Picture 37: UD008JLM Bearing: East Date: 4/28/2021

Picture 38: UD008JLM Bearing: N/A Date: 4/28/2021

Picture 39: UD008JLM Bearing: West Date: 4/28/2021

Picture 40: UD009JLM Bearing: N/A Date: 4/28/2021

Picture 41: UD009JLM Bearing: Northeast Date: 4/28/2021

Picture 42: UD009JLM Bearing: Southwest Date: 4/28/2021

Picture 43: UD010JLM Bearing: East Date: 4/28/2021

Picture 44: UD010JLM Bearing: N/A Date: 4/28/2021

Picture 45: UD010JLM Bearing: West Date: 4/28/2021

Picture 46: UD011JLM Bearing: East Date: 4/28/2021

Picture 47: UD011JLM Bearing: West Date: 4/28/2021

Picture 48: UD012JLM Bearing: North Date: 4/29/2021

Picture 49: UD012JLM Bearing: N/A Date: 4/29/2021

Picture 50: UD012JLM Bearing: West Date: 4/29/2021

Picture 51: UD013JLM Bearing: N/A Date: 4/29/2021

Picture 52: UD013JLM Bearing: Northeast Date: 4/29/2021

Picture 53: UD013JLM Bearing: Southwest Date: 4/29/2021

Picture 1: WB001JLM Bearing: East Date: 4/29/2021

Picture 2: WB001JLM Bearing: West Date: 4/29/2021

Picture 3: WB002JLM Bearing: Southeast Date: 4/29/2021

Picture 4: WB002JLM Bearing: Southwest Date: 4/29/2021

Picture 5: WB003JLM Bearing: Southeast Date: 4/29/2021

Picture 6: WB003JLM Bearing: West Date: 4/29/2021

Picture 1: WD001BPH Bearing: North Date: 4/28/2021

Picture 2: WD001BPH Bearing: Northwest Date: 4/28/2021

Picture 3: WD001BPH Bearing: Southeast Date: 4/28/2021

Picture 4: WD001JLM Bearing: North Date: 4/27/2021

Picture 5: WD001JLM Bearing: North Date: 4/27/2021

Picture 6: WD001JLM Bearing: Southwest Date: 4/27/2021

Picture 7: WD002BPH Bearing: North Date: 4/28/2021

Picture 8: WD002BPH Bearing: Northwest Date: 4/28/2021

Picture 9: WD002BPH Bearing: Southeast Date: 4/28/2021

Picture 10: WD002JLM Bearing: North Date: 4/27/2021

Picture 11: WD002JLM Bearing: Northwest Date: 4/27/2021

Picture 12: WD002JLM Bearing: Southeast Date: 4/27/2021

Picture 13: WD003BPH Bearing: North Date: 4/28/2021

Picture 14: WD003BPH Bearing: Northwest Date: 4/28/2021

Picture 15: WD003BPH Bearing: South Southwest Date: 4/28/2021

Picture 16: WD003JLM Bearing: North Date: 4/27/2021

Picture 17: WD003JLM Bearing: N/A Date: 4/27/2021

Picture 18: WD003JLM Bearing: Northwest Date: 4/27/2021

Picture 19: WD003JLM Bearing: Southeast Date: 4/28/2021

Picture 20: WD004BPH Bearing: East Date: 4/28/2021

Picture 21: WD004BPH Bearing: North Date: 4/28/2021

Picture 22: WD004BPH Bearing: West Date: 4/28/2021

Picture 23: WD004JLM Bearing: North Date: 4/27/2021

Picture 24: WD004JLM Bearing: Northwest Date: 4/27/2021

Picture 25: WD004JLM Bearing: Southeast Date: 4/27/2021

Picture 26: WD005BPH Bearing: North Date: 4/28/2021

Picture 27: WD005BPH Bearing: Northwest Date: 4/28/2021

Picture 28: WD005BPH Bearing: Southeast Date: 4/28/2021

Picture 29: WD005JLM Bearing: North Date: 4/27/2021

Picture 30: WD005JLM Bearing: Northeast Date: 4/27/2021

Picture 31: WD005JLM Bearing: Southwest Date: 4/27/2021

Picture 32: WD006BPH Bearing: East Date: 5/4/2021

Picture 33: WD006BPH Bearing: North Date: 5/4/2021

Picture 34: WD006BPH Bearing: N/A Date: 5/4/2021

Picture 35: WD006BPH Bearing: South Date: 5/4/2021

Picture 36: WD006BPH Bearing: West Date: 5/4/2021

Picture 37: WD006JLM Bearing: East Date: 4/28/2021

Picture 38: WD006JLM Bearing: North Date: 4/28/2021

Picture 39: WD006JLM Bearing: West Date: 4/28/2021

Picture 40: WD007BPH Bearing: East Date: 5/4/2021

Picture 41: WD007BPH Bearing: North Date: 5/4/2021

Picture 42: WD007BPH Bearing: N/A Date: 5/4/2021

Picture 43: WD007BPH Bearing: South Date: 5/4/2021

Picture 44: WD007BPH Bearing: West Date: 5/4/2021

Picture 45: WD007JLM Bearing: East Date: 4/28/2021

Picture 46: WD007JLM Bearing: North Date: 4/28/2021

Picture 47: WD007JLM Bearing: West Date: 4/28/2021

Picture 48: WD008BPH Bearing: East Date: 5/4/2021

Picture 49: WD008BPH Bearing: North Date: 5/4/2021

Picture 50: WD008BPH Bearing: N/A Date: 5/4/2021

Picture 51: WD008BPH Bearing: South Date: 5/4/2021

Picture 52: WD008BPH Bearing: West Date: 5/4/2021

Picture 53: WD008JLM Bearing: North Date: 4/28/2021

Picture 54: WD008JLM Bearing: Northwest Date: 4/28/2021

Picture 55: WD008JLM Bearing: Southeast Date: 4/28/2021

Picture 56: WD009BPH Bearing: East Date: 5/4/2021

Picture 57: WD009BPH Bearing: North Date: 5/4/2021

Picture 58: WD009BPH Bearing: N/A Date: 5/4/2021

Picture 59: WD009BPH Bearing: South Date: 5/4/2021

Picture 60: WD009BPH Bearing: West Date: 5/4/2021

Picture 61: WD009JLM Bearing: North Date: 4/29/2021

Picture 62: WD009JLM Bearing: North Date: 4/29/2021

Picture 63: WD009JLM Bearing: South Date: 4/29/2021

Picture 64: WD010BPH Bearing: East Date: 5/4/2021

Picture 65: WD010BPH Bearing: North Date: 5/4/2021

Picture 66: WD010BPH Bearing: N/A Date: 5/4/2021

Picture 67: WD010BPH Bearing: South Date: 5/4/2021

Picture 68: WD010BPH Bearing: West Date: 5/4/2021

Picture 69: WD010JLM Bearing: North Date: 4/29/2021

Picture 70: WD010JLM Bearing: North Date: 4/29/2021

Picture 71: WD010JLM Bearing: Southwest Date: 4/29/2021

Picture 1: RW01JLM Bearing: N/A Date: 5/21/2021

Picture 2: RW01JLM Bearing: Northwest Date: 5/21/2021

Picture 3: RW01JLM Bearing: Southeast Date: 5/21/2021

Picture 4: RW02JLM Bearing: N/A Date: 5/21/2021

Picture 5: RW02JLM Bearing: Northeast Date: 5/21/2021

Picture 6: RW02JLM Bearing: South Date: 5/21/2021

Picture 7: RW03JLM Bearing: N/A Date: 5/21/2021

Picture 8: RW03JLM Bearing: Northeast Date: 5/21/2021

Picture 9: RW03JLM Bearing: West Date: 5/21/2021

Picture 10: RW04JLM Bearing: East Date: 5/21/2021

Picture 11: RW04JLM Bearing: North Date: 5/21/2021

Picture 12: RW04JLM Bearing: N/A Date: 5/21/2021

Picture 13: RW05JLM Bearing: N/A Date: 5/21/2021

Picture 14: RW05JLM Bearing: Northeast Date: 5/21/2021

Picture 15: RW05JLM Bearing: South Date: 5/21/2021

Picture 16: RW06JLM Bearing: N/A Date: 5/21/2021

Picture 17: RW06JLM Bearing: Northeast Date: 5/21/2021

Picture 18: RW06JLM Bearing: West Date: 5/21/2021

Picture 19: RW07JLM Bearing: N/A Date: 5/21/2021

Picture 20: RW07JLM Bearing: Northeast Date: 5/21/2021

Picture 21: RW07JLM Bearing: South Date: 5/21/2021

Picture 1: UD001BPH Bearing: East Date: 5/21/2021

Picture 2: UD001BPH Bearing: North Date: 5/21/2021

Picture 3: UD001BPH Bearing: N/A Date: 5/21/2021

Picture 4: UD001BPH Bearing: South Date: 5/21/2021

Picture 5: UD001BPH Bearing: West Date: 5/21/2021

Picture 6: UD01JLM Bearing: N/A Date: 5/21/2021

Picture 7: UD01JLM Bearing: Northeast Date: 5/21/2021

Picture 8: UD01JLM Bearing: Southwest Date: 5/21/2021

Picture 9: UD002BPH Bearing: East Date: 5/21/2021

Picture 10: UD002BPH Bearing: North Date: 5/21/2021

Picture 11: UD002BPH Bearing: N/A Date: 5/21/2021

Picture 12: UD002BPH Bearing: South Date: 5/21/2021

Picture 13: UD002BPH Bearing: West Date: 5/21/2021

Picture 14: UD02JLM Bearing: N/A Date: 5/21/2021

Picture 15: UD02JLM Bearing: Northeast Date: 5/21/2021

Picture 16: UD02JLM Bearing: Southwest Date: 5/21/2021

Picture 17: UD003BPH Bearing: East Date: 5/21/2021

Picture 18: UD003BPH Bearing: North Date: 5/21/2021

Picture 19: UD003BPH Bearing: N/A Date: 5/21/2021

Picture 20: UD003BPH Bearing: South Date: 5/21/2021

Picture 21: UD003BPH Bearing: West Date: 5/21/2021

Picture 22: UD03JLM Bearing: N/A Date: 5/21/2021

Picture 23: UD03JLM Bearing: Northeast Date: 5/21/2021

Picture 24: UD03JLM Bearing: Southwest Date: 5/21/2021

Picture 25: UD004BPH Bearing: East Date: 5/21/2021

