

CORPUS CHRISTI SHIP CHANNEL DEEPENING PROJECT

FEBRUARY 6, 2019

Agenda

- Introduction
- Project Overview
- Purpose and Need
- Project Alternatives Summary
- Engineering
- Modeling Results
- Threatened and Endangered Species
- Cultural Resources
- Environmental Evaluation
- Proposed Dredge Material Management Plan
- Next Steps

Project Overview



Project Overview

- Deepen the Entrance Channel from the Gulf of Mexico to Harbor Island
- Deepen up to -80 feet MLLW to allow fully loaded VLCCs
- Better prepare PCCA for long term future for crude oil export
- Generate approximately 39.4 MCY of new work material

Purpose and Need

- The purpose of the project is to:
 - 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 Port of Corpus Christi's ability to accommodate future growth in crude oil movement
 - Construct a channel project that the Port of Corpus Christi Authority can readily implement.

Purpose and Need

- This project directly addresses the following priority needs:
 - 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.

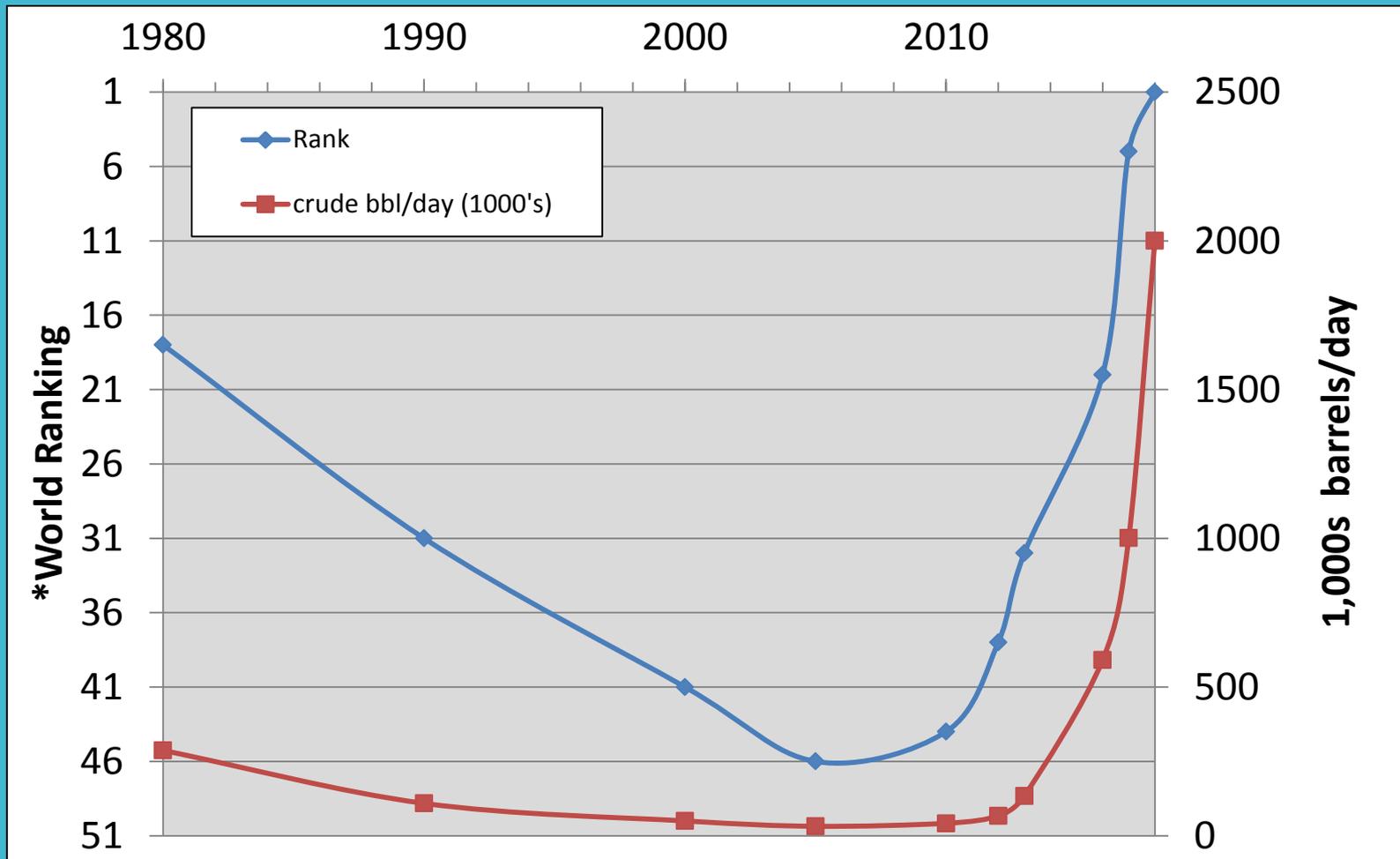
Project Benefits

- Providing key marine highway for national crude oil exports
 - Major positive impact to Texas' energy economy
 - Reduction National Trade Imbalance
- Reduce marine category air emissions
- Provide opportunity for BU and positive ecological benefit

Importance of National Crude Exports

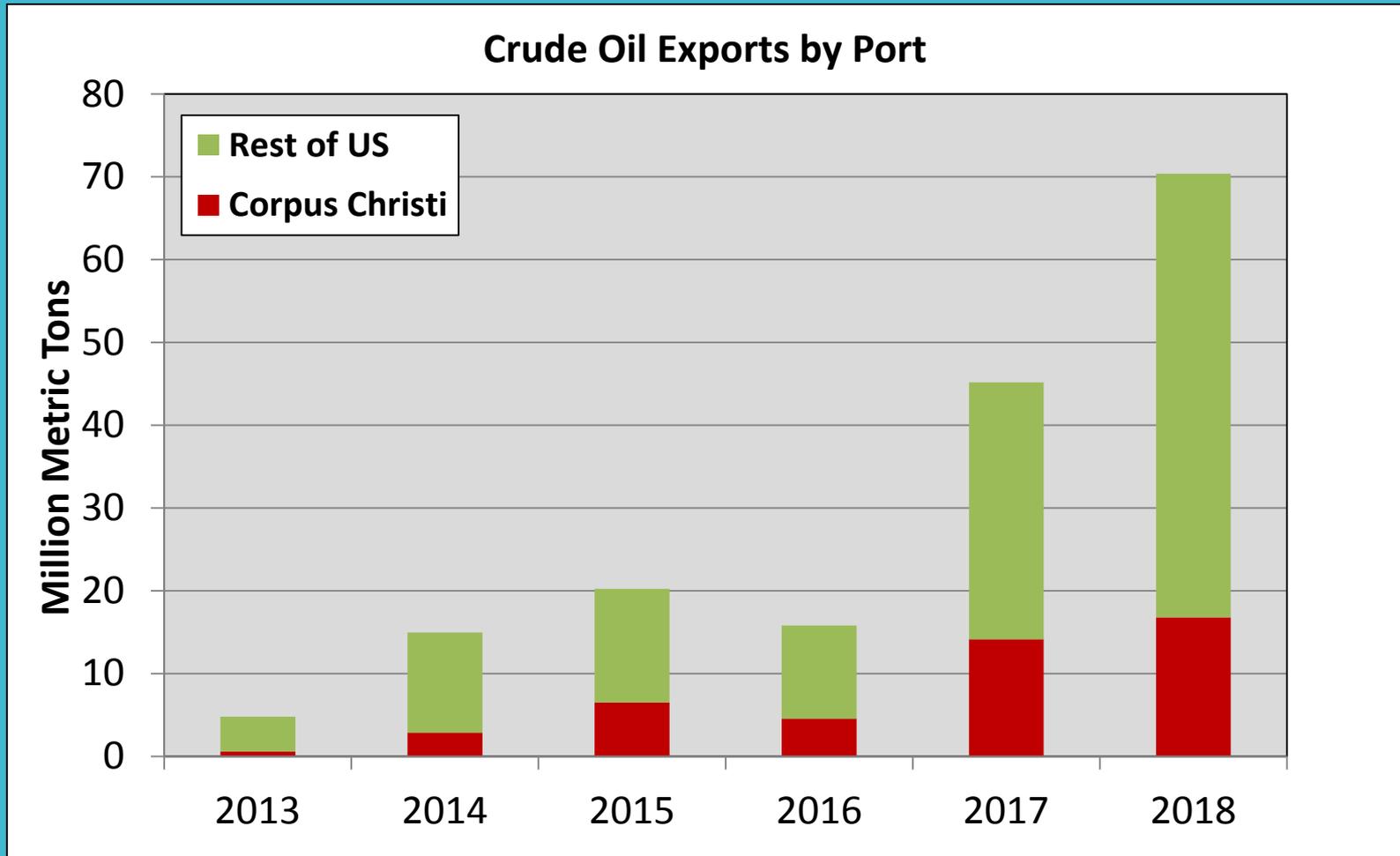
- Before 2016, by law, U.S. could not export crude oil, only condensate.
- In 2005, U.S. was #46 exporter and a top net importer.
- By 2018, U.S. became world's top:
 - Exporter (above Saudi, Russia etc.)
 - Producer (above Saudi, Russia etc.)

U.S. World Rankings in Crude Oil Exports



*Source: EIA International Energy Statistics, <https://www.eia.gov/beta/international/?topL=exp>

Port of Corpus Christi is Key



*Source: U.S. Census USA Trade Data (through October 2018)

Meeting 1 Discussion Topics

- What are the findings of the ship wake analyses?
- Will impacts on shoreline erosion be evaluated?
- Will there be assessment of changes to salinity from the previous and currently authorized channel deepening projects in addition changes from this proposed deepening?

Alternative Analysis

- Screening Criteria Identified
 - Increase export efficiency
 - Ability to serve multiple tenants
 - Ability to accommodate future growth
 - Environmental impacts
 - Risk, safety, and security
 - Ability to contribute to Beneficial Use

Alternative Analysis

- Alternatives Screened:
 - Alternative A – No Action
 - **Alternative B – Channel Deepening Project**
 - Alternative C – Offshore SPM
 - Alternative D – Offshore Platform

ENGINEERING

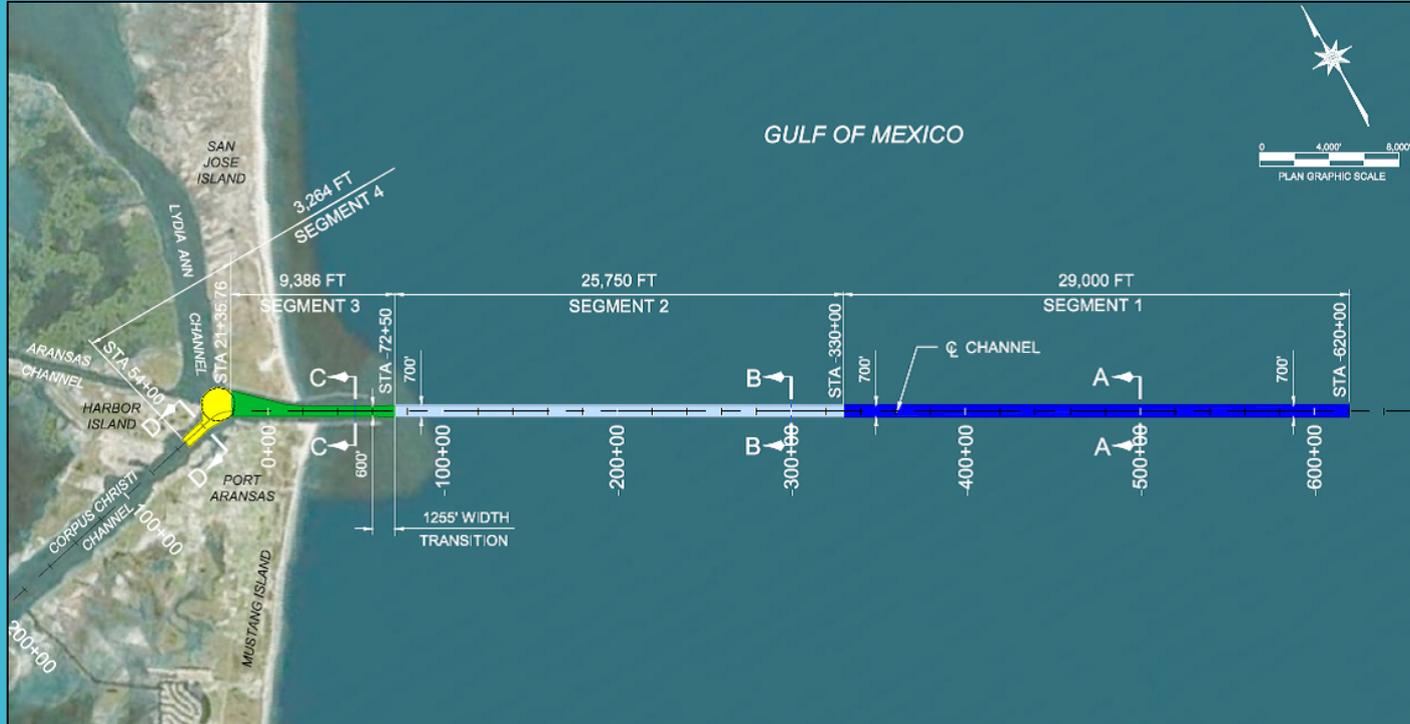
Engineering

- Review of design vessels
- Channel scenarios/selected channel design
- Volume and channel optimization

Review of Design Vessels

- 99th Percentile VLCC
 - LOA: 1116 feet
 - Beam: 197 feet
 - Draft: 70.2 feet (WTI)
- Maximum drafts assume a cargo of low density WTI crude oil (API=40) for VLCCs

Channel Segments



DREDGING PLAN

SCALE: 1" = 800'

SEGMENT	STATIONING (@ CHANNEL CL)		*DEPTH (FT BELOW MLLW)	DESCRIPTION	PLAN VIEW LEGEND
	FROM	TO			
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 21+35.76	-75.0	Jetties to Harbor Island Turning Basin	
4	STA 21+35.76	STA 54+00	-75.0	Harbor Island Junction	

* DESIGN DEPTH SHOWN. DOES NOT INCLUDE 2.0 FT ADVANCED MAINTENANCE DREDGING OR 1.0 FT ALLOWABLE OVER DREDGE.

Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-XXXX-XXXX

**Preferred Channel Alternative
Full Extent**

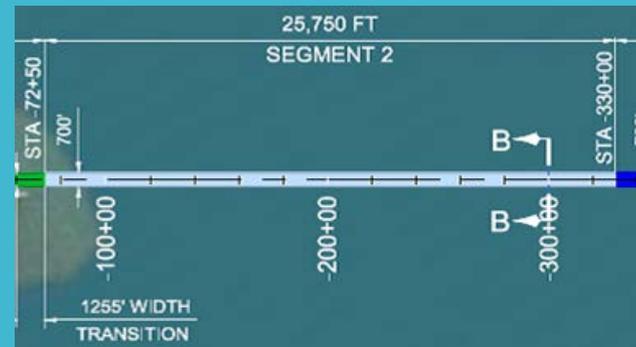
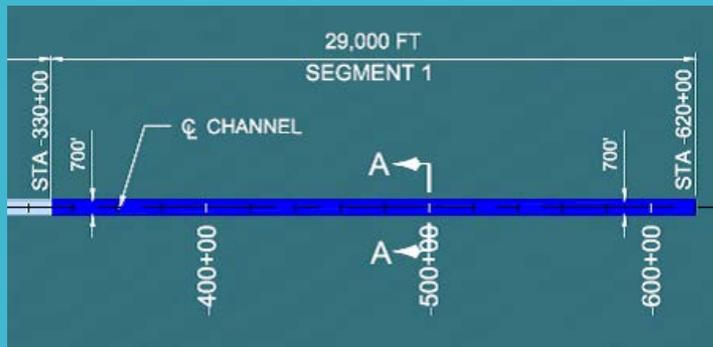
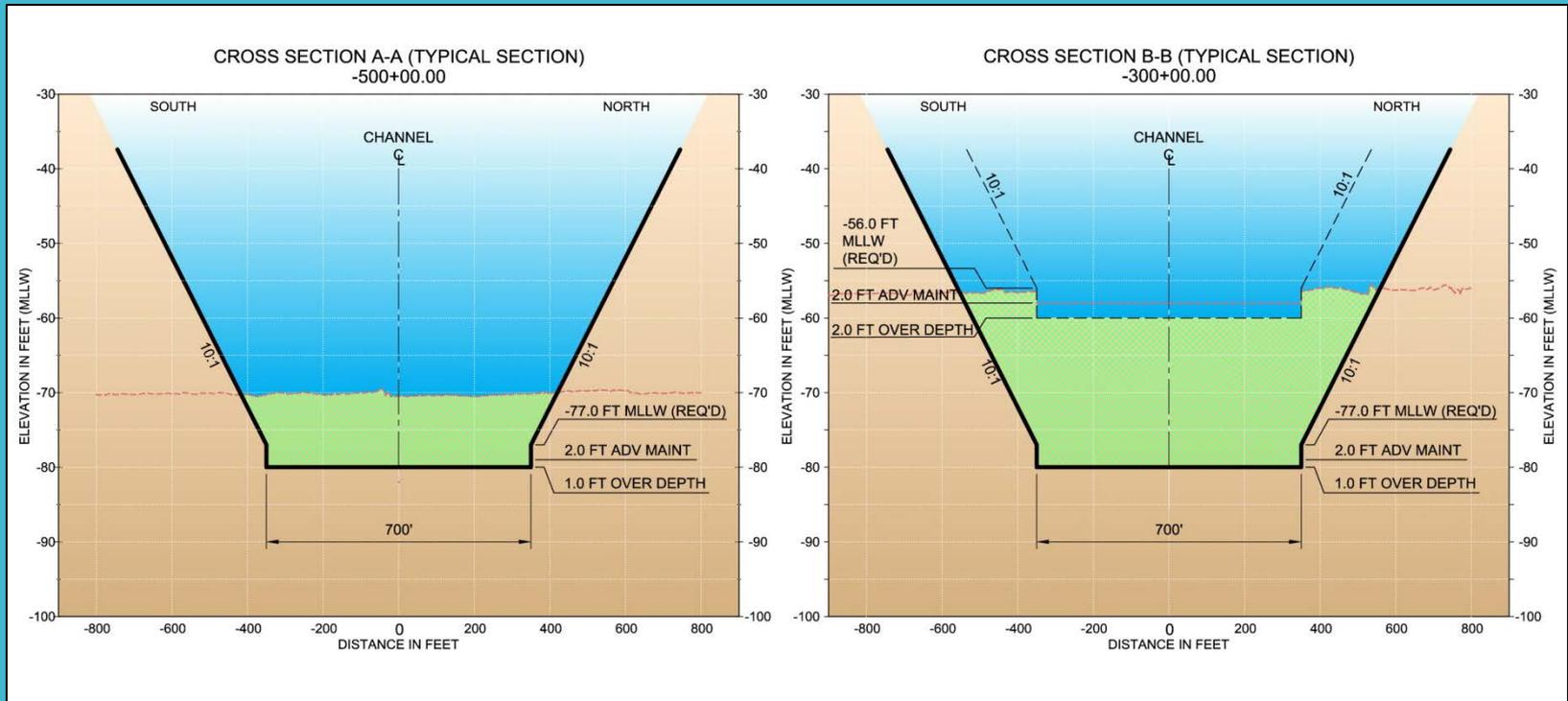
County: Aransas and Nueces
Application By: Port of Corpus Christi Authority

State: Texas
Date: December 2011

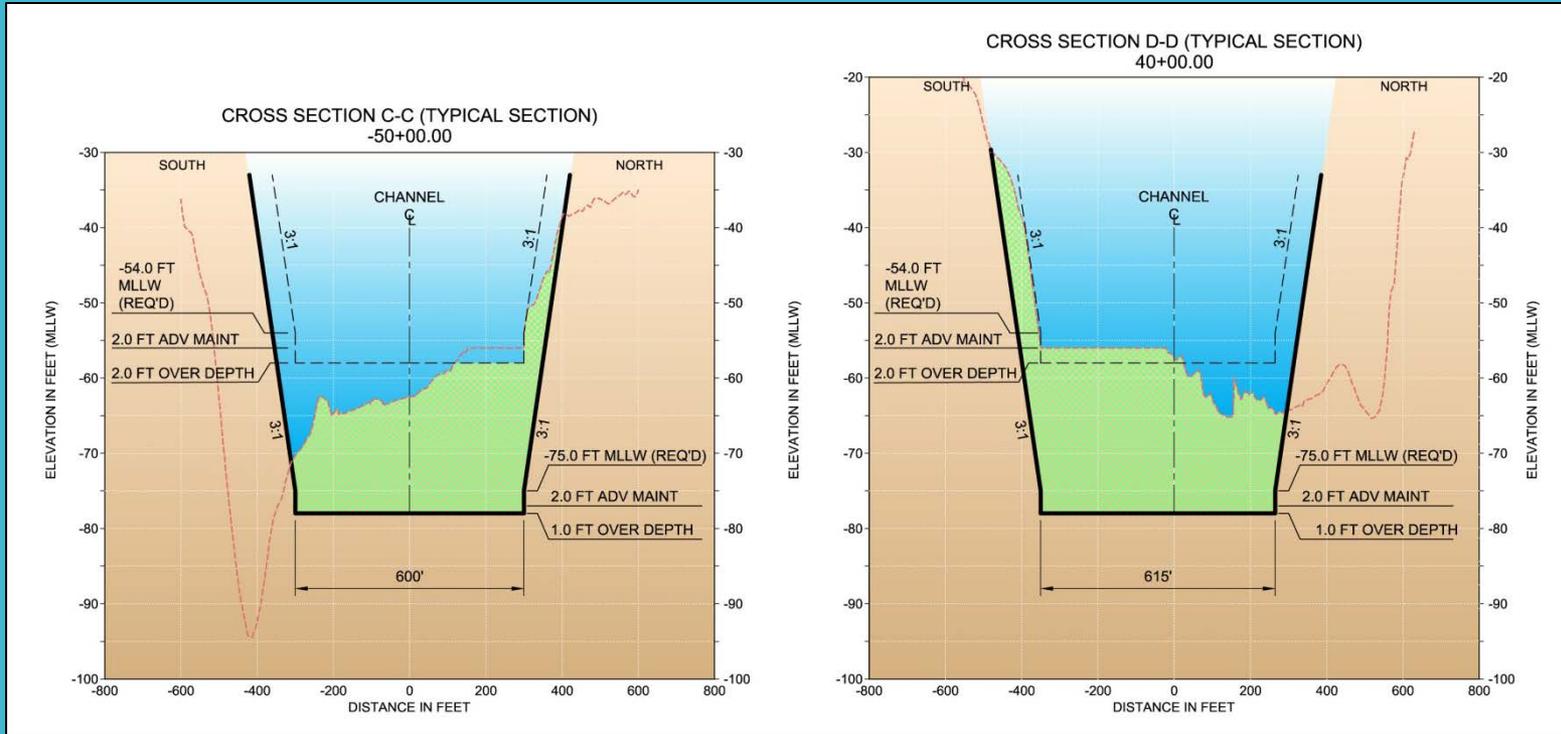
Proposed Channel Segment Depth and Width Compared to -54 ft. Project

Description	Channel Segments			
	Segment 1 Outer Approach	Segment 2 Inner Approach	Segment 3 Between Jetties	Through Harbor Island
Authorized 54 ft. Depth/ Proposed Channel Depth MLLW (ft.)	56/77	56/77	54/75	54/75
Authorized 54 ft. Width/ Proposed Channel Width (ft.)	700/640	700/640	600/540	Varies/ Varies

Channel Cross Section A-A & B-B



Channel Cross Section C-C & D-D



Channel Dimensions

USACE side slopes – included in permit

Channel Segment	Width (ft.)	Side Slopes (H:V)
Outer/ Approach	640	10:1
Jetties to Harbor Island	540	3:1

Segment	Stationing		Design Depth * (ft. MLLW)	Description	Dredge Volume (CY)
	Station Begin	Station End			
1	-620+00	-330+00	-77	Outer Approach Channel	8,921,308
2	-330	-72+50	-77	Inner Approach Channel	19,695,693
3	-72+50	21+35.76	-75	Jetties to Harbor Island	7,240,492
4	21+35.76	54+00	-75	Harbor Island Junction	3,583,237
Total Dredge Volume:					39,440,730

Preferred Channel Dimensions

Steeper side slopes

Channel Segment	Width (ft.)	Side Slopes (H:V)
Outer/ Approach	640	8:1
Jetties to Harbor Island	540	2.5:1

Segment	Stationing		Design Depth * (ft. MLLW)	Description	Dredge Volume (CY)
	Station Begin	Station End			
1	-620+00	-330+00	-77	Outer Approach Channel	8,710,680
2	-330	-72+50	-77	Inner Approach Channel	18,100,348
3	-72+50	21+35.76	-75	Jetties to Harbor Island	7,030,832
4	21+35.76	54+00	-75	Harbor Island Junction	3,508,775
Total Dredge Volume:					37,350,634

