 5.1, shown below, depicts the initial concepts presented during the agency coordination meeting. These concepts represented general categories of placement alternatives and the general vicinity where they would be located. Agency input generated a few more smaller initiatives, but did not result in major new BU sites being identified. However some concepts were reinforced and better defined based on discussions with agency representatives about site specific information and their knowledge of the ecosystem of Corpus Christi and Redfish Bays. These concepts were then analyzed in consideration of agency feedback, further conceptual development and volumetric analysis, and more research on constraints and impacts. The initial evaluation considered cost, existing technology, and logistics in light of the navigation purpose of the Proposed Action. Inherent in cost and existing technology was consideration of the aforementioned dredging method constraints, and inherent in logistics was consideration of needed placement capacities. The following synopsizes the initial concepts, evaluation, and initial screening.

5.1.2.1 Existing PAs for the Current Federally-authorized CCSCIP

The Applicant is the Non-Federal Sponsor for the authorized Federal project, and is therefore aware of commitments and long-term capacity of existing upland PAs required for the authorized project. The following uses for existing PAs were considered

- Use of existing capacity – Most of the existing PA capacity is dedicated to accommodating the new work dredging and 50-year maintenance of the Federally-authorized -54 foot project. Due to lack of uncommitted capacity, only two existing PAs were identified for use: PA4 and PA6

- Expansion of existing PA – M3, M9, and M10 expand existing PAs by using dredged material beneficially. M3 would convert featureless bay bottom to approximately 330 acres of estuarine/aquatic habitat behind Pelican Island. M9 and M10 would convert featureless bay bottom to approximately 329 and 770 acres of estuarine/aquatic habitat behind PA9 and PA10, respectively.

5.1.2.2 Existing 54 foot project BU sites

Existing BU sites were examined for inclusion where possible. According to PCCA, only a handful of sites were available while others lack capacity especially with priority and consideration given to the placement needs for the CCSCIP which is expected to be constructed over the next three years. Therefore, focus was shifted to expanded existing sites by adding adjacent estuarine/aquatic habitat features or dike raisings. Open-water, unconfined BU sites were avoided completely.

5.1.2.3 Bird Islands

Rookery islands or bird islands serve as nesting, breeding, foraging and rearing areas for birds because they are isolated from the mainland and are too small to sustain populations of predators. Dredged material is often used beneficially to construct or restore bird islands.

A recent study identified several existing or new bird islands in Aransas and Nueces counties. However, most were too small in regards to capacity or sited too far (more than 15 miles away) from the project to make construction economically feasible especially with the revised project footprint. The few options that were within the preferred pumping distance were surrounded by seagrass.

5.1.2.4 Oyster Pads

Beneficially using dredged material as the pad to restore or create new for oyster reef was considered during initial planning. As identified in the TGLO's Texas Coastal Resiliency Master Plan, this option would provide vertical relief need for the restoration of oyster reefs. However, agency feedback indicated that the salinity in the area was not optimal for recruiting or supporting oyster growth.

5.1.2.5 Marsh Restoration at Mustang Island

Marsh restoration opportunities along the bayside of Mustang Island were examined during early planning. However, the area is too far away from the project to make construction economically feasible. Additionally, public feedback during open houses held in September 2018 indicated concerns regarding impacts to existing, established marsh habitat during construction.

5.1.2.6 13A New BU Site

Creating a BU feature similar to existing BU 6 was contemplated adjacent to the existing PA13. This became a less favorable option due to distance. It was reconfigured in the second stage of placement plan development as a contingency upland extension to PA13.

5.1.2.7 New Work ODMDS

Use of the portion of this site for new work placement that is not being used by the -54 foot Federal Project was proposed. This site is a dispersive site, and Multiple Dump Fate (MDFATE) modeling was conducted to analyze the capacity for project use.

5.1.2.8 San Jose and Mustang Island Feeder Berms or Shoreline Repair

The project team reviewed recent aerials and LiDAR data on San Jose Island to determine that there was a substantial amount of repair for dune breaches and foreshore erosion. Similarly, the Texas General Land Office (TGLO) identified areas of both Mustang and San Jose Islands that have experienced historical receding at the rate of 2 feet or more per year. The large amount of sand that would be produced by the project could be used to repair or indirectly nourish these islands

5.1.3 Screening of Initial Concepts

Table 5.1 provides a summary of the screening of initial concepts. Some of these placement options have since been eliminated from further evaluation because of a change in project scope. The preferred alternative was determined to be deepening the channel to Harbor Island, a shorter reach, which requires less PAs. As a result some of the concepts identified during the agency coordination

meeting were also eliminated from further consideration. However, some of these were reconceived as different BU initiatives, such as expansion of existing PA and BU sites.