Picture 26: UD004BPH Bearing: North Date: 5/21/2021

Picture 27: UD004BPH Bearing: N/A Date: 5/21/2021

Picture 28: UD004BPH Bearing: South Date: 5/21/2021

Picture 29: UD004BPH Bearing: West Date: 5/21/2021

Picture 30: UD04JLM Bearing: N/A Date: 5/21/2021

Picture 31: UD04JLM Bearing: Northeast Date: 5/21/2021

Picture 32: UD04JLM Bearing: West Date: 5/21/2021

Picture 33: UD005BPH Bearing: East Date: 5/21/2021

Picture 34: UD005BPH Bearing: North Date: 5/21/2021

Picture 35: UD005BPH Bearing: N/A Date: 5/21/2021

Picture 36: UD005BPH Bearing: South Date: 5/21/2021

Picture 37: UD005BPH Bearing: West Date: 5/21/2021

Picture 38: UD05JLM Bearing: N/A Date: 5/21/2021

Picture 39: UD05JLM Bearing: Northeast Date: 5/21/2021

Picture 40: UD05JLM Bearing: Southwest Date: 5/21/2021

Picture 41: UD006BPH Bearing: East Date: 5/27/2021

Picture 42: UD006BPH Bearing: North Date: 5/27/2021

Picture 43: UD006BPH Bearing: South Date: 5/27/2021

Picture 44: UD006BPH Bearing: West Date: 5/27/2021

Picture 45: UD06JLM Bearing: N/A Date: 5/21/2021

Picture 46: UD06JLM Bearing: Northeast Date: 5/21/2021

Picture 47: UD06JLM Bearing: Southwest Date: 5/21/2021

Picture 48: UD07JLM Bearing: N/A Date: 5/21/2021

Picture 49: UD07JLM Bearing: Northeast Date: 5/21/2021

Picture 50: UD07JLM Bearing: Southwest Date: 5/21/2021

Picture 51: UD08BPH Bearing: East Date: 5/21/2021

Picture 52: UD08BPH Bearing: North Date: 5/21/2021

Picture 53: UD08BPH Bearing: N/A Date: 5/21/2021

Picture 54: UD08BPH Bearing: South Date: 5/21/2021

Picture 55: UD08BPH Bearing: West Date: 5/21/2021

Picture 56: UD08JLM Bearing: N/A Date: 5/21/2021

Picture 57: UD08JLM Bearing: Northeast Date: 5/21/2021

Picture 58: UD08JLM Bearing: Southwest Date: 5/21/2021

Picture 59: UD09BPH Bearing: East Date: 5/21/2021

Picture 60: UD09BPH Bearing: North Date: 5/21/2021

Picture 61: UD09BPH Bearing: N/A Date: 5/21/2021

Picture 62: UD09BPH Bearing: South Date: 5/21/2021

Picture 63: UD09BPH Bearing: West Date: 5/21/2021

Picture 64: UD09JLM Bearing: North Date: 5/21/2021

Picture 65: UD09JLM Bearing: N/A Date: 5/21/2021

Picture 66: UD09JLM Bearing: Southwest Date: 5/21/2021

Picture 67: UD10BPH Bearing: East Date: 5/21/2021

Picture 68: UD10BPH Bearing: North Date: 5/21/2021

Picture 69: UD10BPH Bearing: N/A Date: 5/21/2021

Picture 70: UD10BPH Bearing: South Date: 5/21/2021

Picture 71: UD10BPH Bearing: West Date: 5/21/2021

Picture 72: UD10JLM Bearing: N/A Date: 5/21/2021

Picture 73: UD10JLM Bearing: Northeast Date: 5/21/2021

Picture 74: UD10JLM Bearing: West Date: 5/21/2021

Picture 75: UD11BPH Bearing: East Date: 5/21/2021

Picture 76: UD11BPH Bearing: North Date: 5/21/2021

Picture 77: UD11BPH Bearing: N/A Date: 5/21/2021

Picture 78: UD11BPH Bearing: South Date: 5/21/2021

Picture 79: UD11BPH Bearing: West Date: 5/21/2021

Picture 80: UD11JLM Bearing: N/A Date: 5/21/2021

Picture 81: UD11JLM Bearing: Northeast Date: 5/21/2021

Picture 82: UD11JLM Bearing: Southwest Date: 5/21/2021

Picture 83: UD12BPH Bearing: East Date: 5/21/2021

Picture 84: UD12BPH Bearing: North Date: 5/21/2021

Picture 85: UD12BPH Bearing: N/A Date: 5/21/2021

Picture 86: UD12BPH Bearing: South Date: 5/21/2021

Picture 87: UD12BPH Bearing: West Date: 5/21/2021

Picture 88: UD12JLM Bearing: N/A Date: 5/21/2021

Picture 89: UD12JLM Bearing: Northeast Date: 5/21/2021

Picture 90: UD12JLM Bearing: Southwest Date: 5/21/2021

Picture 91: UD13BPH Bearing: East Date: 5/21/2021

Picture 92: UD13BPH Bearing: North Date: 5/21/2021

Picture 93: UD13BPH Bearing: N/A Date: 5/21/2021

Picture 94: UD13BPH Bearing: South Date: 5/21/2021

Picture 95: UD13BPH Bearing: West Date: 5/21/2021

Picture 96: UD13JLM Bearing: East Date: 5/21/2021

Picture 97: UD13JLM Bearing: N/A Date: 5/21/2021

Picture 98: UD13JLM Bearing: West Date: 5/21/2021

Picture 99: UD14BPH Bearing: East Date: 5/21/2021

Picture 100: UD14BPH Bearing: North Date: 5/21/2021

Picture 101: UD14BPH Bearing: N/A Date: 5/21/2021

Picture 102: UD14BPH Bearing: South Date: 5/21/2021

Picture 103: UD14BPH Bearing: West Date: 5/21/2021

Picture 104: UD14JLM Bearing: N/A Date: 5/21/2021

Picture 105: UD14JLM Bearing: Northeast Date: 5/21/2021

Picture 106: UD14JLM Bearing: West Date: 5/21/2021

Picture 107: UD15BPH Bearing: East Date: 5/21/2021

Picture 108: UD15BPH Bearing: North Date: 5/21/2021

Picture 109: UD15BPH Bearing: N/A Date: 5/21/2021

Picture 110: UD15BPH Bearing: South Date: 5/21/2021

Picture 111: UD15BPH Bearing: West Date: 5/21/2021

Picture 112: UD16BPH Bearing: East Date: 5/21/2021

Picture 113: UD16BPH Bearing: North Date: 5/21/2021

Picture 114: UD16BPH Bearing: N/A Date: 5/21/2021

Picture 115: UD16BPH Bearing: South Date: 5/21/2021

Picture 116: UD16BPH Bearing: West Date: 5/21/2021

Picture 1: WD01BPH Bearing: East Date: 5/21/2021

Picture 2: WD01BPH Bearing: North Date: 5/21/2021

Picture 3: WD01BPH Bearing: N/A Date: 5/21/2021

Picture 4: WD01BPH Bearing: South Date: 5/21/2021

Picture 5: WD01BPH Bearing: West Date: 5/21/2021est

Picture 6: WD01JLM Bearing: East Date: 5/21/2021

Picture 7: WD01JLM Bearing: N/A Date: 5/21/2021

Picture 8: WD01JLM Bearing: Southwest Date: 5/21/2021

Picture 9: WD02BPH Bearing: East Date: 5/21/2021

Picture 10: WD02BPH Bearing: North Date: 5/21/2021

Picture 11: WD02BPH Bearing: N/A Date: 5/21/2021

Picture 12: WD02BPH Bearing: South Date: 5/21/2021

Picture 13: WD02BPH Bearing: West Date: 5/21/2021est

Picture 14: WD02JLM Bearing: N/A Date: 5/21/2021

Picture 15: WD02JLM Bearing: Northeast Date: 5/21/2021

Picture 16: WD02JLM Bearing: Southwest Date: 5/21/2021

Picture 17: WD03JLM Bearing: N/A Date: 5/21/2021

Picture 18: WD03JLM Bearing: Northeast Date: 5/21/2021

Picture 19: WD03JLM Bearing: West Date: 5/21/2021

Picture 20: WD04JLM Bearing: N/A Date: 5/21/2021

Picture 21: WD04JLM Bearing: Northeast Date: 5/21/2021

Picture 22: WD04JLM Bearing: West Date: 5/21/2021

Picture 23: WD05JLM Bearing: East Date: 5/21/2021

Picture 24: WD05JLM Bearing: N/A Date: 5/21/2021

Picture 25: WD05JLM Bearing: Northwest Date: 5/21/2021

Picture 26: WD06JLM Bearing: N/A Date: 5/21/2021

Picture 27: WD06JLM Bearing: Northwest Date: 5/21/2021

Picture 28: WD06JLM Bearing: Southwest Date: 5/21/2021

Picture 29: WD07JLM Bearing: N/A Date: 5/21/2021

Picture 30: WD07JLM Bearing: Northeast Date: 5/21/2021

Picture 31: WD07JLM Bearing: Southwest Date: 5/21/2021

E. Aquatic Resources Survey Workplan and Report

TRITON ENVIRONMENTAL SOLUTIONS LLC

Aquatic Survey Plan for the

Corpus Christi Ship Channel Deepening Project

SWG-2019-00067

Prepared for: Port of Corpus Christi Authority

(PCCA)

April 20, 2021 (draft)

April 26, 2021 (rev.)

contact@tritonenv.com www.tritonenv.com P.O. Box 1755, Rockport, Texas 78381

1.0 Introduction/Background:

The Port of Corpus Christi Authority (PCCA) is proposing to utilize six (6) separate dredged material Placement Area (PA) sites in association with the proposed Corpus Christi Ship Channel Deepening Project (SWG-2019-00067). Field surveying and quantification of sensitive resources within the proposed PA sites are required to support the Draft Environmental Impact Statement (EIS) being prepared by the U.S. Army Corps of Engineers (USACE). The following aquatic survey plan shall be performed to document and quantify sensitive resource occurrence and coverage within each respective survey area.