~ 2MCY Less Material

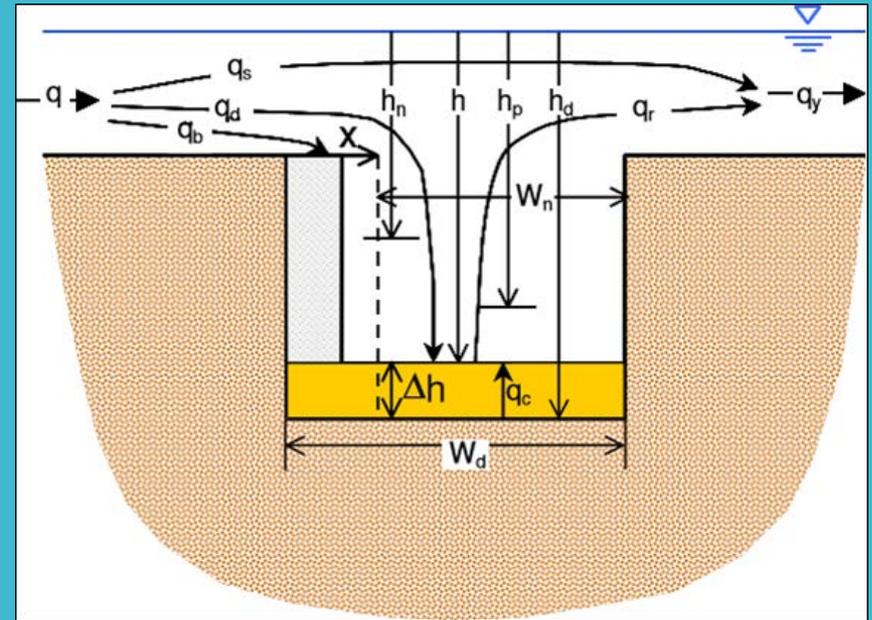
MODELING

Modeling Results

- Shoaling
- Tide and Velocity
- Salinity
- Vessel Wake
- ODMDS Capacity

Shoaling Analysis

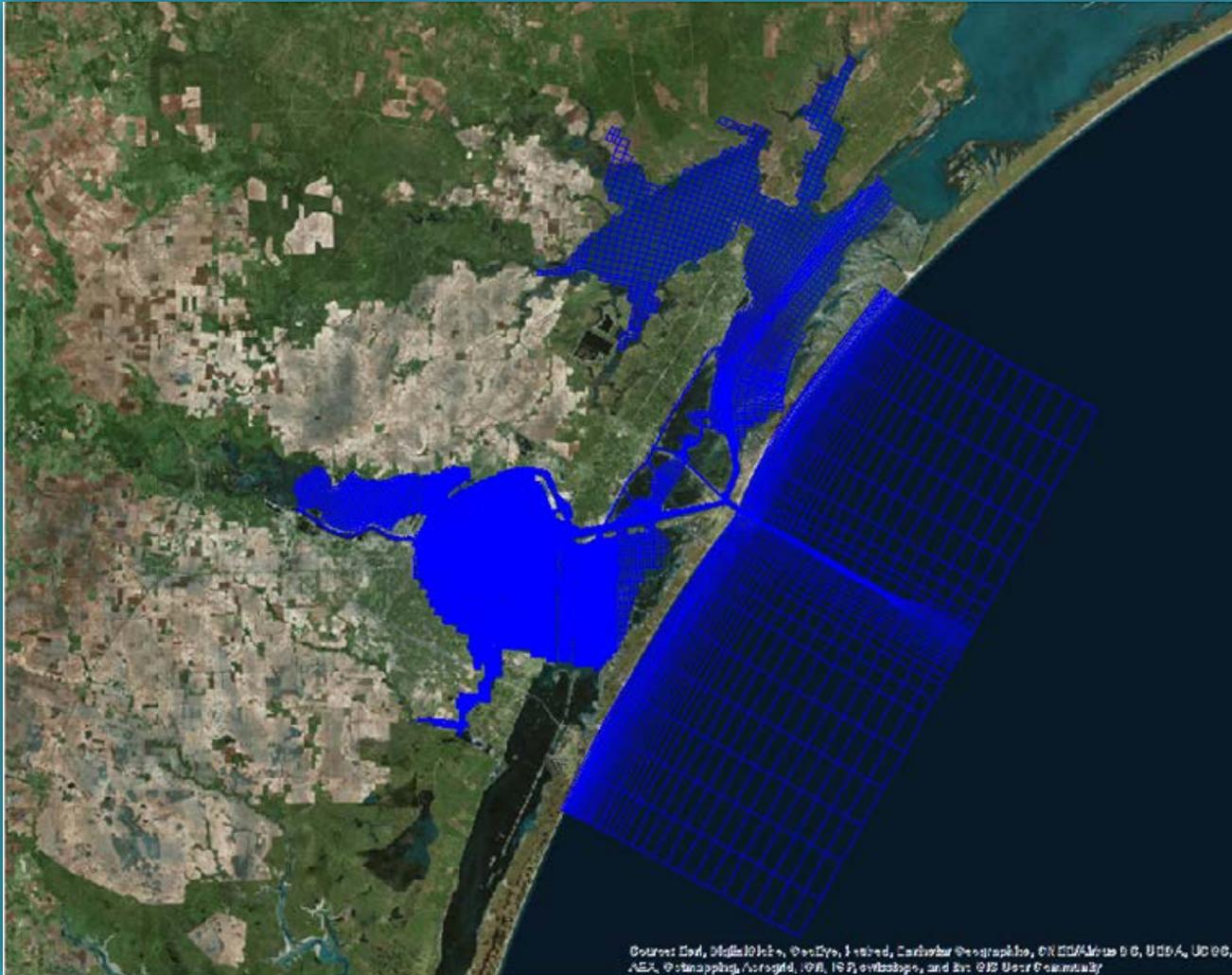
- Determined using USACE methodology
- A parametric model that describes infilling of a channel (Δh) due to cross-channel sediment transport (q) and the resultant processes of channel deposition and channel bank encroachment (Δx)
- For application of the model, the transport rates are typically specified as the rate per unit length of channel



Shoaling Analysis

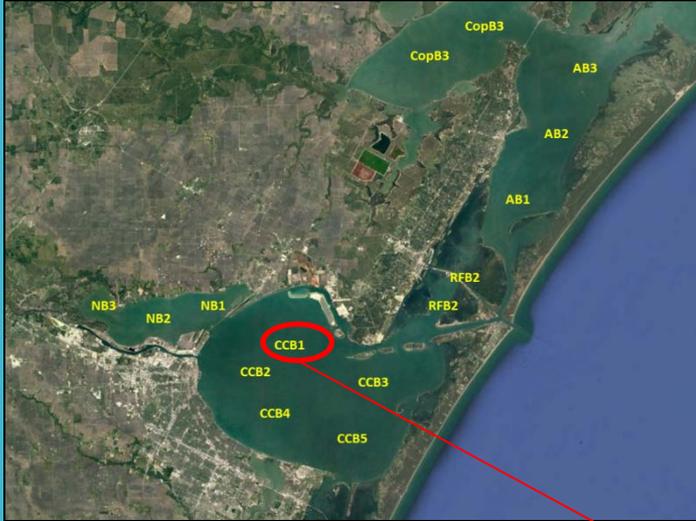
- Estimated using modified USACE rapid estimation techniques
- CCSCIP Project Shoaling (without project) = 1.08 MCY
- CDP Shoaling incremental increase = 0.39 MCY
- Most shoaling is still due to Gulf-related sediment (i.e. littoral)

Tidal and Velocity Modeling

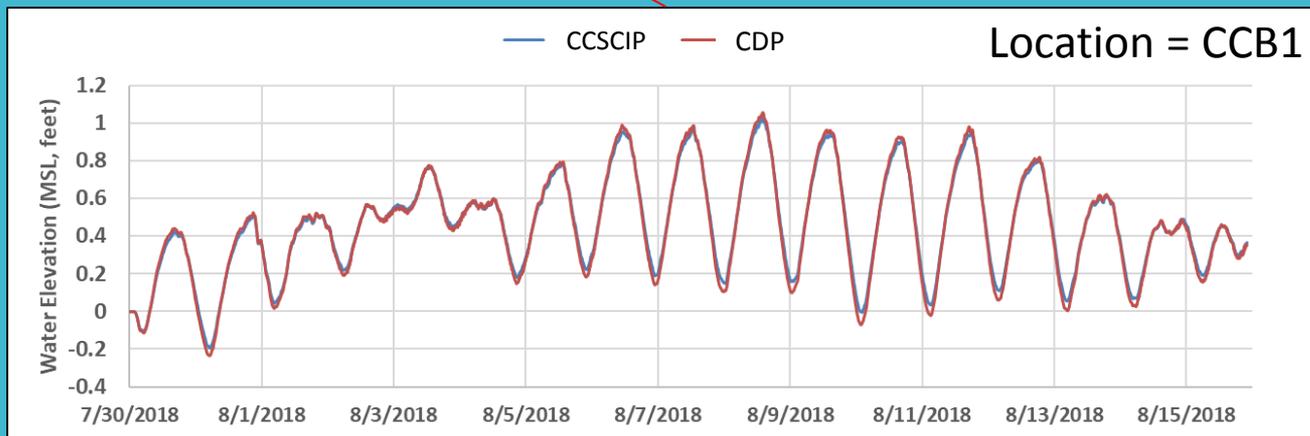


With Project Tidal Range Change

Change in Average of All Tides



Location	CCSCIP Spring Tide Range (ft)	CDP Spring Tide Range (ft)	Change (ft)
Corpus Christi Bay	0.62	0.67	0.05
Nueces Bay	0.68	0.74	0.06
Redfish Bay	0.66	0.74	0.08
Aransas Bay	0.47	0.5	0.03
Copano Bay	0.35	0.38	0.03



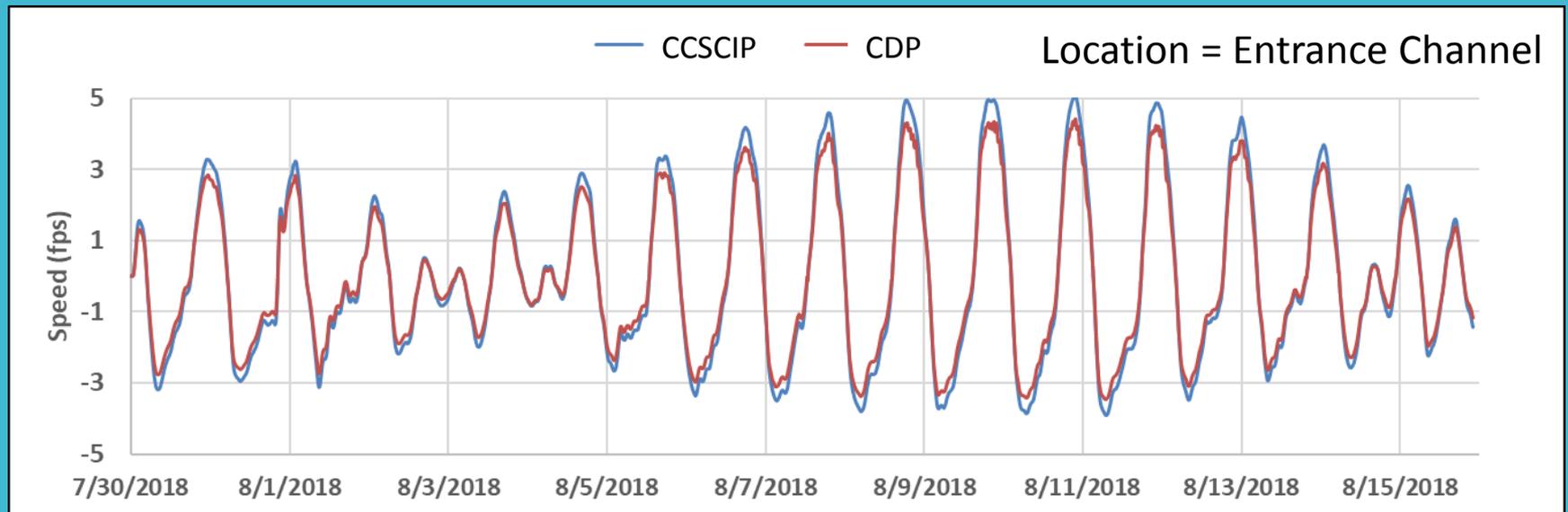
These changes are:

- <1 in.
- very small
- negligible

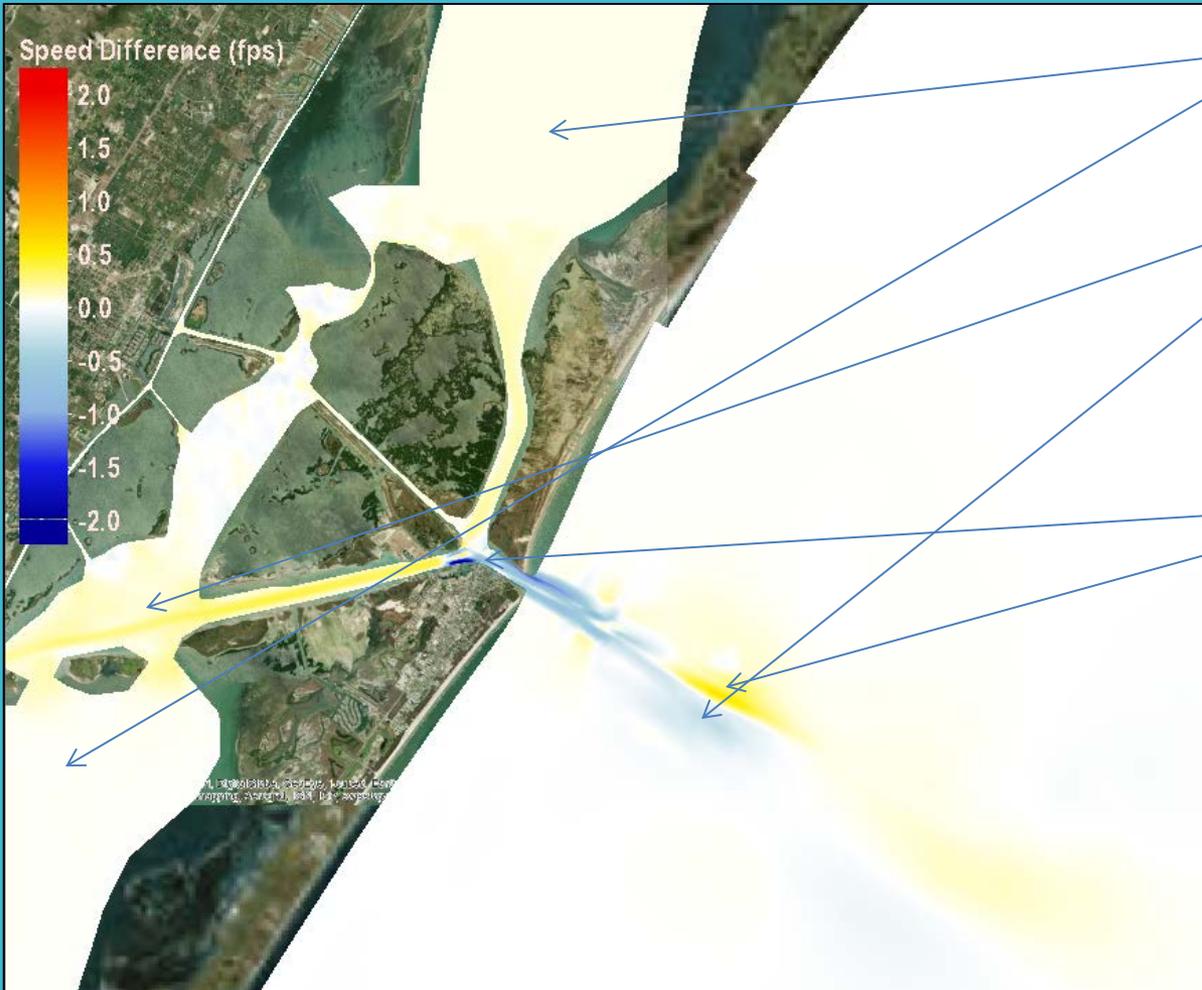
Project Velocity Change

Changes at Entrance Channel

	CCSCIP	CDP	Change	%
Peak Velocity (fps)	5.04	4.42	-0.62	-12%
*Average Velocity (fps)	1.98	1.71	-0.27	-14%
*Average of hourly velocities over 14 day simulation				



With Project Tidal Maximum Velocity Change (CDP versus CCSCIP Project)



- Most area is 0 or near-zero change
- Most in-channel change 0.01-0.1 fps increase/decrease
- Some very localized changes between 0.5-0.7 fps increase/decrease
- These are minor & relatively negligible to erosion & sediment transport

Salinity Modeling Results

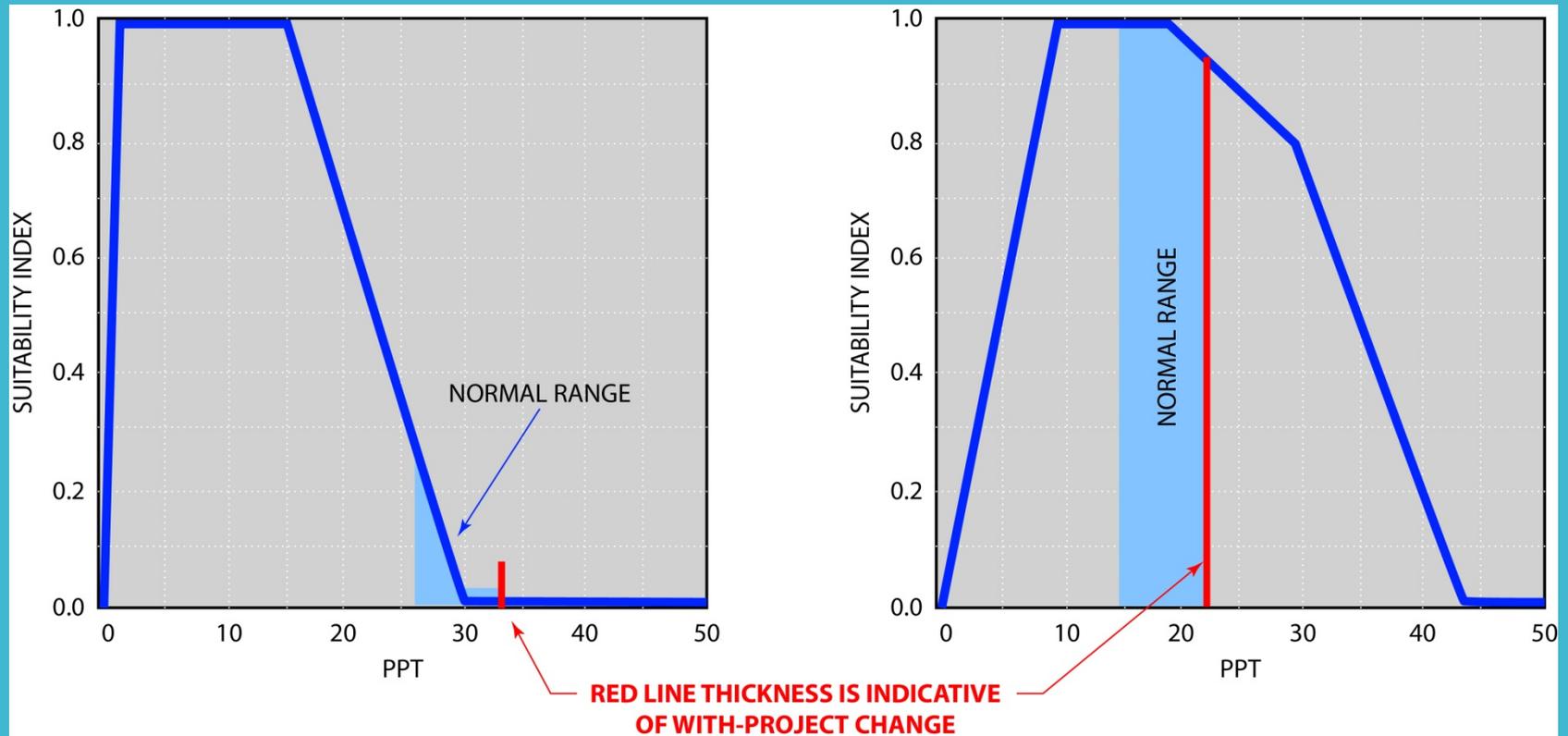
With Project Salinity Changes Calculated in the DELFT3D Model

Location	Average Increase * (ppt)	Increase In Maximum* (ppt)
CC3	0.37	0.47
Corpus Christi	0.38	0.52
CC4	0.33	0.46
CC2	0.35	0.40
N1	0.26	0.29
Nueces	0.25	0.32
CC6	0.24	0.29
CC5	0.32	0.40
Ingleside	0.32	0.47
CC1	0.36	0.53
Basin	0.05	0.06
RedFish Bay	0.21	0.09
A1	0.37	0.44
Aransas Bay	0.28	0.31
A2	0.11	0.12
COP1	0.08	0.08
COP2	0.07	0.08



*Average of all simulations in all conditions. Changes in the maximum values obtained from a selected condition run

Salinity Change in Context Using HSI Models*



White shrimp – mean salinity during summer

Brown shrimp – mean salinity during summer

Vessel Wake

- Model is currently being updated for changes to project and related vessel speed and call assumptions.
- Without project, bow being estimated empirically and drawdown waves being modeled using USACE ADH model.
- Based on past comparative analyses from other studies, ship wakes cumulative energy expected to be minor compared natural wind-wave climate.

ODMDS Capacity

- Placement in NW ODMDS (Homeport site)
- Capacity to accommodate new work material modeled using USACE MPFATE
- 13.8 MCY assumed placed in addition to CCSCIP project volume
- Mounding height below 11ft threshold in SMMP →adequate capacity

THREATENED AND ENDANGERED SPECIES

Threatened and Endangered Species

Common name	Scientific name	Critical habitat in project area?
Piping Plover	<i>Charadrius melodus</i>	Yes
Red Knot	<i>Calidris canutus rufa</i>	No
Loggerhead sea turtle	<i>Caretta caretta</i>	Yes
Green sea turtle	<i>Chelonia mydas</i>	No
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	No

Critical Habitat and Project Footprint



Species of Concern - Review

Common Name	Scientific Name	Affected Habitat	Critical Habitat
Piping Plover	<i>Charadrius melodus</i>	Beach – used for roosting, feeding, and foraging from July-March	Yes – PAs SJI, SS2, & PA2
Red Knot	<i>Calidris canutus rufa</i>	Beach – used for roosting, feeding, and foraging from July-March	No
Loggerhead sea turtle	<i>Caretta caretta</i>	Beach – summer nesting Open ocean–sargassum seaweed feeding and foraging area	Yes - outer segment of dredge channel
Green sea turtle	<i>Chelonia mydas</i>	Beach – summer nesting	No
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	Beach – summer nesting	No

Biological Assessment

- Aquatic Resources and Species
 - Biological Assessment
 - Critical Habitat
 - EFH Assessment

CULTURAL RESOURCES

Cultural Resources – Channel

- Four cultural resources, all shipwrecks, recorded in dredge footprint
 - American Star, Bill Hollis, Jimbo, and Ring Dove
 - Previously completed investigations in reported vicinity of wrecks (i.e., Enright et al. 2016 and Hoyt 1990) did not re-identify any of these vessels, suggesting that they may be misplotted.
 - It would be expected that if the wrecks were in the footprint, they would have been identified and/or assessed during the investigations for the current 54' authorized project.
 - However, if the wrecks lie in deeper water, such as below 55 ft., they may have been outside of the cultural resources survey parameters.