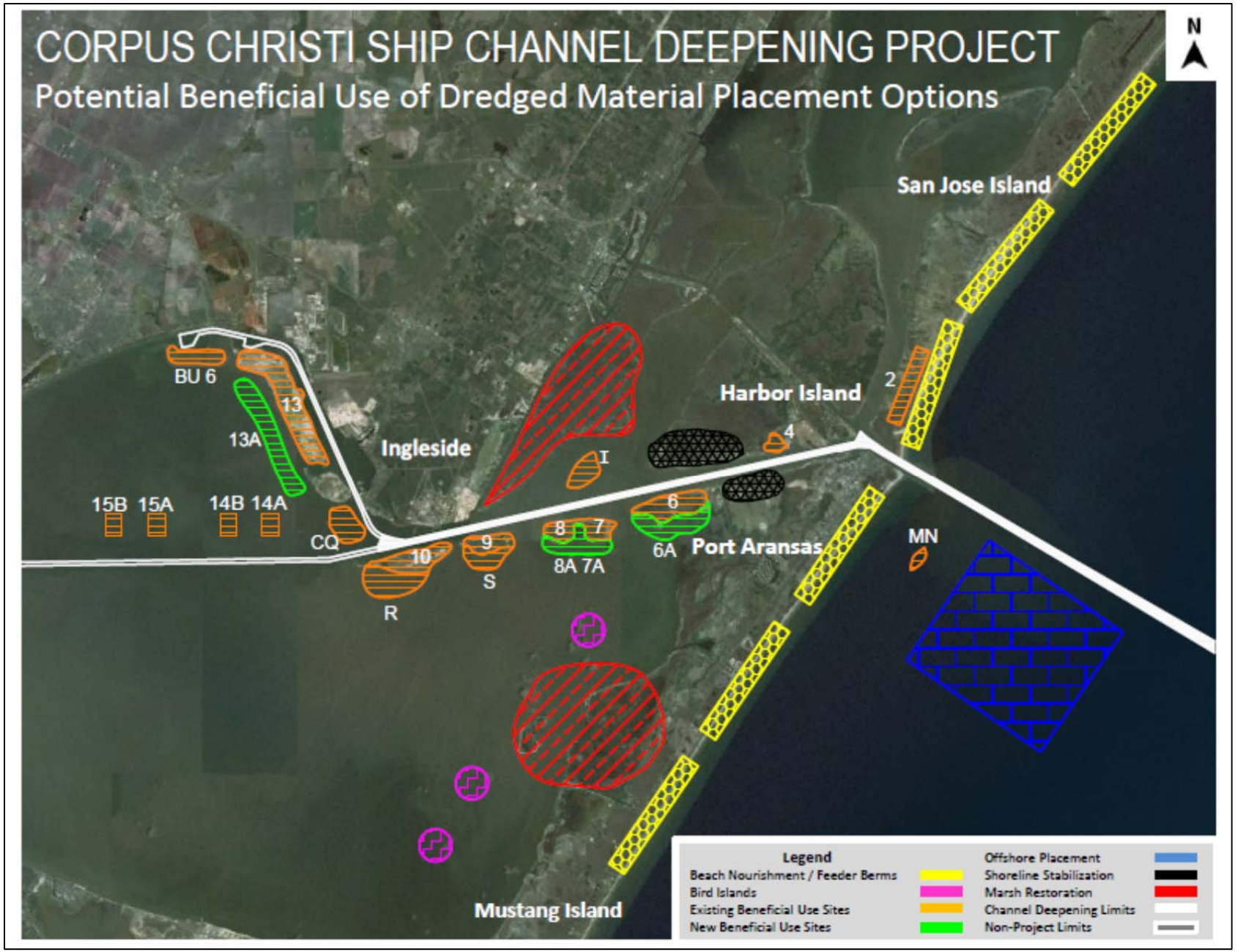

Figure 5.1: Initial Dredged Material Placement Concepts

Table 5.1: Initial Placement Area Screening

Concept	Logistics	Technology	Cost	Determination
New Terrestrial Upland Site	Too many issues involving infrastructure, distance, limited parcel size and availability	Pump distance and potential pumping constraints further inland	Logistics factors could make it costly to implement.	Eliminated
Existing PAs for the Current Federally-authorized -54 foot MLLW project	Limited available placement capacity	Feasible	Would be cost effective, but no capacity.	Eliminated for existing, but reconceived for expansion.
Existing 54 foot project BU sites	Limited available placement capacity	Feasible	Would be cost effective, but limited capacity.	Eliminated for existing, but reconceived for expansion.
Bird Islands	12 acre site size criteria limits capacity to place	Feasible	Would likely have higher unit implementation cost due to small size	Eliminated due to distance, and limited capacity
Oyster Pads	Distance from Harbor Island would be far.	Salinity in the area not optimal	Rock for cultch recruitment surface could be a major expense	Eliminated
Marsh Restoration at Mustang Island	Public concerns about impacting existing habitat	Feasible	Could be cost feasible	Eliminated
13A new BU Site	Distance from Harbor Island is far.	Feasible	Distance would make it more costly	Eliminated
NW ODMDS	Channel adjacent. Good option.	Feasible	Near channel. Minimal construction. Would be cost effective	Advanced
San Jose and Mustang Island Feeder Berms and Shoreline Repair	Channel adjacent. Good option.	Feasible	Near channel. Minimal construction. Would be cost effective	Advanced

5.2 Placement Alternatives Evaluated Further

The initial alternatives that were advanced or reconceived were refined. Given the large amount of materials that could be beneficially used, especially the large volume of sand in one the of the channel segments, and proximity of some of the desirable BU options, it became clear, a mix of existing offshore, expansion of existing BU sites and the Gulf side BU initiatives would be a viable, cost effective approach. Of 13 initiatives further refined, 11 were BU features that aimed to achieve a variety of shoreline restoration, land loss restoration, marsh cell expansion, and Gulf-side shoreline initiatives. The following alternatives were developed.

- M3 – Creation of an estuarine/aquatic habitat extension at Pelican Island. This would bring the elevation of an extension at this BU site to an elevation suitable to restore either marsh or seagrass.

- M4 – Restoring historic land and marsh loss at Dagger Island. This is an ecosystem restoration measure included in USACE's Coastal Texas study and the TGLO Coastal Resiliency Master Plan. Design of project elements will be coordinated to support TPWD's existing permit for this project.

- PA9-S – This option will extend the upland placement of dredged material behind PA9. This area was originally identified as Site R in the CCSCIP for the creation of shallow water habitat, but current projections from the PCCA are that there will not be enough material from that project to create that site.

- M10 – Creation of an estuarine/aquatic extension behind PA10. This would bring the elevation of an extension at this BU site to an elevation suitable to restore either marsh or seagrass.

- PA6 – Raising levees on PA6, after the CCSC CIP one time use, by 5 feet and filling it with 4 feet of new work material at the existing PA6 location.

- SS1 – Restoring eroded shoreline to a higher elevation than what was previous to prevent future land breaches as a result of storm events, the restored feature will be armored to protect the very large seagrass area behind Harbor Island.

- SS2 – Restoring shoreline washouts along the Port Aransas Nature Preserve/Charlie's Pasture as a result of Hurricane Harvey. Piping plover sand flat critical habitat located behind this breach would be protected again. Design of project elements will be coordinated with TGLO's restoration efforts for this area.

- PA4 – Reestablish eroded shoreline and land loss in front of PA4. The shoreline has undergone major erosion over the last few decades, and if it continues, would eventually expose the Harbor Island seagrass area to erosion and loss.

- SJI – Dune & shore restoration at San Jose Island using new work sands to repair severe damage caused by Hurricane Harvey.

- NW ODMDS – Placement in New Work ODMDS (Homeport).

- B1-B9 – Feeder berms offshore of SJI and Mustang Island that would be located within the active transport zone in front of the depth of closure, and indirectly nourish these barrier islands.

- HI-E – Restore eroded bluff at the junction of the CCSC, Aransas Channel and Lydia Ann Channel and will be armored to prevent future erosion. The bluff will be restored to its historic shape and

new work material will be placed behind the bluff with a levee raise around the site. According to USGS historical topographic maps for Port Aransas, Texas, SE/4 Aransas Pass 15' Quadrangle, this site appears to have been created from Aransas Channel spoils around 1967-1968.

- MI – Mustang Island beach nourishment, this feature is intended to directly place new work sands to enhance the shoreline from the south CCSC jetty five (5) miles along the Gulf side of Mustang Island.

5.3 Applicant's Proposed Placement Plan

All the proposed options would be viable due to proximity, material volume capacity, and need for material to achieve ecological restoration. The large volume of sands indicates that material placement would be better used for BU restoration of important coastal resources that were damaged by Hurricane Harvey and experience continuing erosion. The availability of other new work material such as clays could opportunely be used to stem land losses that would expose sensitive habitats to continual erosion. These materials would be better used in these initiatives than in upland placement that avoids the marine environment and provides no benefit. All options were selected, with M9 and M10 providing extra capacities as a contingency for unavailability of SJI. Therefore, more capacity was identified to provide flexibility in the plan. Table 5.1 lists the selected placement plan elements.