Six survey areas have been established, based on spatial data and project plans provided by the PCCA. Triton Environmental Solutions, LLC (Triton) has established Global Positioning System (GPS) coordinates for survey boundaries, transects, and sample stations. To create the respective survey areas, Triton buffered each PA boundary by 500 feet to delineate any seagrasses and/or live oysters within the project vicinity, per USACE requirements. Survey files will be loaded onto Trimble real time kinetic (RTK) and/or GEO7x GPS units for field mapping, data collection, and navigation. The total survey area encompasses roughly 3,878.67-acres across the six survey areas and include SS1/PA4 (Approx. 884.05-acres), SS2 (Approx. 250.60-acres), HI-E (Approx. 269.39-acres), SJI (Approx. 1,482.35-acres) and MI (Approx. 992.28-acres). All PA boundaries were provided to Triton by PCCA, excluding PA4. The boundary for PA4 was downloaded from the USACE Geospatial website on April 20, 2021. As shown on the Preliminary Survey Planning Map for SS1 and PA4, creation of 500-foot buffers around SS1 and PA4 caused the survey area for the two proposed placement areas to merge. The aquatic survey will be conducted within the limits of the survey boundaries shown on the enclosed plans (Appendix A).

Triton anticipates the aquatic survey to be conducted between April 26 – May 31, 2021. The proposed schedule may be affected by inclement weather (i.e., high winds, thunderstorms, high tides, etc.), or other unanticipated factors and circumstances. Triton initially proposed a schedule timeframe of 42 days to conduct the aquatic survey but has revised the timeline to accommodate pressing schedules associated with the project. Triton will make every effort to complete the aquatic field survey by May 31, 2021.

2.0 Methodology

2.1 Aquatic Sensitive Resource Surveys (Seagrass and Oyster): SS1, PA4, SS2, HI-E, SJI, MI Survey Areas

2.1.1 Sampling Design and Data Collection

The seagrass and oyster survey will be conducted with systematic, analytical methodology utilizing wading visual and/or hand detection sampling (i.e., feeling the bay bottom by hand) in conjunction with a modified Braun-Blanquet rapid visual assessment technique (Braun-Blanquet 1972; Fourqurean 2001). The implementation of wading presence/absence (i.e., percent frequency) and Braun-Blanquet techniques will allow for the landward and bayward delineation of seagrass beds to determine seagrass bed extents (acreage) while also providing species composition and percent cover (i.e., relative abundance) information. Triton personnel will travel to the sites in outboard skiffs ranging in length from 17- to 25-feet. Skiffs draw less than one foot of water and prop-washing will be strictly avoided. Sample data points will be collected along pre-defined transects, orienting from the shoreline and extending waterward within each respective survey area. Transects will be spaced at 100-foot intervals. Orienting from the shoreline, Triton will utilize hand detection sampling spaced at 10-foot intervals and

a modified Braun-Blanquet rapid visual quadrat assessment conducted at every 5th (i.e., 50-feet) sampling interval. All transects and sample stations are shown in the enclosed Survey Plan Illustrations (Appendix A) and the following will be observed:

a. SS1 and PA4 Sites: 280 total transects (mean total length = 1,015-ft; range: 160 – 2,592-ft); 284,268 linear feet of transects; 34,880 total sample stations (N = 28,799 total hand detection feels; N = 6,081 quadrats)
b. SS2 Site: 117 total transects (mean total length = 686-ft; range: 63 – 1,807-ft); 80,208 linear feet of transects; 13,504 total sample stations (N = 11,734 total hand detection feels; N = 1,770 quadrats)
c. HI-E Site: 82 total transects (mean total length = 504-ft; range: 190 – 1,042-ft); 41,352 linear feet of transects; 5,159 total sample stations (N = 4,227 total hand detection feels; N = 932 quadrats)
d. SJI Site: 19 total transects (mean total length = 1,721-ft; range: 1,449 – 2,175-ft); 32,703 linear feet of transects; 3,976 total sample stations (N = 3,294 total hand detection feels; N = 682 quadrats)
e. MI Site: 14 total transects (mean total length = 1,601-ft; range: 1,537 – 1,673-ft); 22,415 linear feet of transects; 2,730 total sample stations (N = 2,261 total hand detection feels; N = 469 quadrats)
f. *Note: the above represents the maximum number of sample points, transects, etc. and will likely be less, especially if transect or sample station length decreases. Also, attributed to transect termination at deep-water channels* and intersection with land features.

At each sample station, Triton personnel will identify composition of substrate, determine presence/absence of seagrass, and identify seagrasses to species (Braun-Blanquet stations only). To determine presence or absence of seagrass, survey staff will conduct a visual or hand feel detection on the bay bottom, centered on the transect line. For the Braun-Blanquet data collection points, a 0.25m^2 quadrat will be randomly tossed within 1-meter of the transect line. Triton will conduct each quadrat assessment by visually identifying each seagrass species present and estimating percent cover for each species within the 0.25m^2 quadrat. Percent cover, as defined for this purpose, is the fraction of the total quadrat area that is obscured by a particular species when observed from an overhead view. Seagrass will not be removed or disturbed with the hand detection or rapid visual assessment techniques. Seagrass species and Braun-Blanquet data will be recorded according to Tables 1 and 2, respectively.

Wading visual hand detection and Braun-Blanquet survey methods will terminate at approximately -3.0 feet NAVD 88 due to safety concerns (ship traffic, currents, etc.) and inability to effectively and efficiently sample seagrass in deeper waters. In waters > -3.0 feet NAVD 88, when necessary, Triton will confirm the bayward edge of seagrass surveying from a vessel using a post-hole grab. Sampling will continue at three consecutive sample stations (i.e., 30-feet) from the last identified seagrass location on the transect line. If any transect intersects a deep-water channel, the survey transect line will terminate at channel edge for safety concerns. Transects will terminate at 30-feet past the bayward edge of seagrass or the leading slope of deep-water channels, whichever occurs first.

In areas where oyster reef and/or shell are encountered during the wading surveys (i.e., ≤ -3.0 feet NAVD 88), a grab from the bay bottom will be utilized to determine whether the substrate encountered was live oyster, dead shell, or shell hash. A grab will only be utilized if shell type cannot be visually identified. All oyster identified will be circumnavigated to delineate the boundary, providing spatial acreage estimates. In waters beyond -3.0 feet NAVD 88, Triton staff will consolidate readily available

current oyster geospatial data from National Oceanic Atmospheric Administration (NOAA) National Centers for Environmental Information; Gulf of Mexico Data Atlas to identify any known existing oyster reef locations within the survey areas. Once consolidated, Triton staff will survey these locations by sounding to verify/determine oyster boundaries and acreage extent.

Substrate composition will be recorded at each sample point, providing substrate profile and frequency of occurrence information. Substrate will be recorded according to the key in Table 3. Representative bottom elevations and depth of soft sediment will be collected with a sounding rod (tide-adjusted) within each survey area; primarily in areas of identified sensitive resources (i.e., seagrass beds) and occur at roughly 300-foot transect intervals, every 10-feet. Note: This survey will not result in comprehensive seafloor bathymetric mapping throughout the entire survey areas. All survey data will be georeferenced and recorded with a Trimble RTK GPS receiving real-time corrections from the VRS Network, or into a GEO 7x handheld GPS and will comply with the USACE Standard Operating Procedures for recording jurisdictional delineations with a GPS. Position coordinates will be recorded and then plotted in the office with ArcGIS 10.6 and ArcGIS Pro software.

2.1.2 Data Analysis

Determining presence/absence (i.e., frequency of occurrence) of seagrass by hand detection at each sample station will be calculated as follows:

$$F_O = (\sum O_S / N_H)$$

where F_O = seagrass percent frequency of occurrence, O_S = seagrass occurrence, and N_H = number of total hand detection sampling stations. The presence/absence component of the survey will facilitate delineation of seagrass extent throughout the survey areas.

The data for each 0.25-meter^2 quadrat will be analyzed to quantify percent cover and frequency by species encountered within the survey areas. These data will provide species composition information, frequency of occurrence by species, as well as percent cover values for seagrass species. Percent cover will be calculated as follows:

$$VC_{S1} = (\sum Q_{S1} / N_Q)$$

where VC_{S1} = mean percent vegetative cover by species, Q_{S1} = quadrat score per species, and N_Q = number of total quadrats.

Percent frequency by seagrass species will be calculated with the following equation:

$$F_{OS} = (\sum O_{S1} / N_Q)$$

where F_{OS} = seagrass percent frequency of occurrence by species, O_{S1} = seagrass occurrence by species, and N_Q = number of total quadrats.

Substrate data will be quantified by summing the total occurrence of substrate type and dividing by total number of substrate sample stations, providing substrate composition information for each respective survey area.

2.2 Meteorological Data and Photographic Record

Triton will document general meteorological conditions on daily field sheets. The nearest operational tide station is determined to be USS Lexington, Corpus Christi Bay, TX - Station ID: 8775296 and will be accessed via the National Oceanic and Atmospheric Administration's website. Air and water temperature, salinity, wind speed and direction, and daily tide data will be obtained from https://tidesandcurrents.noaa.gov/stationhome.html?id=8775296.

Additionally, Triton staff will photo-document the field survey collections and include images of representative habitats and general site conditions.