Cultural Resources – Channel

- Nine other shipwrecks identified within 500 ft of dredge footprint
- Three with archeological site numbers
 - **Mary** – Site 41NU252, determined eligible and previously subjected to archeological mitigation (Pearson and Simmons 1995).
 - **Utina** – Site 41NU292; THC assessed as undetermined eligibility in 2003; Enright et al. 2003 recommended further work
 - **Unknown Shipwreck** – Site 41NU264; THC originally determined shipwreck eligible in 1992 but reassessed as possessing undetermined eligibility in 2003; Enright et al. 2003 recommended further work

Cultural Resources – Channel

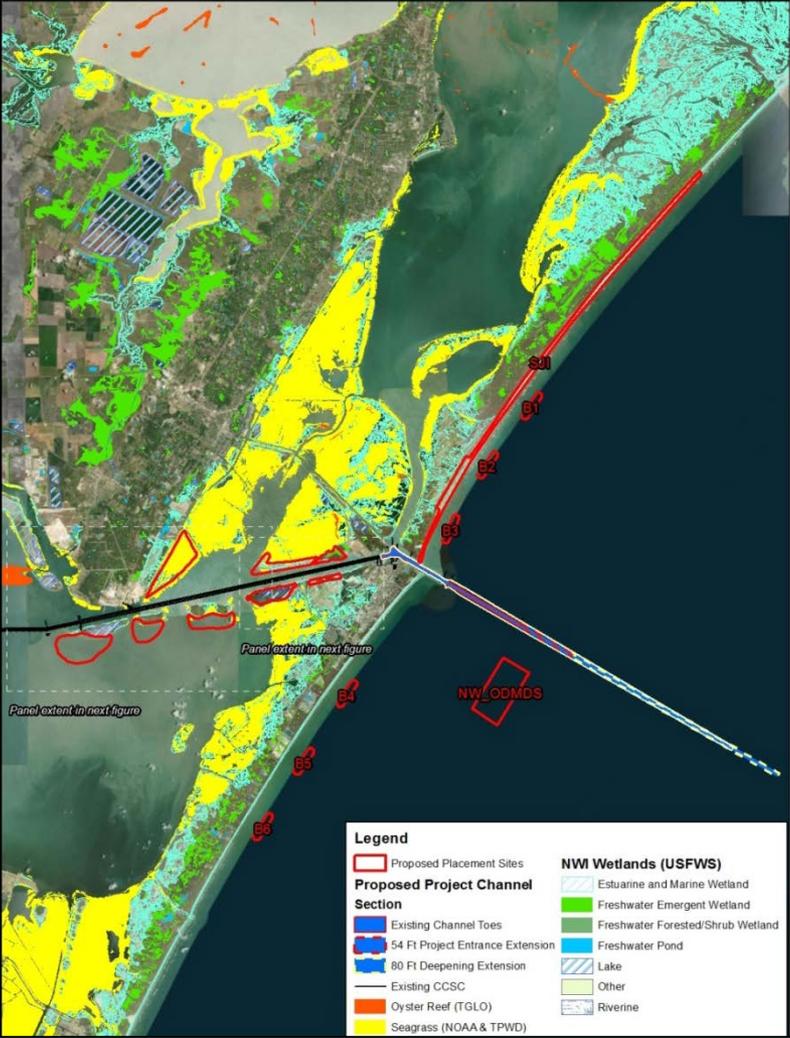
- Remaining 6 were shipwrecks not yet designated archeological sites.
 - Baetty SCA, Chuckadee II, De Rail, Ellen, and two unknown wrecks
 - Except for Baetty SCA, wrecks lie in areas that have been surveyed previously for cultural resources
 - Pertinent reports from THC or TARL are being pursued.

Cultural Resources – Placement

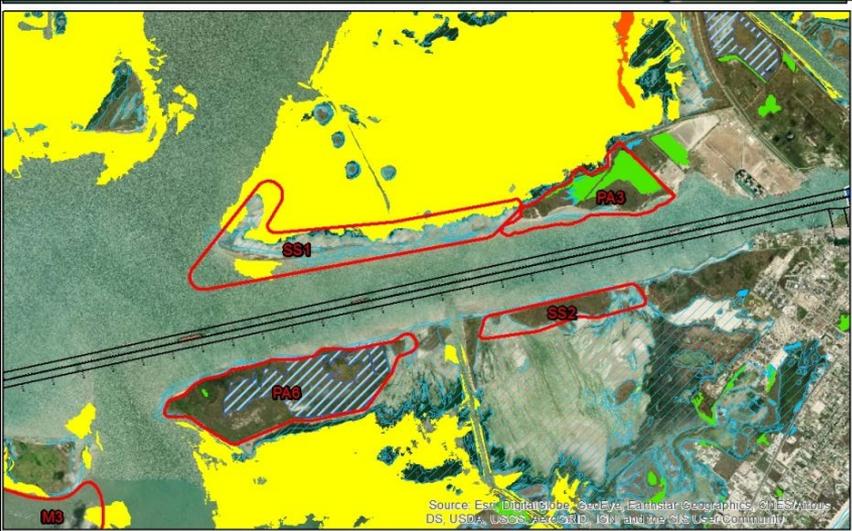
- Four resources identified in placement sites footprint
 - Three shipwrecks
 - Coral Sands – not surveyed yet, location unconfirmed
 - Unknown shipwreck – not surveyed yet, location unconfirmed
 - Tramp – located on upland PA4. May be plotted incorrectly
 - Site 41AS91 – Remains of 1934 factory determined ineligible by THC in 2005 in current PA2 proposed for contingent maintenance placement

ENVIRONMENTAL EVALUATION

Project Area Aquatic Resource Mapping



Project Area Aquatic Resource Mapping



Air Quality Impacts

- Construction – only temporary, not subject to General Conformity (we are in attainment)
- Long Term Operational – reductions through enabling fully loaded VLCC use
 - Eliminate Reverse Lightering Emissions
 - Reduce number of vessels needed to carry cargo
 - Provide the efficient highway for onshore loading facilities, which would have better loading emissions controls vs offshore facilities

Lightering Emissions

- Sources of emissions during lightering
 - Loading: headspace vapor displaced by oil
 - Ballasting: headspace vapor displaced by ballast water **MAJOR**
 - Reverse lightering vessel transit, loaded vessel hoteling
 - Vessel's steam-driven pump boilers **MINOR**
- TCEQ 2017 Lightering Emissions Study*
 - Used to estimate potential reductions
 - Gulf region, AIS-based, estimation
 - Corpus Christi & Houston region dominated events

*Ocean-Going Tanker Vessel Lightering Emissions in the Gulf of Mexico, Ramboll Environ, 2017

Reverse Lightering Emissions Eliminated

CC Crude Lightering at Future Export Rate						
Crude oil export at assumed future rate	4	VLCCs per week				
VLCC loading based on export	208	Annual VLCCs				
	Annual Emissions (tons)					
	NO _x	VOC	CO	PM ₁₀	PM _{2.5}	SO _x
Using per lightering event emissions	112	9,268	22	11	11	68
Using source EF (VOC)*	-	6,508	-	-	-	-

DREDGE MATERIAL MANAGEMENT PLAN

Dredged Material Placement Plan

- Management of dredged materials should consider the most cost effective and implementable alternatives that weigh economics, engineering, and the environment.
- PCCA, USACE, and Resource Agency Participation
- Use existing PAs, existing BU sites, and existing ODMDS
- Incorporate as much BU placement as feasible
- Avoid reef, seagrass, wetlands, etc. as much as possible
- Ecosystem or habitat-oriented where feasible
- Expanded or new ODMDS: Separate, parallel track

Dredged Material Placement Plan

- Initial Concepts
 - Beach Nourishment
 - Dune Restoration
 - Feeder Berm/Sand Engine
 - Marsh and Shoreline Restoration
 - Existing ODMDS
 - Bird Islands
 - Oyster Reef Platform
 - Construction Fill or Elevation Raising

Dredged Material Management Plan Screening

- Factors for advancing initial concepts
 - Limited ability and proximity for new upland sites of sufficient size
 - Agency, public, and PCCA input
 - Proximity to dredged footprint for hydraulic placement or hopper/scow depth access
 - Capacity of site
 - Aquatic resource or infrastructure constraints

Initial Concept 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, but reconceived as contingency upland expansion site
NW ODMS	Channel adjacent. Good option.	Feasible	Near channel. Minimal construction. Would be cost effective	Advanced
San Jose and Mustang Island Feeder Berms or Shoreline Repair	Channel adjacent. Good option.	Feasible	Near channel. Minimal construction. Would be cost effective	Advanced

Dredged Material Management Plan

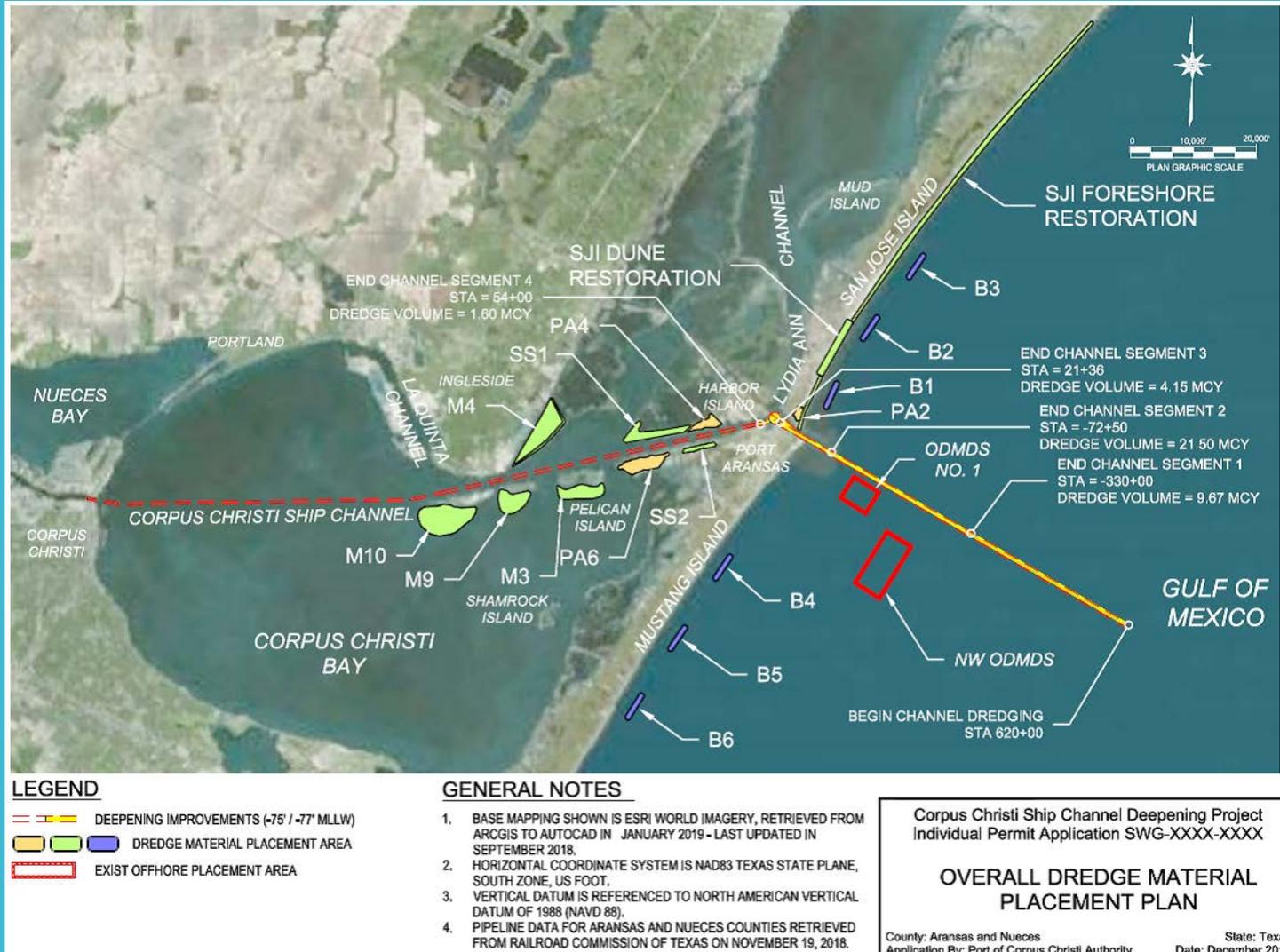
Advancing Concepts

- Beach nourishment
- Dune and foreshore restoration
- Feeder berm/Sand engine
- Aquatic habitat and shoreline restoration
- Existing ODMDS

Dredged Material Placement Plan

Placement Option	Description	Placement Capacity (CY)	Proximity to New Work Dredging Operations	Provides Environmental Benefit
M3	Estuarine/aquatic creation extension Pelican Island	4,328,400	Located approximately 6 miles from Harbor Island	This option will convert featureless bay bottom to approximately 330 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.
M9	Estuarine/aquatic creation adjacent to PA9	3,500,000	Located approximately 8 miles from Harbor Island	This option will convert featureless bay bottom to approximately 329 acres of estuarine/aquatic habitat.
M10	Estuarine/aquatic 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	2 foot dike raise and fill	3,704,900	Located approximately 4 miles from Harbor Island	This option does not create any environmental benefit.
SS1	Restoring eroded shoreline and armoring to protect Harbor Island seagrass area	1,682,000	Located approximately 3 miles from Harbor Island	This option restores an eroding shoreline to its historic profile.
SS2	Restore shoreline washout along Port Aransas Nature Preserve as a result of Hurricane Harvey	695,600	Located approximately 2 miles from Harbor Island	This option restores two washouts of shoreline along the Port Aransas Nature Preserve as a result of Hurricane Harvey.
PA4	Reestablish eroded shoreline and land loss behind PA4	3,020,000	Located approximately 2 miles from Harbor Island	This option does not create any environmental benefit.
SJI	Dune & shore restoration San Jose Island	7,000,000	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 part of New Work ODMDS	13,800,000	Located directly next to Channel Dredging Operations	This option does not create any environmental benefit.
B1-B6	Feeder berms offshore of SJI and Mustang Island	7,200,000	Located less than 10 miles from Channel Dredging Operations	This option will nourish beach shoreline by natural sediment transport processes.
Scenarios for new work placement capacity provided and needed.		56,731,500	Total Capacity Provided	
		49,731,500	Total Capacity less SJI (should that option become unavailable)	
		39,440,700	Total NW placement capacity required (Narrowed Channel with USACE Slopes)	
		10,290,800	Additional Capacity less SJI (should that option become unavailable)	