Table 5.2: Selected New Work Placement Plan (See Sheet 9 of 23)

Placement Option	Description	Placement Capacity (CY)	Proximity to New Work Dredging Operations	Provides Environmental Benefit
M3	Estuarine/aquatic habitat creation adjacent to Pelican Island	3,798,000	Located approximately 6 miles from Harbor Island	This option will convert featureless bay bottom to approximately 300 acres of estuarine/aquatic habitat.
M4	Restoring historic land and marsh loss at Dagger Island	867,000	Located approximately 7 miles from Harbor Island	This option will restore eroding marsh habitat for native shorebirds and coastal wildlife. Design of project elements will be coordinated to support TPWD's existing permitted project.
PA9-S	Upland Placement Site Expansion behind PA9	9,000,000	Located approximately 8 miles from Harbor Island	This option does not restore aquatic habitat, it will convert featureless bay bottom to upland.
M10	Estuarine/aquatic habitat creation adjacent to PA10	10,933,600	Located approximately 10 miles from Harbor Island	This option will convert featureless bay bottom to approximately 770 acres of estuarine/aquatic habitat.
PA6	5 foot levee raise and fill	1,796,400	Located approximately 4 miles from Harbor Island	This option does not create any environmental benefit.
SS1	Restoring eroded and washed out shoreline	4,800,000	Located approximately 3 miles from Harbor Island	This option restores an eroded shoreline landmass and provides protection to Harbor Island Seagrass area.
SS2	Restore shoreline washouts along Port Aransas Nature Preserve as a result of Hurricane Harvey	669,700	Located approximately 2 miles from Harbor Island	Shoreline restoration that fills in the washouts caused by Hurricane Harvey that protects Piping Plover critical sand flat habitat.
PA4	Reestablish eroded shoreline and land loss in front of PA4	3,020,000	Located approximately 2 miles from Harbor Island	This option provides protection to Harbor Island seagrass area.
HI-E	Bluff and Shoreline restoration with site fill	1,825,000	Located less than 1 mile from Harbor Island	This option restores an eroding bluff and shoreline to its historic profile.
SJI	Dune and beach restoration San Jose Island	4,000,000	Located directly next to Channel Dredging Operations	This option restores several miles of beach profile that was washed away as a result of Hurricane Harvey.
NW ODMDS	Place on New Work ODMDS (Homeport)	13,800,000	Located directly next to Channel Dredging Operations	This option does not create any environmental benefit.
B1-B9	Feeder berms offshore of SJI and Mustang Island	8,100,000	Located less than 10 miles from Channel Dredging Operations	This option will nourish beach shoreline by natural sediment transport processes.
MI	Beach Nourishment for Gulf side of Mustang Island	2,000,000	Located directly next to Channel Dredging Operations	This option will nourish beach shoreline by direct sediment placement.
Scenarios for new work placement capacity provided and needed.		64,609,700	Total Capacity Provided	
		60,609,700	Total capacity less SJI (should that option become unavailable)	
		46,283,590	Total NW placement capacity required for Channel Preferred Alternative – Base Option	
		14,326,110	Additional Capacity less SJI (should that option become unavailable)	

6.0 SUMMARY OF PROPOSED PROJECT IMPACTS AND MITIGATION FOR AQUATIC HABITATS

As shown in Table 5.2, the majority of placement options involves BU to restore aquatic habitat or protect impacted resources, and would overall benefit seagrass, estuarine/aquatic habitats, and coastal habitats. The options that indicate estuarine or aquatic habitat restoration (M3 and M10) would be targeted to restore either tidal marsh or seagrasses, dependent on further agency input and final project impact offset needs. At similar elevation to tidal marsh, portions of the site could be left unvegetated and configured to restore sand or mudflat habitats. The remaining impacts to seagrass or wetlands provided in Table 3.2 would be offset by reconfiguring these sites to be able to host the impacted habitat. Placement would be configured to provide the elevations needed conducive to successful planting or recruitment of either tidal marsh or seagrass vegetation species. As an example, at M3, part of the impacted seagrass could be offset by dedicating part of the created habitat to seagrass colonization, since planned elevations would be conducive to recruitment and establishment. Table 6.1 below provides a summary of the proposed new work placement in terms of the impact and the restoration provided. As shown, the proposed restoration of approximately 1,100 acres of aquatic habitat would exceed the actual adverse impacts of approximately 244 acres of special aquatic sites. PCCA proposes to use this restoration to offset these impacts, with the amount of the proposed acreage required to offset the impacts to be determined in consultation with the USACE. Placement volumes for these features have been initially determined assuming tidal marsh elevation. However, the DMMP has enough flexibility in the placement capacity to allow variation of the needed elevations of M3 and M10 to be configured as either habitat as necessary without constraining the overall needed placement. The table also provides an estimate of the acreage of mapped special aquatic sites that would be directly protected by features proposing to restore or bolster eroding shoreline features. This was estimated using geospatial data, using estimates of the mapped acreage directly behind the restored feature. As shown, large areas behind these features would be subject to more wind, wave, tidal flow, and vessel wake erosion from eroded land and shoreline.

7.0 CONCLUSION

The PCCA understands that discharges into waters of the United States should not occur unless it can be shown that the discharge would not result in an unacceptable adverse impact on the aquatic ecosystem. It is also understood that if there is a practicable alternative to the discharge, the discharge should not occur. A practicable alternative is not available that would meet the proposed project requirements and achieve the project purpose. The proposed project would increase crude oil export efficiency for the Nation, reducing trade deficits, and fostering economic development. The result of the proposed action would be a more efficient channel to export crude oil. The proposed project meets the project purpose and need. The placement alternatives were developed in coordination with resource agencies, and considered public input during open house meetings at the start of the project. The resultant proposed placement alternatives make extensive use of BU to address ecological restoration needs that agencies desire. The volume of material and volume of sands are valuable assets, and the dredging and placement presents a unique and major opportunity to address restoration needs in this estuary and barrier island system.

Table 6.1: Summary of Project Impacts and Proposed Restoration

Placement Option	Description	Restoration Action	Acres				Comments
			Proposed Restoration Seagrass or Marsh	Adverse Impacts to Special Aquatic Sites (SAS)	SAS Protected	Conversion of Open Water to Upland	
HI-E	Estuarine/Marine Wetland	Restoring protective uplands and armored bluff for protection of significant seagrass acreage which lies behind	0.0	28.6	264.4	3.3	Predominantly unconsolidated shore impacted Predominantly Estuarine and Marine Wetland protected
M3	Estuarine/aquatic habitat creation adjacent to Pelican Island	Convert featureless bay bottom to approximately 330 acres of estuarine/aquatic habitat.	330.0	7.6			Seagrass impacted
M4	Restoring historic land and marsh loss at Dagger Island	Restore eroding marsh habitat for native shorebirds and coastal wildlife. Design elements will be coordinated to support TPWD's existing permitted project.		0.0	615.4		Predominantly seagrass protected
PA9-S	Upland placement expansion converting 309 acres of bay bottom to upland, adjacent to PA9.	none		0.0		308.8	
M10	Estuarine/aquatic habitat creation adjacent to PA10	Convert featureless bay bottom to approximately 770 acres of estuarine/aquatic habitat.	770.0	0.0			
MI	Mustang Island Beach Nourishment	Nourishment creating 250 ft of aerial beach, utilizing » 2,000,000 CY of sand as storm surge and wave attenuation		0.0			
SS1	Restoring eroded shoreline and armoring to protect Harbor Island seagrass area	Restore eroding shoreline to its historic profile. Protects Harbor Island seagrass area	0.0	208.1	1,552.1		Predominantly unconsolidated shore impacted Predominantly seagrass protected

Placement Option	Description	Restoration Action	Acres				Comments
			Proposed Restoration Seagrass or Marsh	Adverse Impacts to Special Aquatic Sites (SAS)	SAS Protected	Conversion of Open Water to Upland	
SS2	Restore shoreline washout along Port Aransas Nature Preserve as a result of Hurricane Harvey	Restores two washouts of shoreline along the Port Aransas Nature Preserve as a result of Hurricane Harvey.	0.0	0.0	333.0		Predominantly Estuarine and Marine Wetland (sand flats) protected
PA4	Reestablish eroded shoreline and land loss behind PA4	Restores historically eroding shoreline and land protecting Harbor Island seagrass area.	0.0	0.0	750.6	3.3	Predominantly seagrass protected
PA6	Dike raise	none	0.0	0.0			
SJI	Dune & shore restoration San Jose Island	Restore several miles of beach profile washed away as a result of Hurricane Harvey.		0.0			
NW ODMDS	Place on part of New Work ODMDS	none		0.0			
B1-B9	Feeder berms offshore of SJI and Mustang Island	Nourish beach shoreline by natural sediment transport processes.		0.0			
		TOTAL	1,100.0	244.3	3,515.6		

Attachment B – Texas Commission on Environmental Quality
Tier II
401 Certification Questionnaire
Alternatives Analysis Checklist

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Tier II
401 Certification Questionnaire

The following questions seek to determine how adverse impacts will be avoided during construction or upon completion of the project. If any of the following questions are not applicable to your project, write NA ('not applicable') and continue.