2.3 General Survey Comments

1. At date of this survey plan, Triton understands site access is currently granted for SS1, PA4, SS2, HI-E, and SJI. SJI and MI aquatic survey transects and sample points will need to be accessed via land. PCCA is currently working toward attaining access approval for MI. Triton will not initiate the MI survey until access approval is attained and authorized by the PCCA.
2. Triton has developed this survey plan in accordance with the provided Scope of Work as well as recent correspondence. The transect and sample station spacing of 100- and 10-feet, respectively, could result in a timeframe that does not meet the current project schedule. Triton respectfully requests feedback from the USACE and/or other resource agencies on any acceptable transect and/or sample point spacing variances which could produce sufficient data over the span of the survey areas while also accommodating project timelines. For instance, Triton requests approval to adjust transect and/or sample station spacing, as necessary, to accommodate the compressed project schedule (e.g., from 100- to 200-foot transects and/or 10- to 20-foot sampling spacing).
3. Strategies to increase sampling efficiency (i.e., < timeline)
    a. > transect and sample point (hand feel & B-B assessments) spacing
        i. Transect: 100 to 200 or greater, consider > spacing in buffered areas
        ii. Hand feel: 10 to 20-ft or greater
        iii. B-B: every 50 to 60-ft or greater
    b. Consider > survey spacing in the buffer areas only (example: 100-ft in survey area proper, 200-ft in buffered areas, etc., etc.)
4. If detailed seafloor mapping is required, substantial revisions to the scope and project timeline would need to occur.

3.0 Tables

Table 1. Seagrass species list key

Abbreviation	Common Name	Scientific Name
0	Not present	N/A
H	Shoalweed	*Halodule wrightii*
T	Turtle grass	*Thalassia testudinum*
S	Manatee grass	*Syringodium filiforme*
R	Beaked ditch-grass (Widgeon)	*Ruppia maritima*
Ha	Clovergrass	*Halophila englemannii*
A	Algae	N/A
W	Seagrass wrack material	N/A

Table 2. Braun-Blanquet abundance scores (S). Each seagrass species will be scored in each 0.25-meter^2 quadrat according to Fourqurean et al., 2001 and assigned a percent cover score. (Shoot density applies to *Thalassia* only).

S	Interpretation
0	Species absent from quadrat
0.1	Species represented by a single solitary short shoot, < 5% cover
0.5	Species represented by a few (< 5%) short shoots, < 5% cover
1	Species represented by many (> 5%) short shoots, < 5% cover
2	Species represented by many (> 5%) short shoots, 5 – 25% cover
3	Species represented by many (> 5%) short shoots, 25 – 50% cover
4	Species represented by many (> 5%) short shoots, 50 – 75% cover
5	Species represented by many (> 5%) short shoots, 75 – 100% cover

Table 3. Substrate list key

Abbreviation	Substrate Type
M	Mud
S	Sand
C	Clay
G	Gravel
SH	Shell (gaping, halves, or fragments)
OY	Live Oyster

Table 4. Summary of transect length and number of transects, sample stations, and quadrats by survey area and combined totals.

Survey Area	Transect Length (ft.)	N Transects	N Sample Stations	N Quadrats
SS1 and PA4	284,268	280	28,799	6,081
SS2	80,208	117	11,734	1,770
HI-E	41,352	82	4,227	932
SJI	32,703	19	3,294	682
MI	22,415	14	2,261	469
Combined Totals:	**457,638 (86.67 mi)**	**503**	**49,974**	**9,854**

Note: subject to change based on site conditions and methods discussed above (i.e, land overlap, edge of deepwater channel transect termination).

4.0 Literature Cited

Braun-Blanquet. 1972. Plant Sociology: The Study of Plant Communities. Hafner Publishing Company

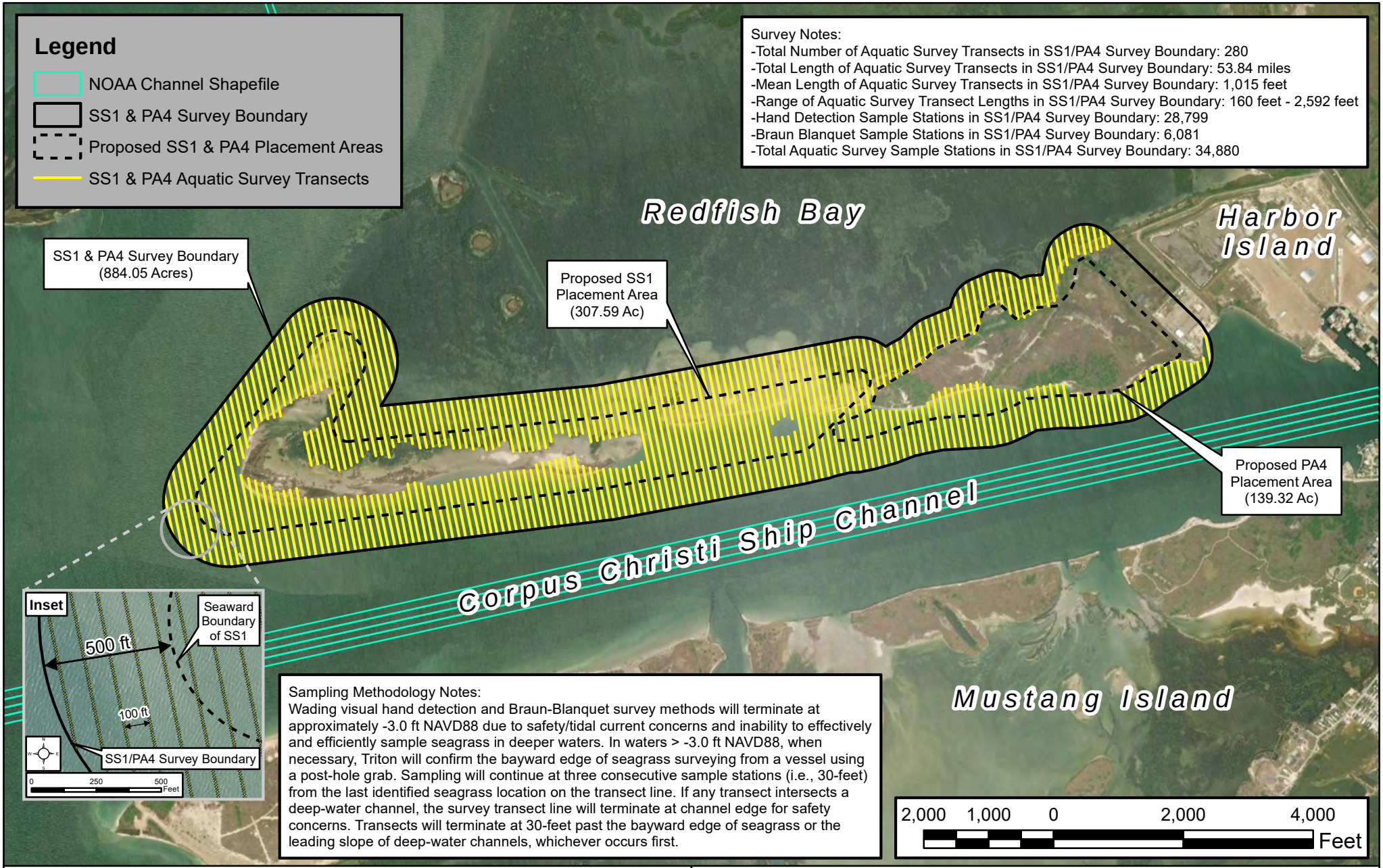
Fourqurean J.W., A. Willsie, C.D. Rose, and L.M. Rutten. 2001. Spatial and Temporal Patterns in Seagrass Community Composition and Productivity in South Florida. Marine Biology Journal 138:341-354

Pulich, W.M., Jr., B. Hardegree, A. Kopecky, S. Schwelling, C. P. Onuf, and K.H. Dunton. 2003. Texas Seagrass Monitoring Strategic Plan (TSMSP). Publ. Texas Parks and Wildlife Department, Resource Protection Division, Austin, Texas. 27 pp.

5.0 Appendices

Appendix A: Survey Plan Maps
Appendix B: Survey Plan Development Reference Materials
- **PCCA Scope of Work,**
- **USACE WOTUS Letter, June 22, 2020**
- **USACE Email Correspondence, Jayson Hudson, January 8, 2021**