Dredged Material Placement Plan



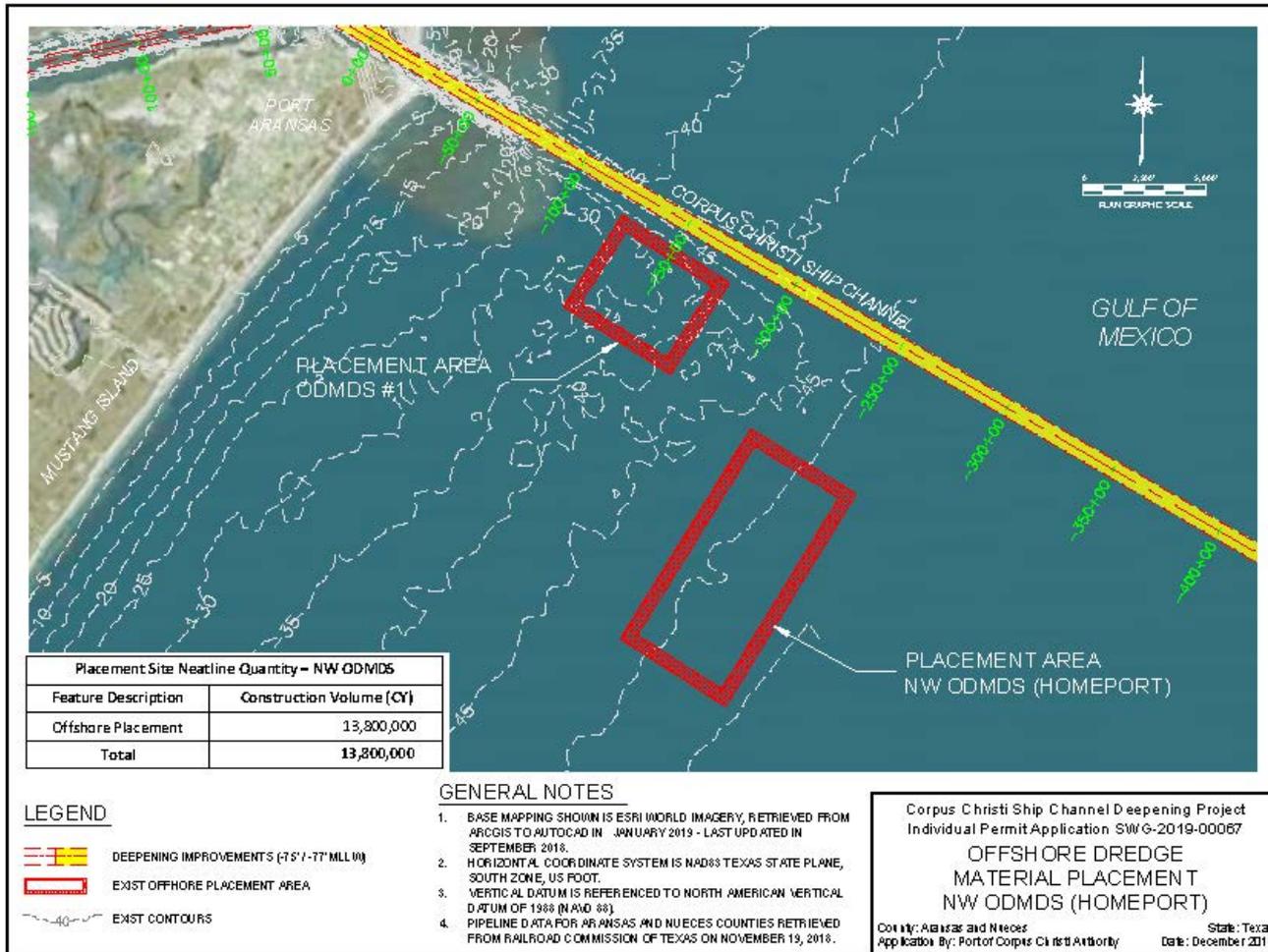
Summary of Mapped Wetland Impacts in Placement Sites

Acres		Predominant Wetland Type	Comment	Outcome
984.3		Total mapped Wetlands		
Portions Reviewed				
262.6		Lake (Lacustrine impounded)	Portion inside active PA 6 or eroded away	Not present
512.2		Estuarine and Marine Wetland (Beach shoreline)	Portion to directly restore as beach or dune (SJI)	Restoration
68.0		Estuarine and Marine Wetland (intertidal emergent)	Portion avoided or that would be integrated into M4	Avoided/restored
Remainder	141.5	Estuarine and Marine Wetland (Unconsolidated shoreline)	Portion that would be directly impacted by BU feature (SS1)	Restoration to protect seagrass

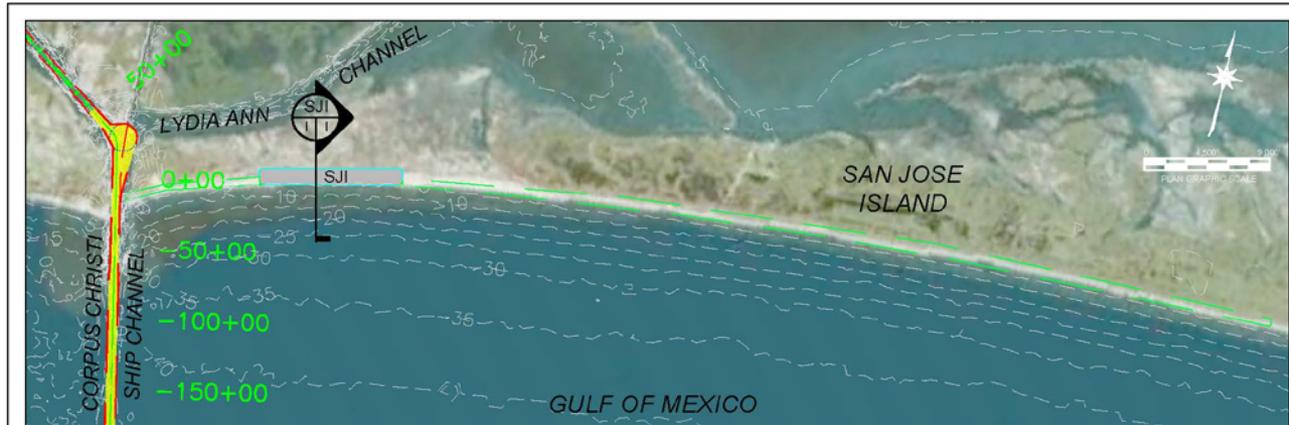
Summary of Mapped Seagrass Impacts in Placement Sites

Acres		Comment	Outcome
679.0		Total Mapped Seagrasses	
Portions Reviewed			
559.0		Portion in M4 interior to be largely avoided except at fringes, and would be protected by BU	Avoided/Protected
22.7		Portion that BU can be reconfigured to replace impacted seagrass acreage (M3, M9, M10)	Restoration
Remainder	96.8	Remaining portion that would be impacted by SS1	Restoration to protect seagrass

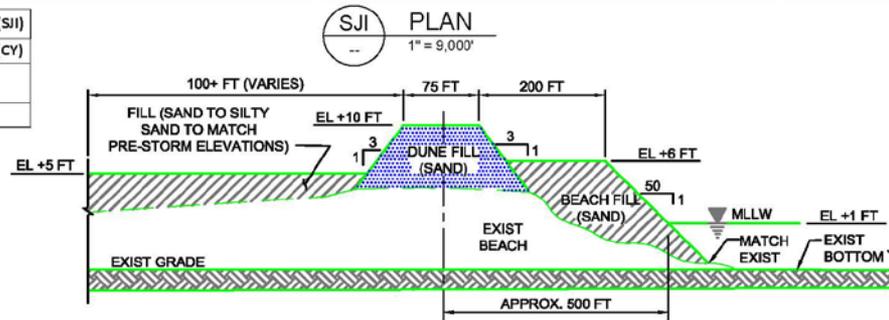
Dredged Material Management Plan



Dredge Material Placement Plan



Placement Site Neatline Quantity - San Jose Island (SJI)	
Feature Description	Construction Volume (CY)
Dune and Foreshore Restoration	7,000,000
Total	7,000,000



LEGEND

- PROPOSED SHIP CHANNEL DEEPENING
- EXIST CONTOURS
- DUNE RESTORATION
- FORESHORE RESTORATION

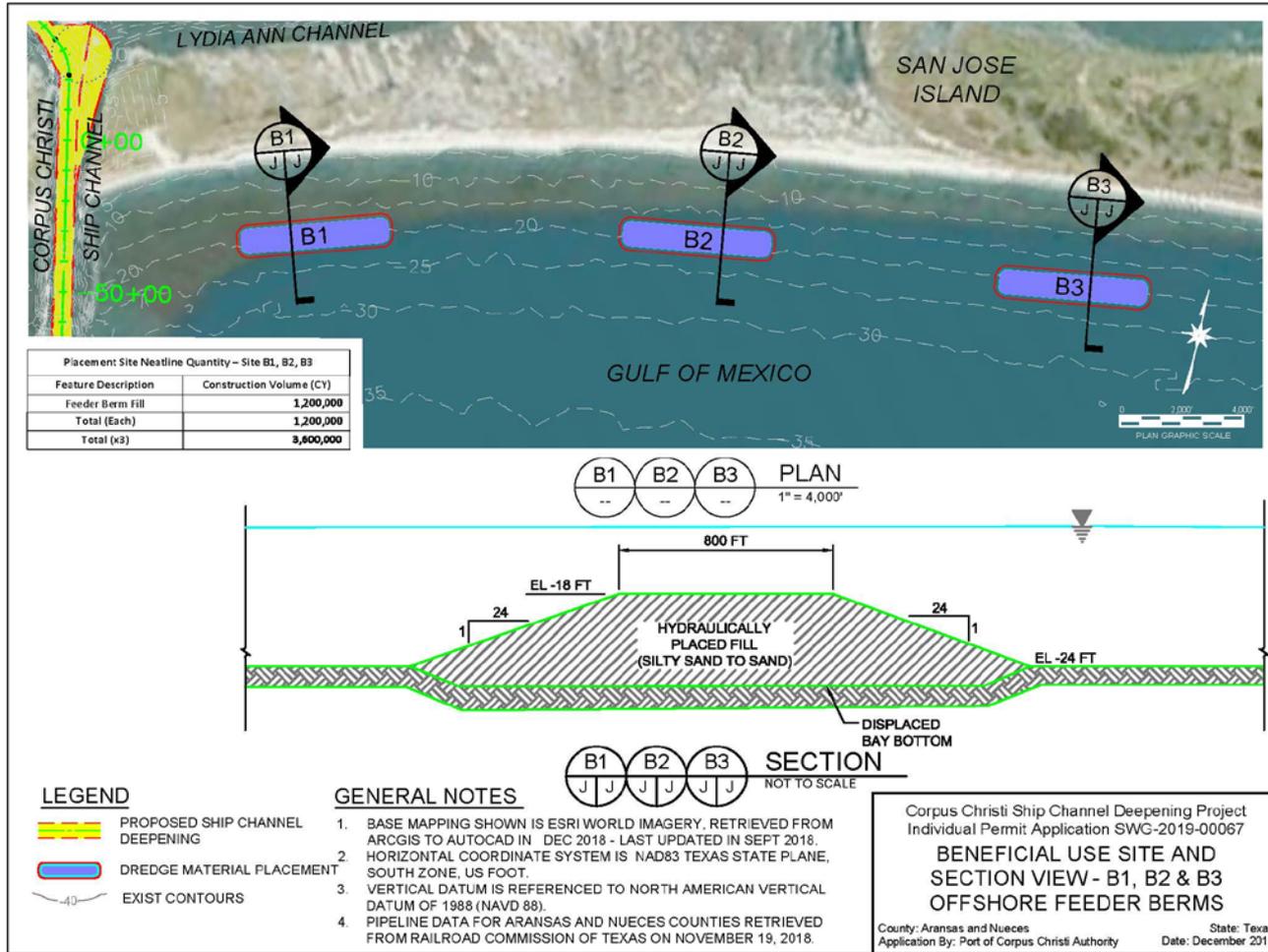
GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN DEC 2018 - LAST UPDATED IN SEPT 2018.
2. HORIZONTAL COORDINATE SYSTEM IS NAD83 TEXAS STATE PLANE, SOUTH ZONE, US FOOT.
3. VERTICAL DATUM IS REFERENCED TO MEAN 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
BENEFICIAL USE SITE AND SECTION VIEW - SJI DUNE AND FORESHORE RESTORATION
 County: Aransas and Nueces State: Texas
 Application By: Port of Corpus Christi Authority Date: December 2018