Please include the applicant's name as it appears on the Corps of Engineers' permit application (and permit number, if known) on all material submitted. The material should be sent to:

Texas Commission on Environmental Quality
Attn: 401 Coordinator (MC-150)
P.O. Box 13087
Austin, TX 78711-3087

Applicant's Name: Sarah L. Garza, Port of Corpus Christi Authority
Assigned Permit Number: SWG-2019-00067

I. Impacts to surface water in the State, including wetlands

A. What is the area of surface water in the State, including wetlands, that will be disturbed, altered or destroyed by the proposed activity?

The proposed activity will dredge approximately 588.8 acres of undredged ocean bottom below mean lower low water (MLLW) in the Gulf of Mexico, 329.0 acres of undredged and partially dredged ocean and estuarine bottom and 0.11 acres of seagrass adjacent to the existing and authorized Corpus Christi Ship Channel (CCSC), 665.8 acres of the existing and authorized CCSC channel bottom, 56.7 acres of estuarine bottom in the Lydia Ann Channel, and in Aransas Pass as part of proposed channel improvements.

For the proposed dredged material management plan (DMMP), using available Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO), National Oceanic and Atmospheric Administration (NOAA), and U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) data, approximately 4,673.9 acres of surface waters, 688.3 acres of mapped seagrass, and 984.5 acres of mapped wetland were identified as located in the proposed placement features.

Of the wetlands, 238.6 acres are features that were mapped within an active Placement Area (PA) or have eroded away based on aerial review (SS2, PA4,6,HI-E), 279.4 acres are San

Jose Island shoreline and 211.7 are Mustang Island shoreline which are proposed for placement and would directly restore as beach or dune (SJI, MI), 68.9 acres would be avoided or integrated into [Ducks Unlimited and TPWD's] planned Dagger Island shoreline restoration (M4). 28.6 acres of wetland will be impacted by placement at Harbor Island East (HI-E), and 157.3 acres of wetland impacted at restoring an eroded shoreline to protect Harbor Island seagrass (SS1). The 185.9 acres between SS1 and HI-E would be impacted by beneficial use (BU) features proposed to protect large areas of seagrass.

Of the seagrass, 571.5 acres would be in the interior of M4 at Dagger Island and would be largely avoided except at the fringes of shoreline restoration which would protect this seagrass from further erosion, and of the 17.1 acres at M3 where proposed BU marsh can be reconfigured to replace impacted seagrass acreage approximately 7.6 acres are visible upon aerial inspection. PA9-S and M10 may have stands of seagrass of 3.1 and 2.5 respectively however it is not visible upon aerial inspection and is most likely sparse and tenuous as a result of focused wave energy. The remaining 50.8 acres would be impacted by shore and land loss restoration at SS1, which will protect a very large seagrass area behind Harbor Island.

B. Is compensatory mitigation proposed? If yes, submit a copy of the mitigation plan. If no, explain why not.

Currently, waters of the U.S. (WOUS) and aquatic habitat within proposed project footprints have been determined using the most current existing geospatial mapping from TPWD, TGLO, NOAA, USFWS, and aerial imagery to identify open water, wetlands and seagrass. A mitigation plan has not been developed yet. Compensatory mitigation will be proposed as required, following field surveys to delineate WOUS and special aquatic sites more specifically, and assessment to determine the functions and services of these resources. The proposed DMMP for this project has been planned to use beneficially as much dredged material as possible to restore beach, shorelines, and aquatic habitat, including the types that would be impacted. Initially, BU aquatic habitat restoration sites have been planned assuming tidal marsh elevation, but the DMMP has enough available material and capacity to have the flexibility to provide the required elevation for tidal marsh, flats, or seagrass. Tables 3.1, 3.2 and 6.1 in Attachment A of the permit application detail and summarize the acreage of mapped habitat in each proposed placement feature, the estimated adverse impacts, and the proposed BU restoration. The proposed aquatic habitat restoration of 1,100 acres exceeds the estimated adverse impacts of 244 acres of mapped special aquatic sites. Except for SS1 and HI-E, the remaining seagrass and wetland impacts of the BU features would be addressed by reconfiguring the BU placement to provide suitable area for the reestablishment of impacted habitat. SSI and HI-E establish protective barriers to larger seagrass areas that would otherwise be very prone to erosion if further shoreline loss is experienced. These and several other features restore shoreline protecting approximately 3,500 acres of seagrass and marsh behind these shorelines from wind, wave, tidal flow, and vessel wake energy. The proposed BU features SJI, MI, and B1 through B9 on the Gulf side of San Jose and Mustang Islands, are all direct or indirect beach and dune nourishment intended to restore those coastal habitats from hurricane-related and long term erosion.

C. Please complete the attached Alternatives Analysis Checklist.

Alternatives Analysis Checklist is attached.

II. Disposal of waste materials

A. Describe the methods for disposing of materials recovered from the removal or destruction of existing structures.

No removal or destruction of existing structures is expected. Minor removal of debris and unsuitable materials encountered during dredging may be necessary during construction. Minimal disposal will be required. All material that is not re-usable will be disposed of at a properly permitted facility.

B. Describe the methods for disposing of sewage generated during construction. If the proposed work establishes a business or a subdivision, describe the method for disposing of sewage after completing the project.

Sewage generated during construction would be collected on ship-board facilities or in self-contained portable toilets that would be serviced regularly. The proposed activity will be dredging in the marine environment and dredged material placement at existing placement areas (PA), beneficial use (BU) sites or proposed PA or BU sites. No wastewater services currently exist within the project area and none are included in the proposed construction.

C. For marinas, describe plans for collecting and disposing of sewage from marine sanitation devices. Also, discuss provisions for the disposing of sewage generated from day-to-day activities.

N/A

III. Water quality impacts

A. Describe the methods to minimize the short-term and long-term turbidity and suspended solids in the waters being dredged and/or filled. Also, describe the type of sediment (sand, clay, etc.) that will be dredged used for fill.

The proposed action would generate approximately 46.3 million cubic yards (MCY) of new work dredged material. Based on review of existing borings, approximately 17.1 MCY of the new work material would consist of clay material and 29.2 CY would consist of sand material. Placement and use of these materials is planned as follows, employing standards dredged material placement construction techniques generally described here and in more detail under Item B:

Offshore Placement *– For construction of the proposed action, the existing and currently approved dispersive offshore placement site (a.k.a. New Work ODMDS) would be used to place new work clay and silty material. Placement would be by scow, hopper, or direct pipeline placement, employing standard scow or hopper operation techniques to achieve controlled deposition.*

Repair and nourishment of Gulf-side shorelines *– For construction of the proposed action, pending owner approval, sandy material would be used to restore dunes in large dune breaches, and restore the eroded foreshore on San Jose Island (SJI) due to damage caused by Hurricane Harvey. Standard construction techniques for beach nourishment used elsewhere on the Texas coast would be employed such as the use of temporary dewatering*

dikes to effect deposition and material retention. Restored dunes would be planted with native stabilizing vegetation to anchor dunes. Sandy and other appropriate new work material would also be used to create a series of offshore feeder berms (B-1 through B-6) that would be located within the active shoreward transport zone to indirectly nourish San Jose and Mustang Islands. According to the Texas General Land Office (TGLO) 2014 Coastwide Erosion Response Plan (CERP) and Bureau of Economic Geology (BEG) Shoreline Change Map, these islands have experienced historical shoreline erosion of approximately 2 or more feet per year. These berms would be constructed using standard submerged placement techniques for either hydraulic placement at sites closer to the point of dredging and potentially by scow for sites more distant from the point of dredging.