Appendix A: Survey Plan Maps



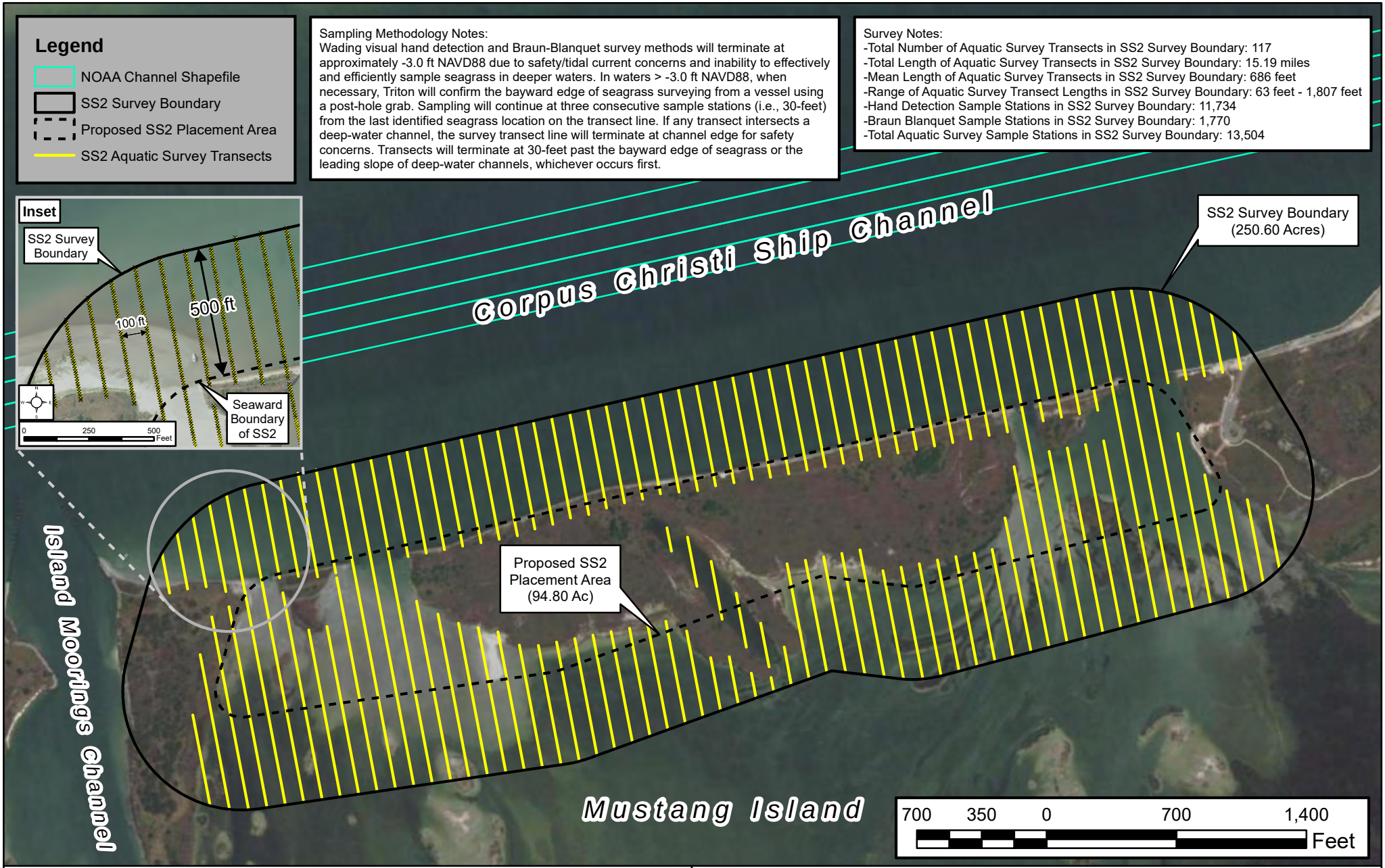
Aquatic Survey Overview Map
SS1 & PA4 Survey Areas & Aquatic Survey Transects
Corpus Christi Ship Channel Deepening Project
(SWG-2019-00067)

Prepared By:
Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381

N W E S

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, Texas 78401

Map Notes:
-BaseMap Source: -ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
-Placement Area boundary shapefiles for SS1, SS2, HI-E, MI & SJI were provided by the Port of Corpus Christi Authority.
-The shapefile for PA4 was obtained from the U.S. Army Corps of Engineers.
-Map Preparation Date: April 26, 2021 (BPH).



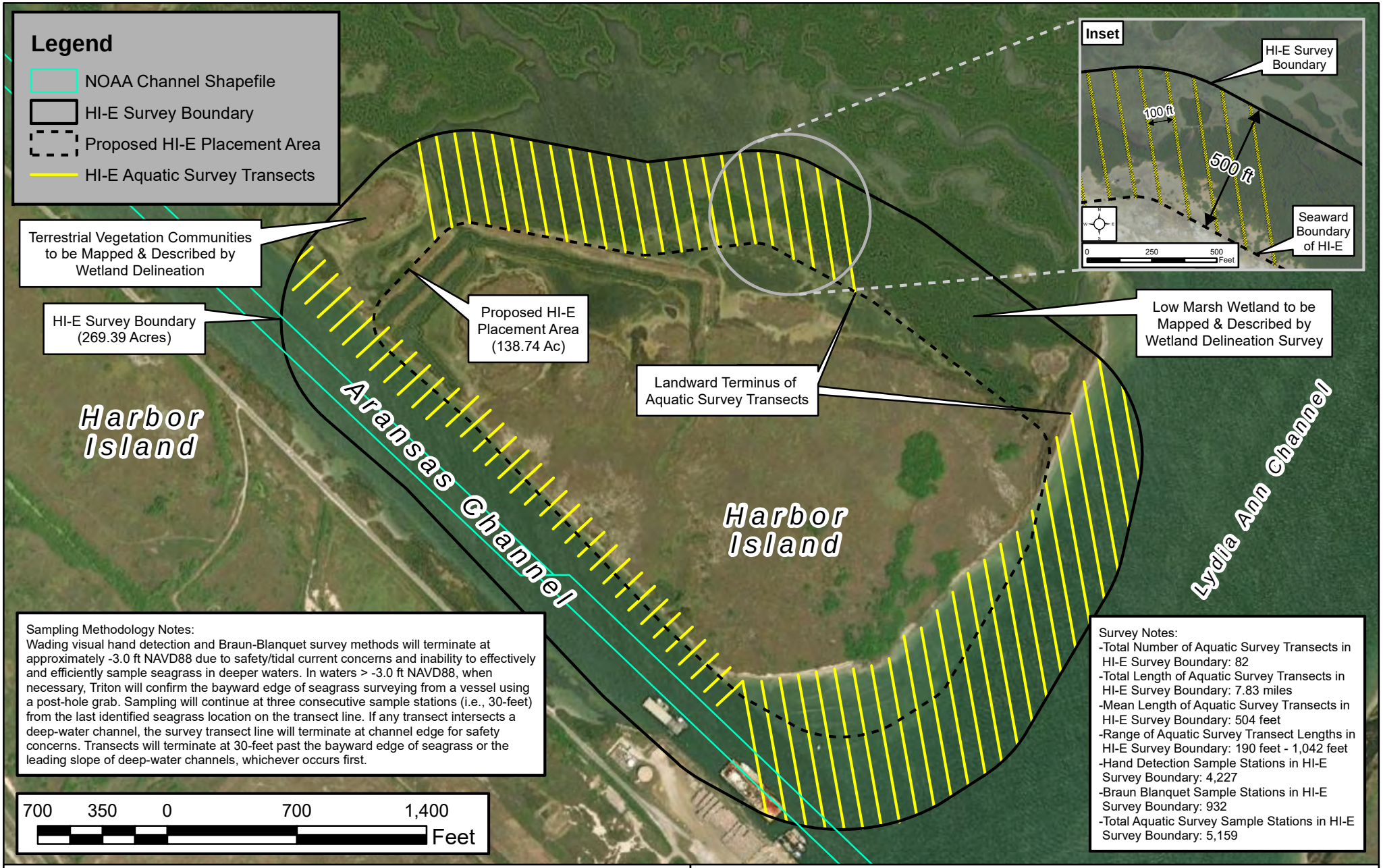
Aquatic Survey Overview Map
SS2 Survey Area & Aquatic Survey Transects
Corpus Christi Ship Channel Deepening Project
(SWG-2019-00067)

Prepared By:
Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381

N
W
E
S

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, Texas 78401

Map Notes:
-BaseMap Source: -ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
-Placement Area boundary shapefiles for SS1, SS2, HI-E, MI & SJI were provided by the Port of Corpus Christi Authority.
-The shapefile for PA4 was obtained from the U.S. Army Corps of Engineers.
-Map Preparation Date: April 26, 2021 (BPH).



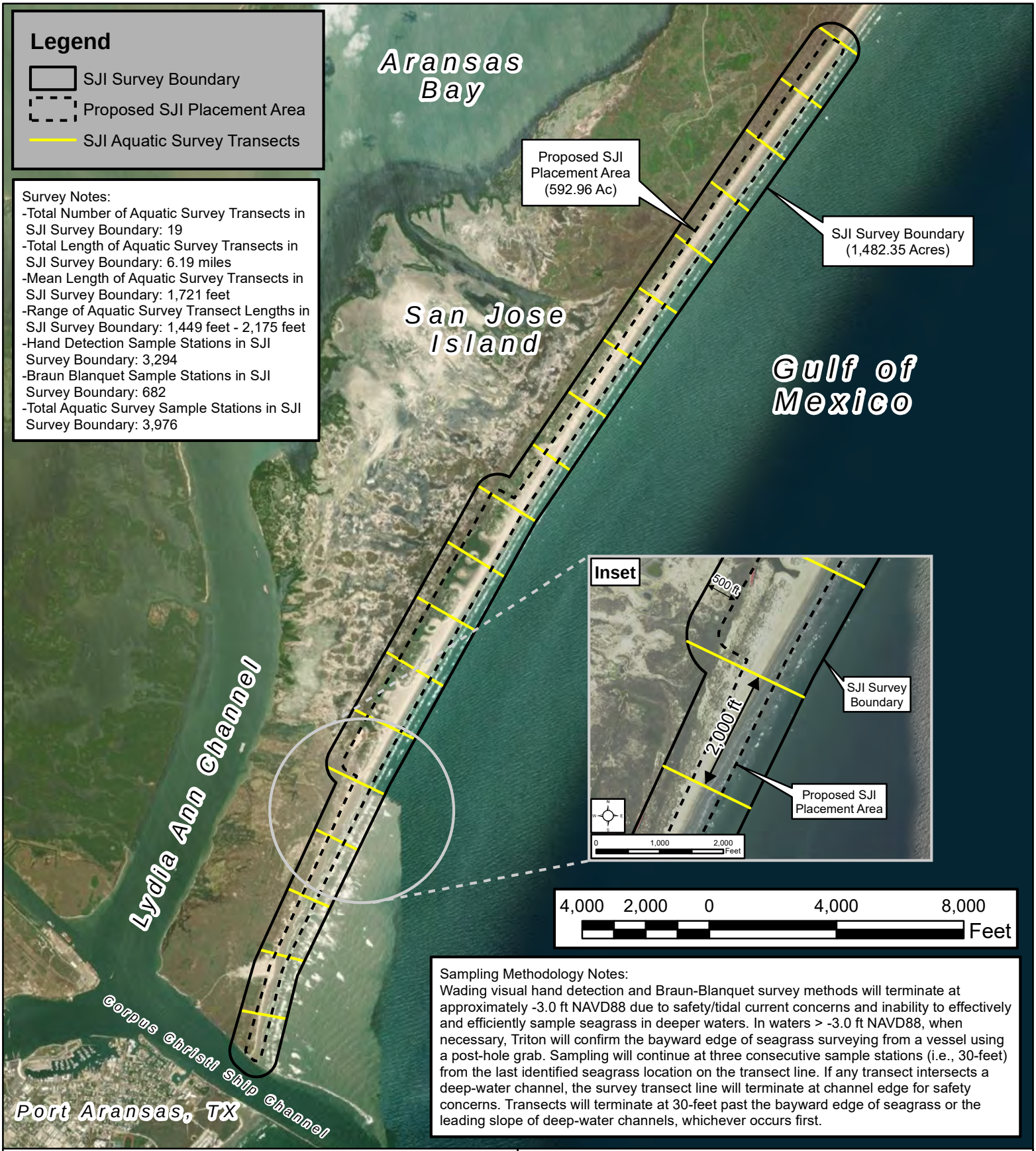
Aquatic Survey Overview Map
HI-E Survey Area & Aquatic Survey Transects
Corpus Christi Ship Channel Deepening Project
(SWG-2019-00067)

Prepared By:
Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381

N
W E
S

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, Texas 78401

Map Notes:
-BaseMap Source: -ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
-Placement Area boundary shapefiles for SS1, SS2, HI-E, MI & SJI were provided by the Port of Corpus Christi Authority.
-The shapefile for PA4 was obtained from the U.S. Army Corps of Engineers.
-Map Preparation Date: April 26, 2021 (BPH).