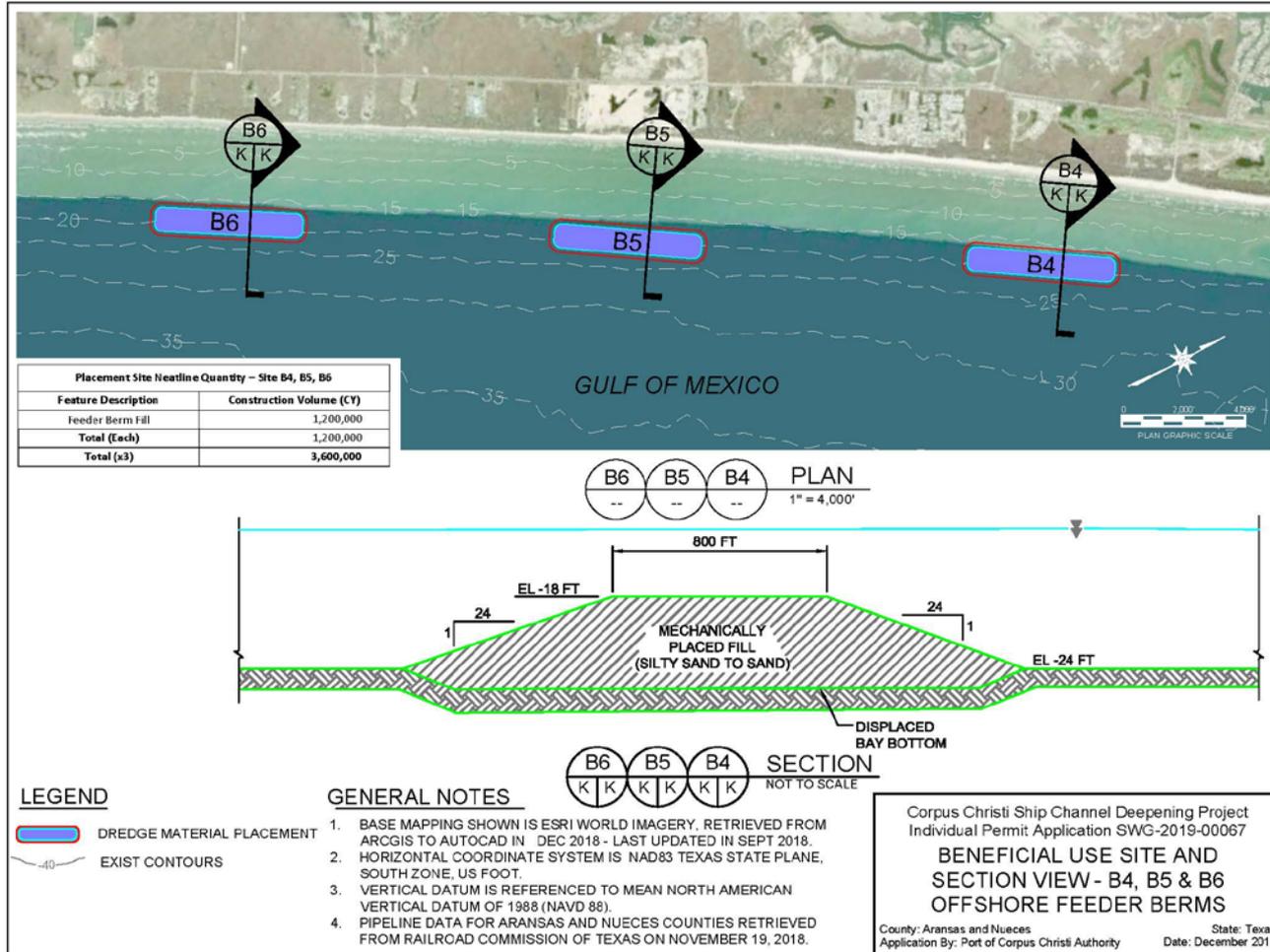
TIME: 1-23-19 - 11:23am User: kshankar@acem.com DWD: P:_PBD\Part of Corpus Christi\00 CAD\25-Station\VEPA Figures\Final: Route CAD\SWP File 8.5x11\19-03A-05-12_9A.dwg

Dredge Material Placement Plan



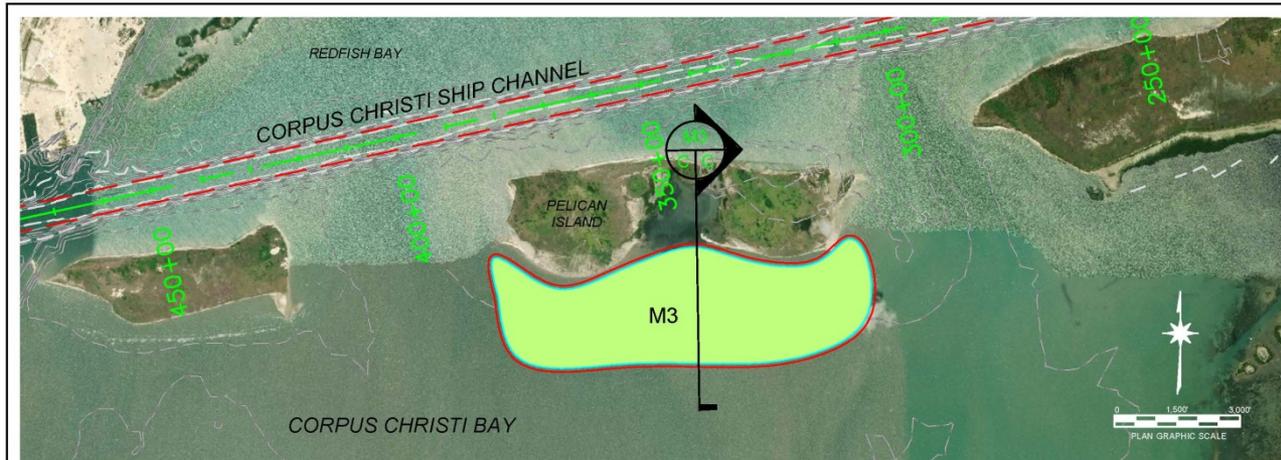
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Dredge Material Placement Plan



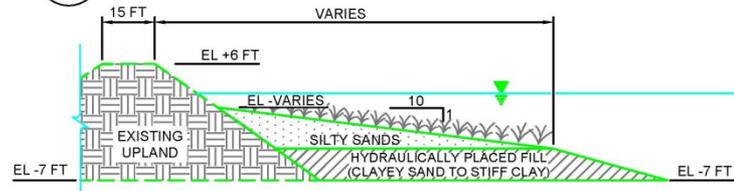
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Dredge Material Placement Plan



M3 PLAN
1" = 2,500'

Placement Site Neatline Quantity - Site M3	
Feature Description	Construction Volume (CY)
Foundation Fill	3,269,200
330-Acre Estuarine / Aquatic Habitat	1,059,200
Total	4,328,400



M3 SECTION
NOT TO SCALE

LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- EXIST CONTOURS

GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN DEC 2018 - 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.

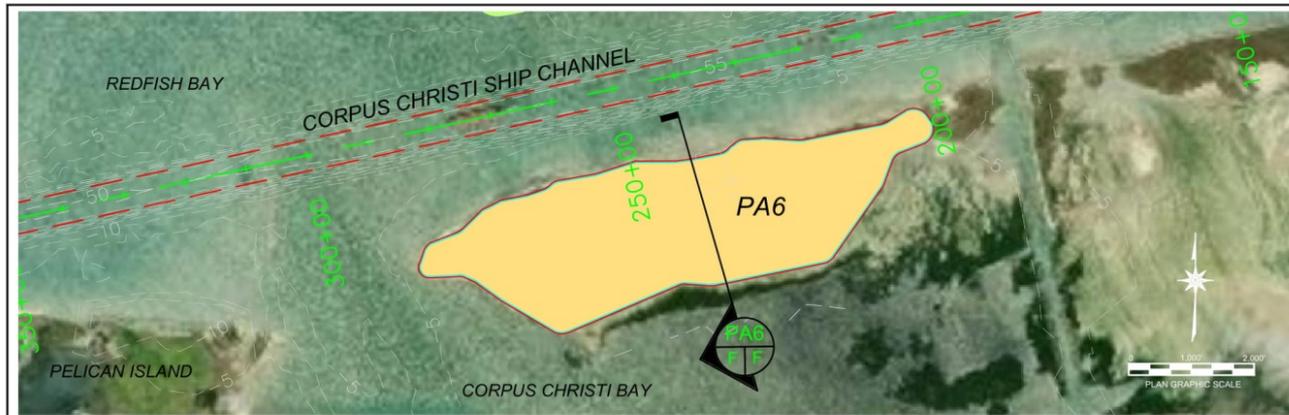
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

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

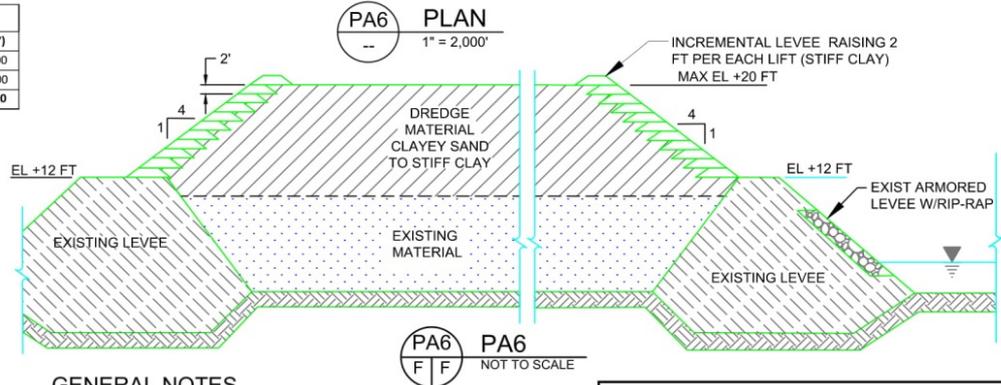
County: Aransas and Nueces State: Texas
Application By: Port of Corpus Christi Authority Date: December 2018

TME: 1-23-19 - 10:36am User: Nathan.Bezzone DWS: P:_PBD\Port of Corpus Christi\300 CAD\25-Station\NPA Figures\Permit Visuals CAD\DWG File 8.5c1\19-0361-05-07_3PA.dwg

Dredge Material Placement Plan



Placement Site Neatline Quantity - Site PA 6	
Feature Description	Construction Volume (CY)
2-ft Levee Raise	116,100
PA Fill	3,588,800
Total	3,704,900



LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- EXIST CONTOURS

GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN DEC 2018 - LAST UPDATED IN SEPT 2018.
2. HORIZONTAL COORDINATE SYSTEM IS NAD83 TEXAS STATE PLANE, SOUTH ZONE, US FOOT.
3. VERTICAL DATUM IS REFERENCED TO MEAN 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.