Repair of bay-side shorelines and land loss *– For construction of the proposed action, new work dredged material would be used to repair eroded shorelines at Harbor Island (SS1), Port Aransas Nature Preserve [PANS] (SS2), and Dagger Island (M4) to stem further land, tidal flat and seagrass habitat loss due to damage experienced during Hurricane Harvey and over time. At SS1, containment dikes for dewatering would be used, and would have seeding on dike crowns and interiors, and armoring on the channel side. At SS2, the previous shoreline profile would be restored and would be backfilled behind it to bolster and reestablish the original land barrier to tidal sand flats in the PANS, using armoring where it previously was used in the breaches. At M4, material would be used to construct containment dikes on certain sides of Dagger Island to prevent channel sediment migration and to build/preserve marsh and seagrass elevation behind it, with these areas potentially seeded for initial stabilization and blending in with existing seagrass. M4 would provide material to implement breakwater and land loss restoration measures already permitted by TPWD and included in the USACE Coastal Texas Study and TGLO Coastal Resiliency Master Plan. Suitable new work material would also be used to build containment dikes toward the channel and fill in behind them at the existing PA4 on Harbor Island to restore severe upland losses experienced over the years. This would also help preserve the land buffer between Aransas Pass and the large seagrass habitat area behind Harbor Island to protect the seagrass habitat from future damage. Containment dikes would be seeded on the crowns and interiors, and armored on the channel side.*

Upland Placement *– For construction of the proposed action, new work material would also be used for raising containment dikes on PA 6, and to fill the interior using capacity created by dike raising. Upon the completion of construction, the dikes would be seeded and vegetated to minimize erosion.*

Estuarine/Aquatic Habitat Creation *– M3, M9, and M10 will create estuarine/aquatic habitat by placing material on bay bottom to raise elevation to optimal subtidal and intertidal marsh elevation, likely using erodible containment dike techniques previously employed elsewhere in Texas. These features would ultimately be planted or colonized by appropriate native vegetation.*

Maintenance *– Over the 10-year permit life, approximately 1.08 MCY of maintenance materials would be generated annually from the deepened channel, of which approximately 399,000 CY would be additional material due to the deepened channel. The material is expected to consist of fine grained silts, sands, and clays, and would be dredged and placed in either existing upland placement areas (PA2), ODMDS No. 1, or proposed BU feeder berms B-1 through B-6, as material suitability allows. Use of the existing sites is consistent*

with the current operations and maintenance (O&M) placement of the existing and authorized CCSC managed by the USACE Galveston District.

The Port of Corpus Christi Authority (PCCA) would follow the current USACE CCSC procedures used for dredging and dredged material placement during construction dredging and channel maintenance. These include standard dredging techniques to construct submerged and emergent containment dikes, and interior placement of material. These techniques are described further in Item B below.

B. Describe measures that would be used to stabilize disturbed soil areas, including: dredge material mounds, new levees or berms, building sites, and construction work areas. The description should address both short-term (construction related) and long-term (normal operation or maintenance) measures. Typical measures might include containment structures, drainage modifications, sediment fences, or vegetative cover. Special construction techniques intended to minimize soil or sediment disruption should also be described.

Techniques used successfully in Texas, around the U.S., and by USACE to construct stable PA and BU restoration features were described in general above. The following provides more details on these techniques which prevent short and long term erosion and turbidity.

- ***Beach nourishment temporary dewatering dikes*** *– This would involve the use of in-situ sand to form a series of temporary retention dikes to dewater hydraulically pumped sand, constructed as placement moves along the shoreline.*
- ***In-water placement for submerged berm, in-water dike construction or in-water fill*** *– This would involve one of two potential general methods: 1) the use of diffusers and downspouts at the end of pipelines to slow exit velocities, reduce turbidity, and control material migration, to achieve focused placement to build the intended template, 2) the use of hydraulically loaded scows or hopper dredges to discharge by gravity fall during a controlled release, to minimize sediment migration and achieve focused placement around the scow or hopper.*
- ***Upland dike construction*** *– Material would be hydraulically pumped to create containment dikes. After dike construction riprap, rock, etc. would be added where armoring is indicated and dike side slopes would be seeded and vegetated as soon as practicable with robust and rapidly establishing species to provide long term stability.*
- ***Interior filling*** *– Where practicable for the type of feature, containment dikes with limited weir outlets or spill boxes designed or planned to allow retention and eventually dewatering as features become emergent. For placement on emergent interiors, interior training dikes, ditching and other enhanced dewatering techniques would be employed to further optimize material retention and dewatering.*

C. Discuss how hydraulically dredged materials will be handled to ensure maximum settling of solids before discharging the decant water. Plans should include a calculation of minimum settling times with supporting data (Reference: Technical Report, DS-7810, Dredge Material Research Program, GUIDELINES FOR DESIGNING, OPERATING, AND MAINTAINING DREDGED MATERIAL CONTAINMENT AREAS). If future maintenance dredging will be required, the disposal site should be designed to accommodate additional dredged materials. If not, please include plans for periodically removing the dried sediments from the disposal area.

Technical Report, DS-78-10 is a former Waterways Extension Service (WES) publication that has been superseded by newer USACE guidance contained in Engineering Manuals (EM) including EM 1110-2-5025 Dredging and Dredged Material Management, and EM 1110-2-5027 Confined Disposal of Dredged Material, for the design of contained dredged material placement. Where applicable and appropriate, these design criteria would be used during the detailed design phase to configure feature geometry and discharge placement. For other unconfined feature construction (e.g. beach nourishment), use of the above described hydraulic placement techniques would be used.

The proposed action is deepening of the existing and authorized Federal channel. Maintenance for the incremental annual amount of 399,000 CY of extra shoaled material would be accomplished as part of the existing channel maintenance cycle using the existing, approved offshore dispersive site ODMDS No. 1, and if suitable material is generated, the existing PA2 on San Jose Island, and the proposed offshore feeder berms B-1 through B-9.

D. Describe any methods used to test the sediments for contamination, especially when dredging in an area known or likely to be contaminated, such as downstream of municipal or industrial wastewater discharges.

The segment of the CCSC to be dredged for the proposed action has two wastewater discharges located directly adjacent to the channels. One is a private domestic wastewater (TCEQ Permit #12731-001) and the other brine discharge (Permit No. WQ0005253000). However, dredged materials from the CCSC to be dredged for the proposed action are not known or likely to be contaminated. The CCSC is tested and maintained in accordance with USACE sediment testing guidelines. No increases in contaminant levels is expected during dredge and fill operations.