Sampling Methodology Notes:
Wading visual hand detection and Braun-Blanquet survey methods will terminate at approximately -3.0 ft NAVD88 due to safety/tidal current concerns and inability to effectively and efficiently sample seagrass in deeper waters. In waters > -3.0 ft NAVD88, when necessary, Triton will confirm the bayward edge of seagrass surveying from a vessel using a post-hole grab. Sampling will continue at three consecutive sample stations (i.e., 30-feet) from the last identified seagrass location on the transect line. If any transect intersects a deep-water channel, the survey transect line will terminate at channel edge for safety concerns. Transects will terminate at 30-feet past the bayward edge of seagrass or the leading slope of deep-water channels, whichever occurs first.

Aquatic Survey Overview Map
SJI Survey Area & Aquatic Survey Transects
Corpus Christi Ship Channel Deepening Project
(SWG-2019-00067)

Prepared By:
Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381

N
W E
S

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, Texas 78401

Map Notes:
-BaseMap Source: -ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
-Placement Area boundary shapefiles for SS1, SS2, HI-E, MI & SJI were provided by the Port of Corpus Christi Authority.
-The shapefile for PA4 was obtained from the U.S. Army Corps of Engineers.
-Map Preparation Date: April 26, 2021 (BPH).

Aquatic Survey Overview Map
MI Survey Area & Aquatic Survey Transects
Corpus Christi Ship Channel Deepening Project
(SWG-2019-00067)

Prepared By:
Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381

N
W E
S

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, Texas 78401

Map Notes:
-BaseMap Source: -ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
-Placement Area boundary shapefiles for SS1, SS2, HI-E, MI & SJI were provided by the Port of Corpus Christi Authority.
-The shapefile for PA4 was obtained from the U.S. Army Corps of Engineers.
-Map Preparation Date: April 26, 2021 (BPH).

Appendix B: Survey Plan Development Reference Materials

PCCA Scope of Work,

USACE WOTUS Letter, June 22, 2020

USACE Email Correspondence, Jayson Hudson, January 8, 2021

REQUEST FOR PROPOSAL
Field Delineation and Report for Port of Corpus Christi Authority Channel Deepening Project Draft Environmental Impact Statement Being Prepared By U.S. Army Corps of Engineers

Scope

Scope of work to delineate wetlands and sea grass beds and conduct threatened and endangered species surveys within the project area will include:

Task 1 - Field Investigations

Using the wetland delineation field plan provided in Attachment A, Consultant will conduct a wetland delineation for the project sites identified on Exhibit A. The survey will cover the project site and a 500 ft buffer area around each location. Consultant will also conduct investigations necessary to determine the likely jurisdictional status of any identified wetlands under USACE/Environmental Protection Agency (EPA) regulations or guidance resulting from applicable U.S. Supreme Court decisions. The *Waters of the United States Delineation Report, Part 1: Potentially Jurisdictional Waters of the United States* report is provided in Attachment B and provides supporting detail for each area.

Additionally, The *Waters of the United States Delineation Report, Part 2: Seagrass Investigation* report is provided in Attachment C. Seagrass beds identified within report will be field verified through sampling. Seagrass will be sampled along transects by feeling the substrate of the bay by hand. Sampling will include the project sites identified in Exhibit A and a 500 ft buffer around each project site. Maps which depict proposed sampling transects for sea grass delineation will be developed prior to field work for coordination with USACE.

The KMZ files and high-resolution aerials for each location will be provided upon request.

All work in this task will be completed in accordance with the USACE 1987 Wetland Delineation Manual and the 2010 U.S. Army Corps of Engineers Regional Supplement Manual for the Atlantic and Gulf Coastal Plain Region to identify and delineate all wetlands, which requires transects for areas greater than 5 acres.

Additionally, the Mean (average) High Water and High Tide Line will be delineated where appropriate. Please see definitions for each in Task 2.

A complete threatened and endangered species survey will be performed on each of the project sites identified on Exhibit A as appropriate. Prior to performing the survey, Consultant will develop a work plan for field activities for coordination with USACE. The threatened and endangered species survey will be completed in strict compliance with the finally approved work plan.

Field work will not commence on non-port owned properties until explicit written approval for access is provided by respective landowner(s). PCCA will coordinate approval for access. Other approvals required for fieldwork not specifically mentioned in this scope of work will be the responsibility of the Consultant.

Task 2 - Prepare Delineation Report

Consultant will prepare a formal Water of the United States delineation and seagrass survey and threatened and endangered species survey report based on results from Task 1 above. The report will include all content (e.g. mapping, GPS, coordinate tables, boundary rationales, field data sheets, Navigable Water Protection Rule or the current definition of Wates of the U.S. interpretation for each wetland, and/or jurisdictional status of any wetlands and waters on the property etc.) required by the USACE's current procedures and will include all data and assessments required by USACE methodologies for inclusion in a request for a Jurisdictional Determination. The threatened and endangered species will be detailed in accordance with the approved work plan.

The wetland assessment determination and delineation report will include all necessary exhibits, photos and supporting maps that identify features that could potentially be subject to the USACE jurisdiction under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. The report will also include the supporting routine wetland delineation data forms for all features within the surveyed area. The report will contain a map showing the delineated waters and wetland boundaries, sea grass beds, and associated GPS coordinates. Use of GPS, will be done in accordance with the USACE Standard Operating Procedure titled *Recording and Submitting Jurisdictional Delineations Using Global Positioning Systems (GPS) and Geographic Information Systems (GIS) Tools and Technologies* dated 4/21/2016. Geospatial data of all sample locations will also be provided to PCCA in the following formats/files: ESRI ArcGIS shapefile (*.shp, *.shx, and *.dbf), ArcGIS geodatabase file (*.mdb, *.gdb), comma separated values file (*.csv). Raw data, copies of physical field books, and digital data collector files will be included in addition to any processed data along with corresponding metadata for each.

Per 33 CFR 329.12(a)(2) Shoreward limit of jurisdiction, navigable waters of the United States extend to the line on the shore reached by the plane of the Mean (average) High Water (MHW), which is the shoreward limit of Section 10 waters. Per 33 CFR 328.3(d). waters of the United States (Section 404) extend shoreward to the High Tide Line (HTL), which is the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. Maps shall be correctly demarcated with the MHW and HTL. Acreages for both sea grass beds and delineated WOUS and wetlands will also be provided on each map. Placement area boundaries, Section 103 of the Marine Protection, Research, and Sanctuaries Act geographical jurisdictional boundary (as per 33CFR 2.20), and Section 408 Mean Low Low Water (MLLW) will also be clearly depicted on each

map. Draft maps will be coordinated with USACE through Authority prior to finalizing.

Datasheets will be properly completed, accurate and free of errors and type-o's.

Consultant will provide PCCA a draft report detailing all field surveys – wetlands, seagrasses, and threatened and endangered species. Consultant will incorporate Authority input into the report for a finalized version for Authority's reference. Consultant will submit all documents in Microsoft Word and a final compiled .pdf document for Authority's use.

Task 3 – Field Verification Support & Follow Up

Consultant will coordinate schedule of field activities with U.S. Army Corps of Engineers Channel Deepening Project – Project Manager to allow personnel to accompany Consultant on fieldwork. Consultant will provide full access to U.S. Army Corps of Engineers to delineation and sea grass verification activities including providing space on work boats.