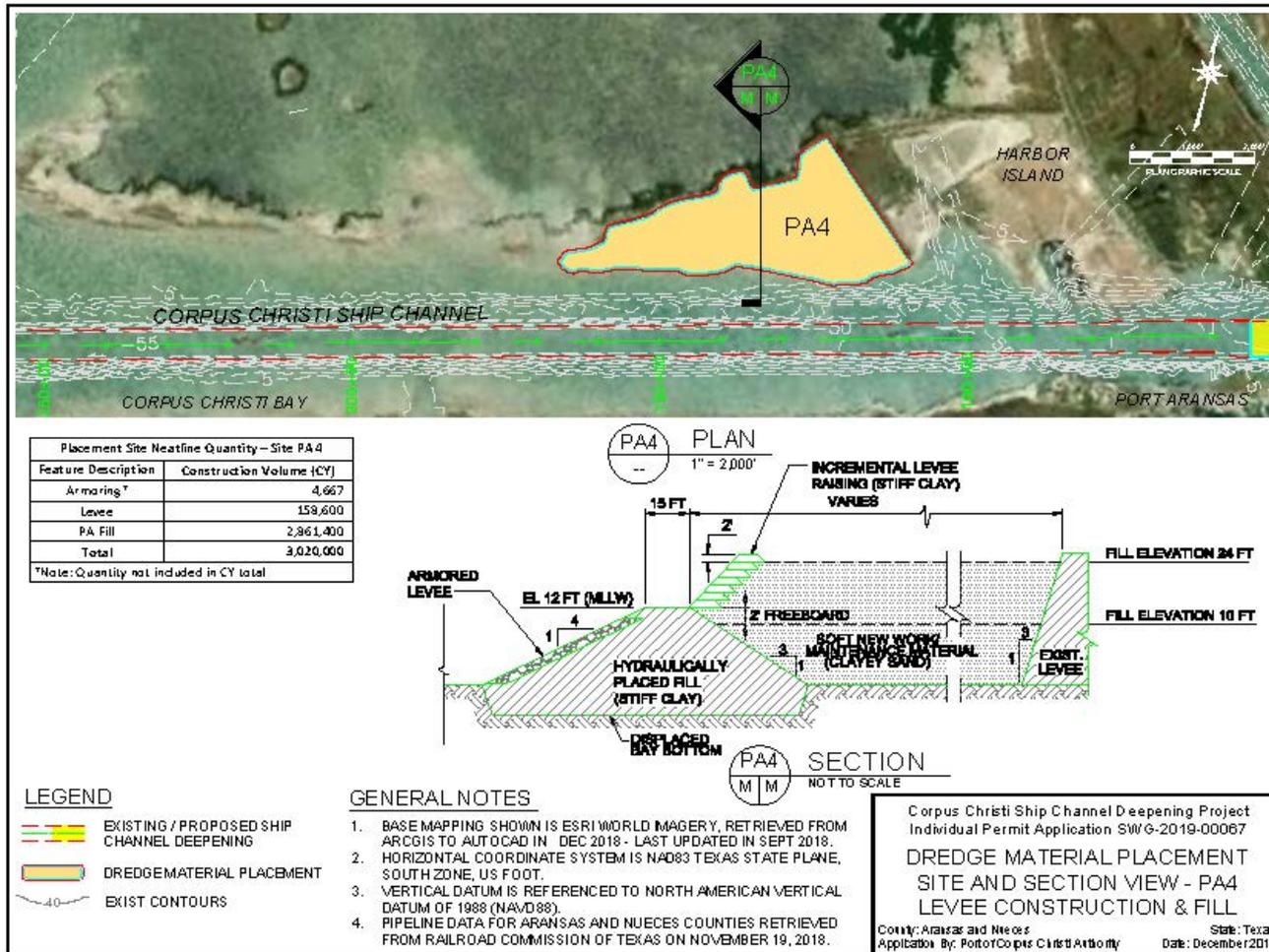
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

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

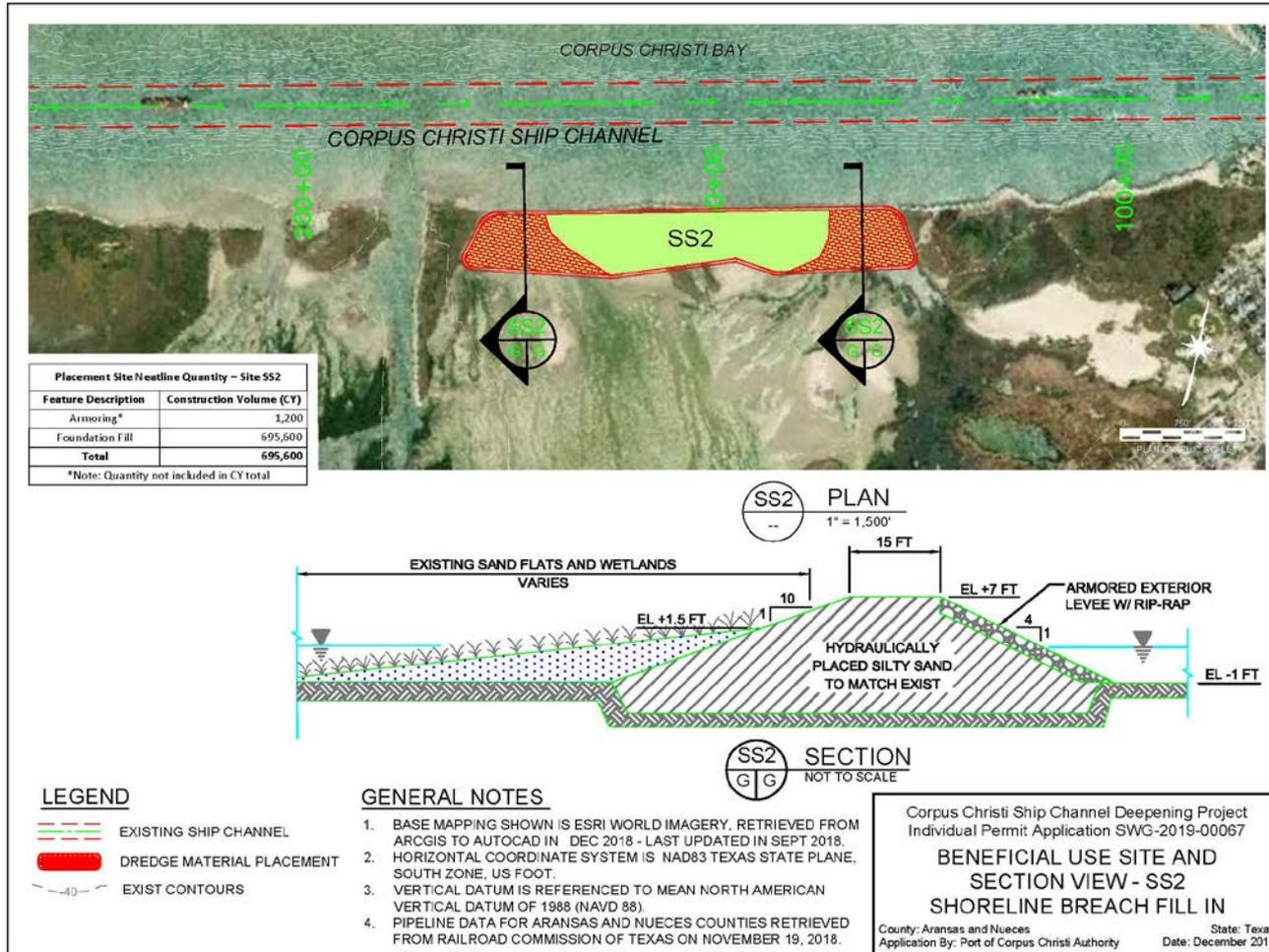
County: Aransas and Nueces State: Texas
Application By: Port of Corpus Christi Authority Date: December 2018

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Dredge Material Placement Plan

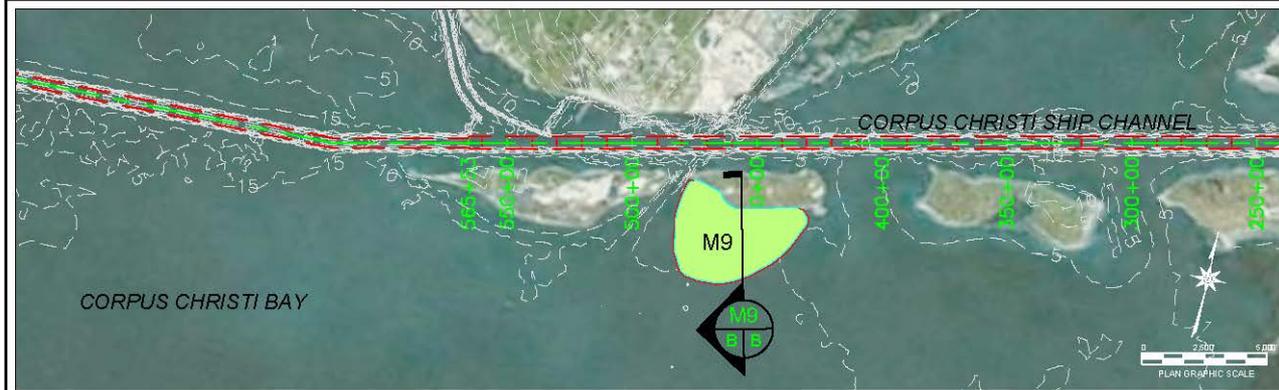


Dredge Material Placement Plan



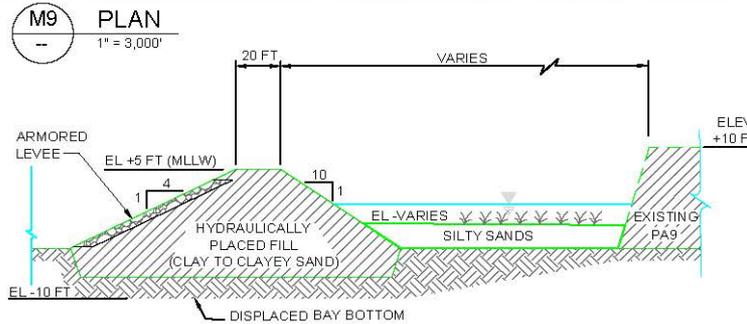
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Dredge Material Placement Plan



Placement Site Neatline Quantity – Site M9	
Feature Description	Construction Volume (CY)
Armoring*	5,333
Levee Creation	312,000
329 Acre Estuarine / Aquatic Habitat	3,188,000
Total	3,500,000

*Note: Quantity not included in CY total



LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- EXIST CONTOURS

GENERAL NOTES

1. BASE MAPPING SHOWN IS ESRI WORLD IMAGERY, RETRIEVED FROM ARCGIS TO AUTOCAD IN DEC 2018 - 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.

M9 SECTION

NOT TO SCALE

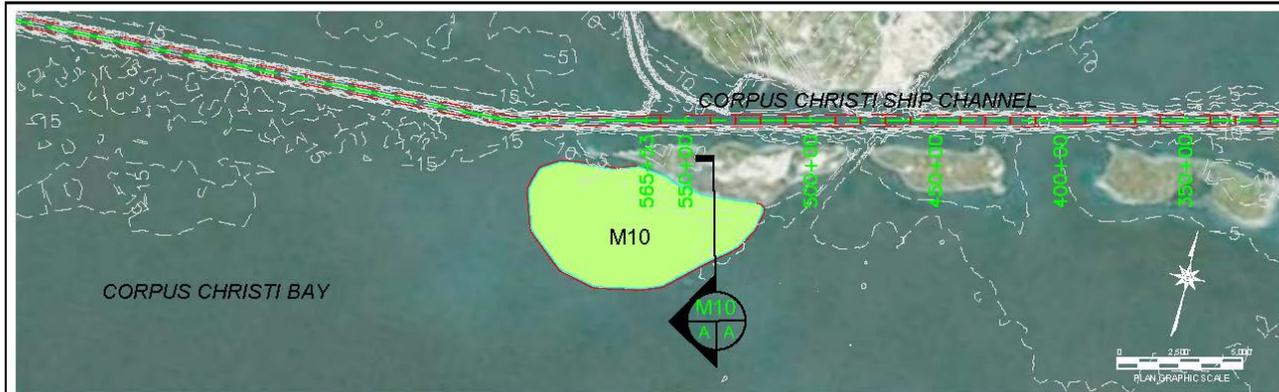
Corpus Christi Ship Channel Deepening Project
Individual Permit Application SWG-2019-00067

**BENEFICIAL USE SITE
AND SECTION VIEW - M9
329 ACRE ESTUARINE / AQUATIC HABITAT**

County: Aransas and Nueces State: Texas
Application By: Port of Corpus Christi Authority Date: December 2018

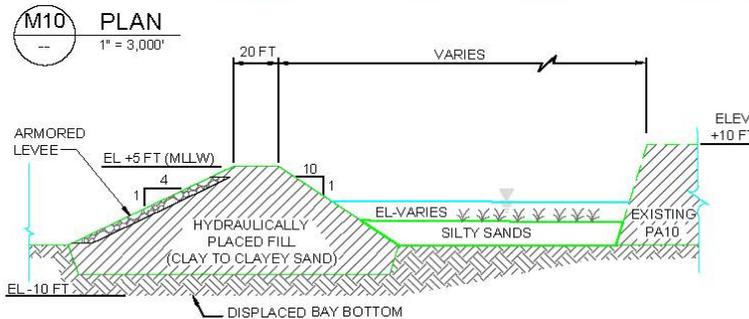
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Dredge Material Placement Plan



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



LEGEND

- EXISTING SHIP CHANNEL
- DREDGE MATERIAL PLACEMENT
- EXIST CONTOURS

GENERAL NOTES

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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.

M10 SECTION

NOT TO SCALE

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 State: Texas
Application By: Port of Corpus Christi Authority Date: December 2018

FILE: 1-23-19 - 10:49am User: Nathan.Hessner DBC: \\nathan\1600\proj\proj\ProjectA_PWD\Port of Corpus Christi\1600 CAD\19-Setback\NAPA Figures\Permit Results CAD\DWG File 8.5x11.6-026A-02-03_PKA.dwg

Agency Coordination and Public Outreach

- Agency Coordination Meeting
 - September 21, 2018 ✓
 - February 6, 2019
- Open Houses
 - September 27, 2018: Port Aransas ✓
 - September 28, 2018: Corpus Christi ✓
 - TBD: Port Aransas
 - TBD: Corpus Christi

Discussion