The potential for contaminants has been evaluated through chemical analyses, grain-size analyses, bioassays, and bioaccumulation tests in the surrounding area as part of the Corpus Christi Ship Channel, Texas Channel Improvement Project for the current authorized Federal channel. These tests spanned a wide variety of volatile, semi-volatile (e.g. PAH), pesticide and persistent organic (e.g. PCB, dioxin) compounds, and metal constituents. The 2003 "Corpus Christi Ship Channel, Texas Channel Improvement Project, Volume I Final Feasibility Report and Final Environmental Impact Statement" concluded that contaminant studies showed that new work and maintenance dredged material from all sections of the channel, with the exception of the Inner Harbor (which is not part of the proposed action), is acceptable for offshore placement, beneficial uses in the bay or ocean, or upland placement.

More recent testing conducted in 2018 for the Entrance Channel segment and entrance channel extension of the CCSC for the current authorized Federal channel to support offshore placement for the purposes Marine Protection, Research and Sanctuaries Act (MPRSA) Section 103 included chemical, grain-size, bioassays, and bioaccumulation tests on new work material samples between current depths and the proposed depth of -54 feet MLLW. Testing results indicated no contaminant concerns and supported offshore placement. This recently tested segment comprises the majority of the project segment for the proposed action. The proposed action would dredge new work, in-situ geological material below the recently tested layer (from -54 feet MLLW to -80 feet MLLW), and thus would be less prone to surface human impacts. The proposed action would also dredge existing Gulf of Mexico seafloor materials to extend the entrance channel further to the -80

foot MLLW contour. This segment would be as or less prone to impacts than the recently tested extension for the authorized Federal channel. The proposed areas to be dredged have been extensively tested previously and/or are not prone to contamination. Despite the expectation of the extension not being prone to contamination based on the review of past nearby sampling and the environmental setting, a Sampling and Analysis Plan (SAP) has been developed for the extension for this project to confirm this expectation.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Tier II
Alternative Analysis Checklist

I. Alternatives

A. How could you satisfy your needs in ways which do not affect surface water in the State?

Work below mean lower low water (MLLW) of the Gulf of Mexico, Corpus Christi Bay, and Redfish Bays within the proposed project area is necessary to meet the project needs of increasing crude oil export efficiency and safety. Crude oil export efficiency and safety in the Corpus Christi Ship Channel (CCSC) cannot be improved without affecting waters in the State. The existing CCSC would need to be deepened to meet the purpose of the project, which is to construct a channel with the capability to accommodate transit of fully laden Very Large Crude Carriers (VLCC) from multiple locations on Harbor Island into the Gulf of Mexico. Multiple crude export terminals are being planned on Harbor Island to export crude oil using the authorized Federal channel being currently constructed to a depth of -54 feet MLLW, which would still require light loading of VLCCs, and supplemental lightering involving multiple other lightering vessels out in the Gulf of Mexico to fully load VLCCs, decreasing export efficiency and increasing crude transfer activity and associated risks in the Gulf. Dredging activities may affect water quality within the proposed project area by temporarily increasing turbidity and suspended sediment load in the estuarine water column. However, these temporary conditions would not be expected to adversely impact marine mammals, essential fish habitat or other aquatic resources in the study area to a significant degree.

B. How could the project be re-designed to fit the site without affecting surface water in the State

Initial crude oil export alternatives were evaluated and screened including alternatives to deepening the channel, which consisted of offshore loading facility options (See Attachment A of the Permit Application). Offshore options did not meet the purpose and need of the proposed action as well as the channel deepening alternative, and channel deepening performed better in most major criteria including export efficiency, flexibility to accommodate growth, and environmental and safety risk. Deepening the channel improves the access for terminals already being planned to export crude. Offshore options would expose San Jose Island and Mustang Island (with the National Seashore) to a greater risk of oil spills during loading activities compared to channel deepening which brings loading activities in a more controlled environment of Corpus Christi Bay. Both barrier islands which host Piping plover (Charadrius melodus) critical habitat and endangered sea turtle nesting beaches. Therefore, channel deepening was selected. The proposed project terminus is Harbor Island, and deepening to accommodate full loading of Very Large Crude Carriers (VLCC) and Suezmax tankers is the only navigation improvement being examined, only one channel extent and alignment was examined. Deepening of the CCSC cannot be done without affecting surface water in the State.

C. How could the project be made smaller and still fit your needs?

The deepening could be done to an optimized depth that serves the majority of the intended design vessel (VLCC) class and likely prevailing crude oil type instead of absolutely maximizing the depth for all versions of the design vessel, carrying the densest crude oil. This has already been examined and incorporated into the channel alternative selected for the proposed action. First, world fleet registry data from IHS Fairplay was used to analyze and identify the appropriate target vessel dimensions (including

draft) from the variation in size among the VLCC fleet. A 99th percentile set of dimensions was identified, and individual vessel dimensions clustered tightly around the selected dimensions. Second, the fully loaded draft for the design vessel was calculated assuming the American Petroleum Institute gravity for West Texas Intermediate (WTI) crude oil, which will be the predominant controlling grade of crude oil exported from the Port of Corpus Christi. This was done in lieu of assuming the largest VLCC carrying the heaviest crude oil possible for this Port (heavy sour). Appropriate under keel clearance in consideration of sea state and climatic factors and guiding navigation standards (USACE and World Association for Waterborne Transport Infrastructure [PIANC]) was added. Ship simulation was accomplished in December 2018 at the Maritime Institute of Technology and Graduate Studies (MITAGS) to verify the depths and under keel clearances were navigable under a range of conditions. Therefore, the depth of the proposed deepening has been optimized.

Another way the project could be made smaller is to use the steepest channel side slopes and narrowest bottom width allowable for one way passage. Geotechnical borings and analyses have been accomplished to determine the steepest stable slopes for the in situ material. Steeper slopes than the existing side slope are being coordinated with the USACE for acceptability under 33 U.S.C. Section 408 approval. December 2018 ship simulation at MITAGS also examined alternate channel bottom widths for one way VLCC transit. This is also being coordinated with the USACE for acceptability under 33 U.S.C. Section 408 approval. If approved and possible, steeper side slopes and narrower bottom widths will be planned for implementation.

D. What other sites were considered?

Offshore alternatives that were initially considered, but would be located a minimum of 13 or more miles. For the reasons discussed in Item I.B above, these offshore options were eliminated. Alternative sites for increasing the efficiency of moving crude oil would require new development of terminal facilities and/or dredging completely new navigation channels; both of which are not practical, nor least environmentally damaging, and therefore were not considered. Alternative sites for dredged material placement considered were existing placement areas (PA), offshore disposal, and beneficial use (BU) sites, and a variety of new and expanded PA and BU site initiatives, within the practical distance for hydraulic dredging pipeline or scow placement. New terrestrial sites were considered in general, but were not practical due to distance, existing infrastructure and residential development, and presence of ecologically sensitive habitat and refuges in nearby terrestrial sites (e.g. Mustang Island). Details of the alternatives considered for both channel improvement and placement are in Attachment A of the Permit Application

1. What geographical areas were searched for alternative sites?

The proposed deepening must occur within the proposed project area, thereby precluding the consideration of alternative sites. For dredged material placement, initially, existing PA and BU sites used for the current and authorized CCSC stretching from the Gulf of Mexico to Ingleside, initial new BU concepts coordinated with resource agencies located from the Gulf-side of Mustang and San Jose Islands north and south of the CCSC, and throughout Corpus Christi Bay and Redfish Bay, were all considered.