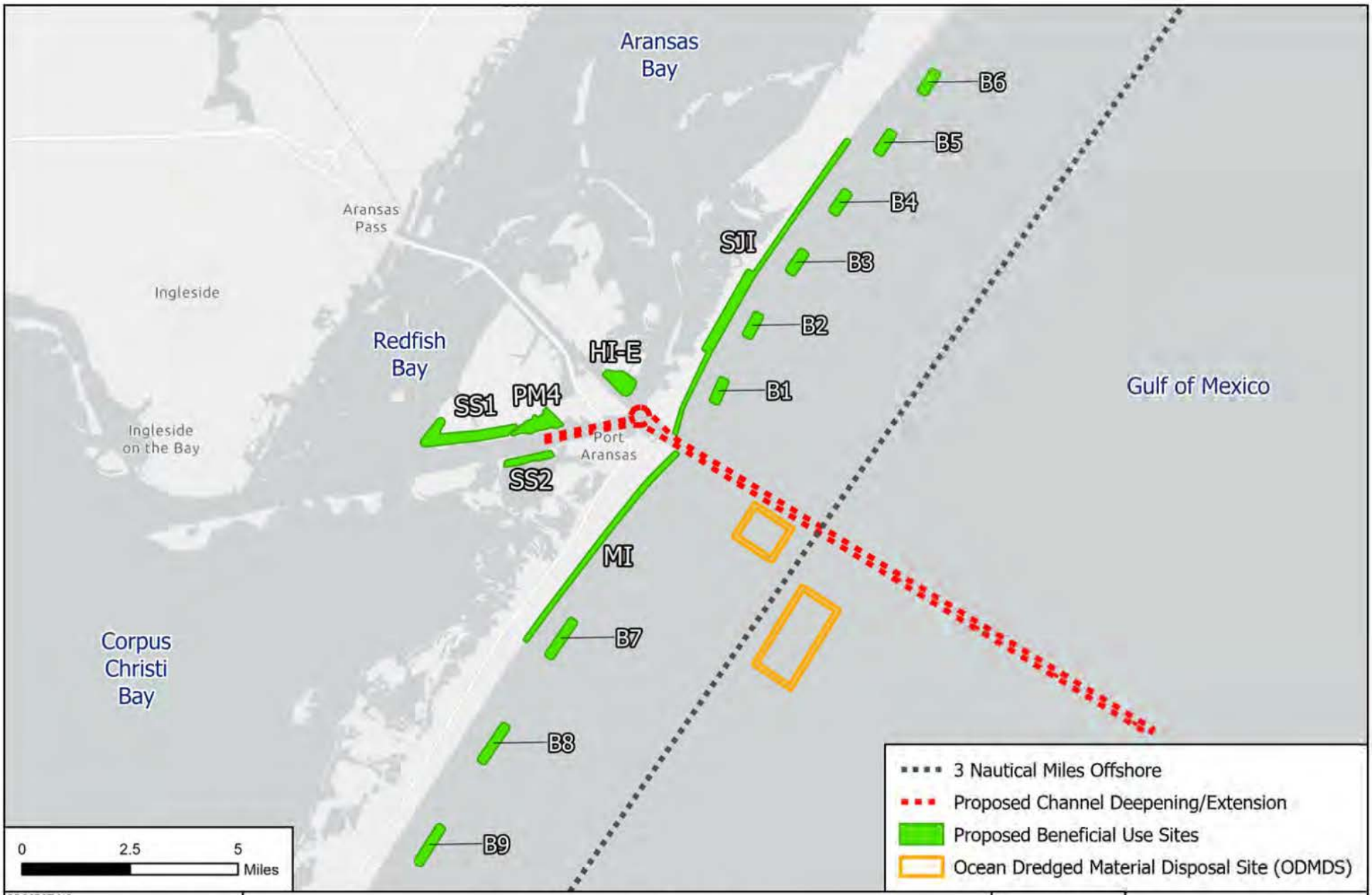
Consultant will also provide additional information or clarification following U.S. Army Corps of Engineers / Third-Party Contractor review of the final report.

Timeline

Consultant will provide appropriate number of teams in order that all field activities will be completed within a two to three-week period to be started not later than March 1, 2021.

The complete draft report will be provided within three weeks of completion of the field activities. The final report will be provided within one week of receiving PCCA comments.

Exhibit A



PROJECT NO.	PCA20166
DATE CREATED	02/11/2021
DATUM & COORDINATE SYSTEM	NAD83 State Plane (feet) Texas South Central
PREPARED BY	DGM

Port of Corpus Christi Authority
Corpus Christi Ship Channel Deepening Project

Site Map

N W E S

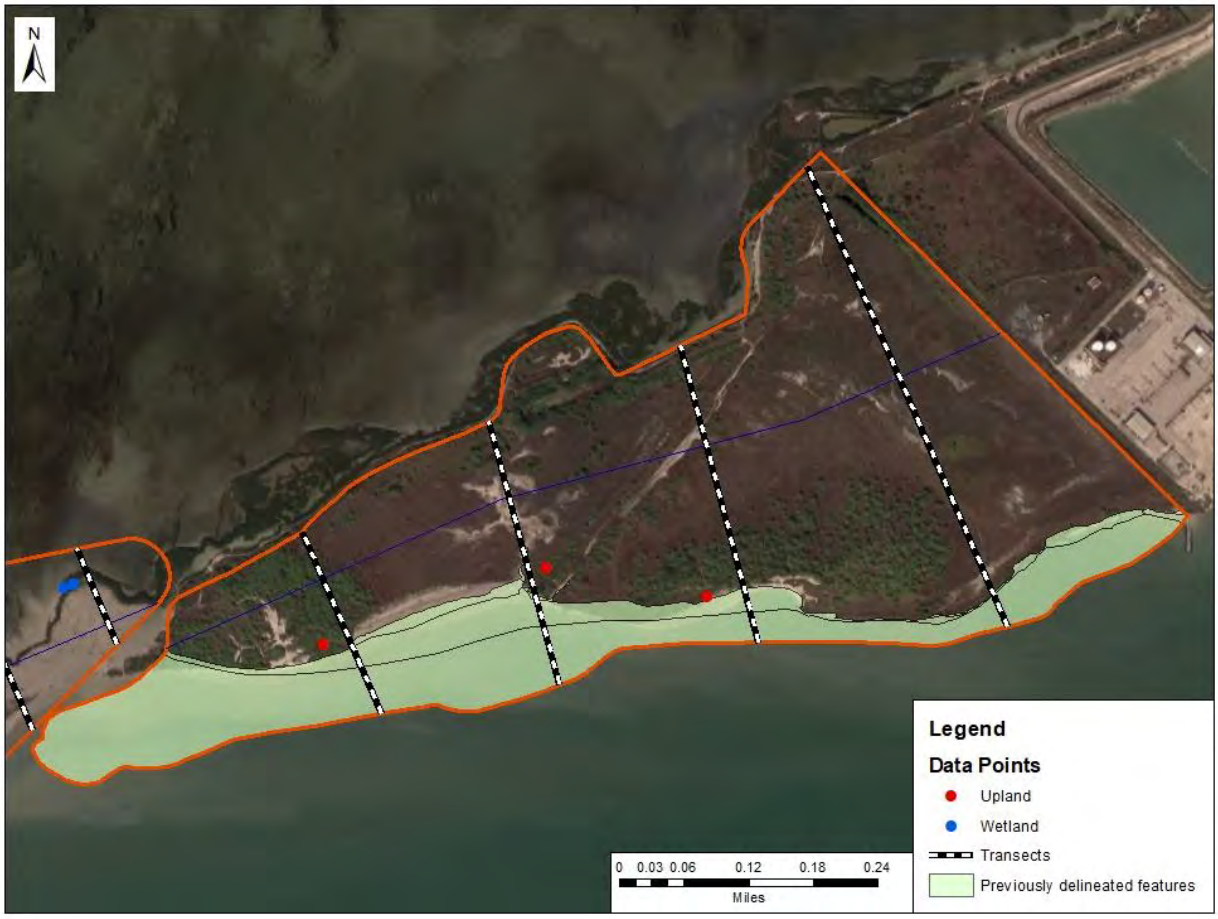
FIGURE 1

Attachment A

Delineation Transects and Previous Results

SJI will be fully delineated within the orange boundary. Proposed transects are shown as dashed lines.

PA4 will be fully delineated within the orange boundary. Proposed transects are shown in dashed lines. Previously delineated wetlands are shown in green, and previous data points are shown in red and blue.



HI-E has been delineated within the orange boundary. Proposed transects are shown in dashed lines. Previously delineated wetlands are shown in green, and previous data points are shown in red and blue.

SS1 has been delineated within the orange boundary. Proposed transects are shown in dashed lines. Previously delineated wetlands are shown in green, and previous data points are shown in red and blue.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

June 22, 2020

Policy Analysis Branch

SUBJECT: Department of the Army Permit Application SWG-2019-00067

Port of Corpus Christi Authority
Attn: Sarah Garza
222 Power Street
Corpus Christi, Texas 78401

Dear Ms. Garza:

This is in reference to the Jurisdictional Delineation Report and Seagrass Survey for the proposed deepening of the Corpus Christi Ship Channel. The reports were completed by AECOM for the Port of Corpus Christi and covered seven proposed dredged material placement areas, specifically Placement Areas SS1, M10, PA4, PA9-S, M4, M3 and HI-E. The proposed placement areas are located along the Corpus Christi Ship Channel, between Port Aransas and Ingleside on the Bay, Nueces County, Texas.

The Corps requested our delineation Technical Expert, Mr. John Davidson, review the submitted information independent of the EIS team. Mr. Davidson has determined that the reports are incomplete and identified several errors that must be addressed before we can proceed with the development of the Draft EIS. In addition to the comments provided in the April 27, 2020 letter, Mr. Davidson has provided the following comments:

a. The delineation report is not in accordance with the 1987 Corps of Engineers Wetland Delineation Manual (1987 Manual) as AECOM did not run transects in the land portions of the proposed placement areas. Per the 1987 Manual, Part IV - Methods, Section D - Routine Method, Subsection D - Onsite Inspection Necessary, Areas Greater Than 5 Acres, Steps 18-21, which instruct the delineator to establish a baseline, run transects perpendicular to the baseline and take sample points along the transects, were not followed.

b. The delineator identified the Mean High Tide Line as a jurisdictional boundary, however, this is not a proper identification of the jurisdictional line of Section 10 of the Rivers and Harbors Act (Section 10) or Section 404 of the Clean Water Act (Section 404). Per 33 CFR 329.12(a)(2) Shoreward limit of jurisdiction, navigable waters of the United States extend to the line on the shore reached by the plane of the Mean (average) High Water (MHW), which is the shoreward limit of Section 10 waters. Per 33 CFR 328.3(d). waters of the United States (Section 404) extend shoreward to the High Tide Line (HTL), which is the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The line encompasses spring high tides and other high

tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm. Neither the MHW nor the HTL were demarcated on the delineation.

c. Placement area boundaries are not clearly identified on the delineation maps. The legend states that the boundary is a black line, however, a black line does not encompass the placement areas.

d. Aquatic resources were delineated on land outside the proposed placement areas. For land based delineations, only aquatic resources within the project boundaries are required to be delineated.

e. Placement Area PA4 was not completely delineated or sampled. There are wetland signatures on aerial photos that were not sampled or delineated.

f. Data sheets were also reviewed and found to contain minor errors, including but not limited to, aquatic fauna species name must be listed in the Hydrology section remarks and Geomorphic Position was not identified when appropriate.

g. The seagass survey did not identify the acreage of seagrass present. It appears the seagrass beds were delineated on the overview map, however, there were no seagrass polygons on the inset maps. Additionally, seagrasses must be delineated within a 500-foot buffer surrounding the tidal portions of the placement areas as is standard for projects in known seagrass habitat.

h. Seagrass were sampled by feeling the substrate of the bay by hand. Grab samples, which pull up sediment to evaluate for seagrasses and/or seagrass roots, is the proper way to sample seagrass beds.