As the proposed channel was refined to an extent from the Gulf to Harbor Island, and existing PA capacities ruled out all but a few current PA and BU sites available for use, the initial PA and BU concepts were further developed and focused to the lower Corpus Christi Bay and Gulf of Mexico. Existing sites are located on existing PAs located on Harbor Island (PA4, HI-E), Mustang Island (PA6), offshore waters adjacent near the existing channel (New Work ODMDS) or originally developed in the Bay (PA13). New BU sites located adjacent to existing PAs (M3, PA9-S, and M10) in Corpus Christi Bay, in Redfish Bay (M4), near the Port Aransas Nature Preserve (SS1, SS2), and in nearshore waters along Mustang (MI) and San Jose Islands (B1 through B9) and on San Jose Island (SJI), were considered. Most of these BU sites were associated with restoring habitat and shoreline from Hurricane Harvey damage or long term erosion and land loss. The dredged material placement alternatives were generally limited to within the 10 miles as a

practical and cost-feasible radius for hydraulic dredging and dredged material placement or use of scows.

2. How did you determine whether other non-wetland sites are available for development in the area?

Aerial imagery, appraisal district data, and distance criteria were used to determine if terrestrial sites without wetlands were likely to be viable. Both existing development, refuge and habitat presence, and property parcel sizes versus needed capacity were used to screen out the viability of terrestrial sites that might be free of wetlands. Once it was determined to use existing and new or expanded PA and BU sites, National Wetland Inventory (NWI), and Texas Parks and Wildlife (TPWD) and National Oceanic and Atmospheric Administration (NOAA) seagrass mapping were used to configure and refine PA concepts to minimize impacts. Very little mapped wetland is present in the BU sites and mapped seagrass directly in the footprint of the proposed placement is limited to natural recruitment at the shallow bathymetric margins of PA dike slopes. The initiatives to use the material beneficially will create more tidal marsh, restore shoreline that protects seagrass habitat, or repair damaged dunes and beaches in sensitive barrier island habitat.

3. In recent years, have you sold or leased any lands located within the vicinity of the project? If so, why were they unsuitable for the project?

Yes. Property at Harbor Island adjacent to the project segment of the CCSC has been leased to an operator to implement construction and long term operation of the PCCA's proposed crude oil export terminal. This is not suitable for project placement use at it is one of several properties being developed for crude export at Harbor Island serviced by the proposed deepening. No other property near the channel project have been leased or sold.

E. What are the consequences of not building the project?

The No Action alternative would not increase efficiency of moving crude oil exports from the Port of Corpus Christi in support of national energy security and national trade objectives, which is the proposed project's purpose and would not increase the safety of this movement, which is an underlying need. This would result in a channel depth that forces shippers to light load their vessels, requiring multiple smaller lightering vessels to shuttle oil to deeper waters, increasing the numbers of vessels needed to move crude oil, which would increase shipping costs and volatile organic chemical (VOC) vapor and greenhouse gas emissions. This would substantially affect the ability of the CCSC to efficiently and safely accommodate the projected increase in tanker tonnage to be handled at existing and planned VLLC-capable crude oil terminals at Harbor Island and at Ingleside, as well the larger VLCCs to which industry is moving towards. This would increase costs to shippers and consumers from continued light-loading of tanker vessels. The No Action alternative would not satisfy the PCCA's mission of leveraging commerce to drive prosperity for the region and community.

II. Comparison of alternatives

A. How do costs compare for the alternatives considered above?

No costs were estimated for the initial channel concepts. However, offshore options consisting of Single Point Moorings (SPM) and offshore loading platforms have substantially higher long term operating and maintenance costs due to the distance over which product must be pumped from onshore storage facilities to loading points out in the Gulf of Mexico which could be as far as 13 or more miles. They are also more costly to expand with additional loading points, compared to adding berths along water frontage served by a deepened channel. For this and the aforementioned reasons discussed in I.B. the offshore options were screened out. The preferred channel improvement project is the least cost alternative that increases crude oil export efficiency. For dredged material placement, the proposed placement alternatives considered are

cost effective compared to new upland sites, meet the placement capacity needed, and make beneficial use of the dredged material or use of existing PA and BU sites.

B. Are there logistical (location, access, transportation, etc.) reasons that limit the alternatives considered?

The logistical factor that limits the consideration of alternatives is the location of the CCSC and future expected crude terminal developments. Alternative sites would require development in a new area and were not considered. The proposed project is designed to provide the needed increase in crude oil export efficiency while minimizing adverse environmental impacts to the Gulf of Mexico and Corpus Christi Bay. For dredged material placement, distance over which material must be pumped or transported by scow, required water depths for hopper or scow use, and access to stage and route hydraulic pipelines, all constrain where cost effective dredge material placement can be achieved. Terrestrial sites are more constrained by available contiguous land and parcel size, easement and access across roads, properties etc. needed for pipelines. In the vicinity of Harbor Island, there are no sizable contiguous tracts to accommodate an upland PA to contain substantial planned new work volumes on the adjacent islands of Mustang or San Jose that aren't local or national refuges, seagrass habitat, or T&E critical habitat. Along with the planned crude terminal, Martin Midstream, and Gulf Copper are located on Harbor Island at the channel entrance. Therefore, BU and offshore placement in this vicinity were planned. The next nearest mainland with larger tracts of land is Ingleside, 8 miles farther in, where several crude oil export facilities are being planned on the land nearest water. Flint Hills Resources, OXY Ingleside Energy Center, Kiewit Offshore, Chemours, Oxychem, Ingleside Ethylene, Cheniere, and Voestalpine Texas are existing facilities located along Ingleside. These limit upland placement options, and options to use material beneficially would be cost competitive due to the distance.

C. Are there technological limitations for the alternatives considered?

For the channel alternative selected, several technological limitations result in the selected depth, width and side slope ratios. These are the required draft to fully load a VLCC with the intended product (WTI crude), the design criteria from USACE Engineering Manuals and PIANC guidelines to determine required under keel clearances to accommodate dynamic movement due to sea state and climatic conditions, wind and current conditions constraining minimum one-way passage widths, and geotechnical slope stability. For placement, technological limitations mainly involve cost-effective hydraulic pump distances (typically 10 miles), and required draft and cost-effective travel distances for scows and hoppers,

D. Are there other reasons certain alternatives are not feasible?

For channel alternatives, the primary reasons offshore alternatives are not feasible are discussed in II.A above. For placement, new upland sites would be less cost effective due to farther distances required to reach sizable contiguous tracts of land. They could involve impacts to terrestrial wetlands, and would require new property purchases, and routing and burial of temporary hydraulic pipelines across existing roads and properties. Depending on land elevation, pumping hydraulic pressure head limitations could be reached, which would force less cost effective transport by truck. These factors would complicate the usability and viability

III. If you have not chosen an alternative which would avoid impacts to surface water in the State, please explain:

A. Why your alternative was selected, and

The preferred channel alternative will deepen a channel that will already be used for crude export facilities already being planned and permitted. The preferred channel alternative would provide a substantial increase in the efficiency of crude oil exports, increase the safety of loading operations, provides more efficient loading and flexibility for future growth than offshore options, and provides material for beneficial use to areas in need of restoration. It meets the overall purpose and needs of the proposed action the best.

The selected depth optimizes the necessary draft to address efficient export while minimizing environmental impacts. The proposed dredged material placement alternatives were chosen because they meet a variety of needs for providing sufficient and additional new work and maintenance dredged material placement capacity. Existing placement capacity for the CCSC is limited to take on new work material, new upland sites would likely be more costly and disruptive, and PCCA engaged planning and coordination to identify desirable BU and PA expansion/extension where possible. Attachment A provides the full discussion and justification for selecting the channel and placement alternatives.

B. What do you plan to do to minimize adverse effects on the surface water in the State impacted?

The construction techniques described in Section III of the Tier II 401 Certification Questionnaire would be employed to minimize migration of placed material. These techniques are standard industry methods of placement employed in USACE and non-Federal projects to construct PAs, and BU sites. In summary, these methods are discharge end measures to slow deposition velocity and control the discharge for hydraulic placement, controlled release from scows or hoppers, diked and contained dewatering methods, and dike erosion control methods including seeding and armoring.

IV. Please Provide Comparison of Each Criteria (From Part II) For Each Site Evaluation in The Alternatives Analysis

See Attachment A of the Permit Application for details. The outcome of initial screening of channel alternatives is summarized in the table below.

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
1) Increase Export Efficiency	• No increase in export efficiency. Inefficient lightering process, involving more vessel calls, transit, and longer VLCC loading process will still occur • Would involve light-loaded VLCC transit on lower 3rd of CCSC • Increase in congestion with future growth from more lightering vessels	• Lightering can be eliminated or reduced, decreasing vessel traffic and shortening the duration of VLCC loading process • Would still require VLCC transit on lower 3rd of CCSC, but elimination or reduction of lightering transit would free up channel availability for future growth. • Multiple tenant accommodation discussed below would allow more fully loaded VLCC participation, increasing efficiency for more exporters	• Lightering can be eliminated or reduced, thereby reducing vessels involved and shorten VLCC loading process • Would eliminate VLCC transit. • Exporting participants would be more limited than channel option, and exporting nonparticipants who couldn't fully load VLCCs would resort to smaller vessels or lightered VLCCs, leaving this congestion component in place as growth occurs. See multiple tenant and future growth discussion below.	• Same as SPM for all attributes except where noted
2) Ability to Serve Multiple Tenants	• No Change	• Port can operate VLCC berths as public docks, servicing multiple tenants and shipping lines, encouraging healthy competition and raising revenue for the Port and local communities. • Centralized and integrated land use planning of developable land assets at Harbor Island. • Loading of different grades from onshore terminals would be easier compared to offshore options	• Difficult to plan multiple offshore SPMs connected individually to individual tank farms. • Accommodating different grades from different customers would be more cumbersome, requiring flushing of longer lengths of line to switch grades, compared to onshore terminals.	• Same as SPM for all attributes except where noted
3) Ability to Accommodate Future Growth/Expansion	• No accommodation of future growth • Vessel draft limitations • Increased vessel traffic due to large increase in reverse lightening	• Local and regional economy is enhanced as revenues are collected for ships calling at and products moving through the PCCA. • Efficient use of capital to achieve growth and meet overall crude export forecast for the nation • Allows for future growth within the PCCA under a single permitting process for deepening the channel.	• Multiple single SPMs may need to be planned by the industry. Multiple permits required for each individual project. • Future expansion of offshore SPM facility more difficult to accommodate new users. Limited users can access the facility at any one time due to complex financing and project development challenges.	• Same as SPM for all attributes except where noted • Expansion of platform to add more users even more difficult and costly than SPM
4) Environmental Impact	• No habitat impact • Increase in air emissions due to increase from reverse lightering activities. • CO_2 emissions would be greater than other options due to continuing lightering activities	• Construction largely being undertaken within existing channel limits. • New entrance channel extension would temporarily disturb 770.3 acres of 60-ft deep Gulf bottom, convert it to deeper bottom, but benthos would recolonize within a year, and water column would remain. Amount of conversion to deeper bottom would be insignificant compared to available Gulf Habitat. • Dredged material will be evaluated for beneficial use and building resilient community. • Potential to reduce more than 485,000 MT of CO_2 emissions by eliminating or reducing reverse lightering when annual export rate averages additional 3.5 MMBPD. • Potential to eliminate 38-112 tons annual NOx and 2,200- 9,270 tons of VOC from elimination	• Puts active loading facility and new pipelines in previously undisturbed part of Gulf of Mexico. • Permanent but negligible size (compared to available Gulf Habitat) of conversion of Gulf bottom and water column to SPM platform • No potential beneficial use of dredged material • Similar potential to reduce CO_2, NOx, and VOC from eliminating or reducing lightering vessel emissions. • Spillages are more likely to happen and not as easily confined or cleaned up. • Potential for higher vapour emissions and higher CO_2 emissions from vessels hoteling due to reduced loading rates. • Tugs needed for hose tending and VLCC positioning during loading will have to transit over 30 miles (assuming support facilities are	• Same as SPM for all attributes except where noted • Permanent but negligible size of conversion of Gulf bottom and water column to SPM platform – larger than SPM, but still negligible

Screening Criteria	OPTIONS			
	Alternative A No Action	**Alternative B Channel Deepening Project**	**Alternative C Offshore SPM Facility**	**Alternative D Offshore Platform**
		of some lightering activity • Enables faster loading rates than SPM, reducing CO_2 emissions from hoteling vessels. • Ability to provide vapour recovery system and shore power to operate vessel systems for reduced emissions.	home based at Port Aransas) from the CCSC to service the platform increasing air emissions generated. • No technically feasible method for providing vapour recovery of vapour combustion systems for reducing emissions.	
5) Risk, Safety and Security	• More vessels in Harbor will make monitoring harder	• Severity of accidental spills would be reduced compared to offshore options as facilities and vessels are in a more controlled Port environment. • Environmental accidents better controlled at onshore facilities in protected waters. • Comprehensive spill response would be quicker than offshore options due to proximity to response resources • Incidents at onshore terminal can be more easily contained to avoid affecting other users. • Risk of in-channel vessel incident or allision present, but would be reduced greatly by slow vessel speed, multiple tug assist, and one way transit when bringing VLCCs in the Port. • Loading spill incident would be closer to Redfish Bay seagrass and marsh areas, but would not significantly expose National Seashore or San Jose Island beaches to impact - Prevailing SE winds directed towards terminal shore which would help containment - Tidal transport may vary however • Strong security presence within the port environment to protect against deliberate damage and sabotage.	• Damage to subsea pipelines or the platform will render the facility unusable until repaired. • Environmental conditions such as high winds, high waves, and strong currents can be designed for, however potential is there for conditions that could restrict use of the facility. • Avoids potential for in-channel vessel incident, but trades it for more risk of pipeline failures due to miles of multiple necessary pipelines. • Comprehensive spill response times to address environmental accidents longer compared to onshore terminals • Loading spill incident would not significantly expose Redfish Bay seagrass and marsh areas to impact, but an offshore facility may be potentially expose National Seashore or San Jose Island beaches to impact depending on the location - Prevailing SE winds directed towards beaches which would hamper containment • More accessible by non-authorized persons; can lead to accidental damage, deliberate damage and sabotage. • Higher risk to human safety with offshore operations. • Response time to the facility by emergency services will be greater and more costly due to offshore location.	• Same as SPM for all attributes except where noted
6) Ability to Contribute to BU	• Beneficial use occurring under the -54 foot project would continue. As before, since there would be no change in dredging or other actions that could contribute.	• New work dredging would provide 38 MCY of varying sandy, clayey and some silty material some of which could be used for ecological or construction BU. Channel maintenance material could also be used long term for future BU such as restoring subsided or submerged marsh.	• Would require virtually no dredging, and therefore would not provide material that could be used to construct BU features.	• Would require virtually no dredging, and therefore would not provide material that could be used to construct BU features.