The comments in this and the previous letter may not be inclusive and additional revisions may be required. We look forward to your revised reports and are ready to assist you in whatever way is possible, including scheduling a meeting with you, the EIS Team, and Mr. Davidson. Please reference our file number in any future correspondence pertaining to this project. If you have any questions, please call me at 409-766-3108. You may also email him at jayson.m.hudson@usace.army.mil if you prefer.

Sincerely,

Robert W. Heinly
Chief, Policy Analysis Branch

cc
AECOM
Ashley Judith
5444 Westheimer Road, Suite 400
Houston, Texas 77056

Andi Binion

From: Garza, Sarah <Sarah@pocca.com>
Sent: Tuesday, April 6, 2021 12:37 PM
To: Andi Binion; B.J. Hill; Chemaine Koester
Cc: Rivera, Beatriz M; McNeil, Harrison
Subject: FW: Action Plan Status

Sarah L. Garza
Director of Environmental Planning & Compliance
Office (361) 885-6163

From: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Sent: Friday, January 8, 2021 12:29 PM
To: Garza, Sarah <Sarah@pocca.com>
Subject: RE: Action Plan Status

Sarah,

The recommendation from John is a response to recent changes in state law regarding uprooting seagrasses. In order to disturb the roots using grab sample difficult permits will need to be secured; so we are not going to require the grab samples. The methods in the SOW of wading/snorkeling etc. along the transects and identifying seagrasses visually or by hand should suffice. I double checked on the transects in the September seagrass report a similar method can employed. However, the trip plan memo we reviewed last fall and included with the SOW only shows wetland delineation transects. I did not find a map of the proposed seagrass transects, let mw know if I just missed it.

You are correct that the baseline does not need to be surveyed in the field, it is a GIS layer provided by NOAA, but it does need to be on the delineations maps. The baseline is relevant to the 103 permit, but it's not just limited to the designated ODMDS site. Dredged material placed below the baseline elevation can be subject to either Section 404 or Section 103. The purpose of the placement guides which statute to evaluate the project under. At this time, the delineation maps need to demarcate all of the Corps statutory boundaries.

One thing I saw that I missed in my the first review is that if the contractors are going to survey the site using GPS, it needs to be done in accordance with our SOP.
https://www.swg.usace.army.mil/Portals/26/docs/regulatory/Wetlands/2016%20GPS%20SOP.pdf

Jayson M Hudson
Regulatory Project Manager
409.766.3108

Please tell me how I am doing by completing the survey found at:
http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

From: Garza, Sarah <Sarah@pocca.com>
Sent: Friday, January 8, 2021 10:31 AM

To: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Subject: [Non-DoD Source] RE: Action Plan Status

Hello Jayson,

Thank you very much for the feedback on this. We are finalizing in order to request proposals for this work. I do have two clarifying questions on the feedback provided.

1. Mr. Davidson deleted the specification on grab samples to determine presence of sea grass. I don't want to misinterpret that but I also don't want to chance having another situation where a consultant utilizes their own methodology. That was the Corps language from the June correspondence. Any issue on leaving it in? If so, more context for the deletion would be helpful.
2. With regard to your comment on the boundary identification, I think that is just a reminder since 103 applies to the ODMDS and that is not within the footprint of this surveying. However, it will be included on the final maps that are presented to you in the report summarizing the results of this work. I just want to make sure I am not missing your meaning. Also, I will have the consultant provide a draft map that I will submit to the Corps for a quick review prior to the final report, if that is OK with you.

Thank you.

Sarah L. Garza
Director of Environmental Planning & Compliance
Office (361) 885-6163

From: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Sent: Wednesday, January 6, 2021 11:30 AM
To: Garza, Sarah <Sarah@pocca.com>
Cc: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Subject: RE: Action Plan Status

Sarah,

John Davidson and I made our comments in track changes and notes.

Jayson M Hudson
Regulatory Project Manager
409.766.3108

Please tell me how I am doing by completing the survey found at:
http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

From: Hudson, Jayson M CIV USARMY CESWG (USA)
Sent: Tuesday, January 5, 2021 11:09 AM
To: Garza, Sarah <Sarah@pocca.com>
Cc: HEINLY, Robert W CIV USARMY CESWG (USA) <Robert.W.Heinly@usace.army.mil>
Subject: RE: Action Plan Status

I am waiting on John Davidson's review. He was out of the office over the holidays.

Jayson M Hudson
Regulatory Project Manager
409.766.3108

Please tell me how I am doing by completing the survey found at:
http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

From: Garza, Sarah <Sarah@pocca.com>
Sent: Monday, January 4, 2021 3:58 PM
To: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Subject: [Non-DoD Source] RE: Action Plan Status

Thank you Jayson for the update. Does the team have comments to provide yet on the scope of work for the wetland and seagrass fieldwork?

Sarah L. Garza
Director of Environmental Planning & Compliance
Office (361) 885-6163

From: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Sent: Monday, January 4, 2021 8:29 AM
To: Garza, Sarah <Sarah@pocca.com>
Cc: Pollack, Jeff <jpollack@pocca.com>; HEINLY, Robert W CIV USARMY CESWG (USA) <Robert.W.Heinly@usace.army.mil>
Subject: RE: Action Plan Status

Thank you, Sarah. I requested the EIS contractor begin working on SOWs and I provided them the action plan and some of the recent reports (e.g. ship sim, HRI etc.) a few weeks ago. We should start seeing some of the SOWs very soon.

Jayson M Hudson
Regulatory Project Manager
409.766.3108

Please tell me how I am doing by completing the survey found at:
http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

From: Garza, Sarah <Sarah@pocca.com>
Sent: Tuesday, December 22, 2020 4:02 PM
To: Hudson, Jayson M CIV USARMY CESWG (USA) <Jayson.M.Hudson@usace.army.mil>
Cc: Pollack, Jeff <jpollack@pocca.com>; HEINLY, Robert W CIV USARMY CESWG (USA) <Robert.W.Heinly@usace.army.mil>
Subject: [Non-DoD Source] RE: Action Plan Status

Good Afternoon All,

Please see attached updated action plan. Jayson, you and I did discuss last Tuesday that the action plan would be your indication to solicit proposals from FNI. However, I was awaiting an answer on the TPC completing the Section 106 work plan. We haven't received concurrence on that so I show

AQUATIC SURVEY REPORT

Port of Corpus Christi Authority Channel Deepening Project
Nueces and Aransas Counties, Texas
SWG-2019-00067

June 18, 2021

July 8, 2021 (Revision 1)

October 29, 2021 (Revision 2)

Prepared for:
Port of Corpus Christi Authority
222 Power Street
Corpus Christi, TX 78401

✉ abinion@tritonenv.com

Office: (361) 450-1538

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Exhibits

1.0 Background and Introduction

The Port of Corpus Christi Authority (PCCA) is requesting authorization from the U.S. Army Corps of Engineers (USACE) to conduct dredge and fill activities to deepen a portion of the existing Corpus Christi Ship Channel (CCSC), as well as a 5.5-mile extension of the ship channel to the natural minus 80-foot bathymetric contour in the Gulf of Mexico. The proposed Corpus Christi Ship Channel Deepening Project (SWG-2019-00067) would deepen the channel from the eastern portion of Harbor Island into the Gulf of Mexico, an overall distance of 13.8 miles. The project is needed to accommodate the transit of fully laden Very Large Crude Carriers (VLCCs), which draft approximately 70-feet. The USACE determined a Draft Environmental Impact Statement (DEIS) will be required for the proposed project.

The PCCA is proposing to utilize five (5) separate Beneficial Use (BU) Placement Areas (PAs) sites in association with the proposed Corpus Christi Ship Channel Deepening Project (SWG-2019-00067). Field surveying and quantification of sensitive resources within and surrounding the proposed BU sites are required to support the DEIS being prepared by the USACE.

Five distinct BU survey areas (PA4, SS1, SS2, HI-E, and MI) were established and surveyed based on information gathered from both PCCA and the USACE. All BU boundaries were provided to Triton Environmental Solutions, LLC (Triton) by PCCA, excluding PA4. The boundary for PA4 was downloaded from the USACE Geospatial website on April 20, 2021. To create the respective BU Project Study Areas (PSAs), Triton buffered each BU boundary by 500 feet in an effort to delineate any seagrass(s) and live oyster within the project vicinity, per USACE requirements. The total survey area encompassed approximately 2,168.50-acres across the five PSAs and included PA4 (Approx. 294.12-acres), SS1 (Approx. 589.90-acres), SS2 (Approx. 250.60-acres), HI-E (Approx. 269.40-acres), and MI (Approx. 764.48-acres). A sixth BU site, San Jose Island (SJI) is included as part of Exhibit C, but due to access and schedule constraints, will be surveyed at a later date and included as an addendum to this report.

Triton established Global Positioning System (GPS) coordinates for survey boundaries, transects, and sample stations. Survey files were loaded onto Trimble real-time kinematic (RTK) and GEO7x GPS units for field mapping, data collection, and navigation. The aquatic survey was conducted within the limits of the survey boundaries shown on the enclosed plans (Exhibit C).

Beginning on April 27, 2021, and spanning through June 4, 2021, Triton conducted aquatic resource surveys to document and quantify marine sensitive resource(s) occurrence, distribution, and coverage within the vicinity (i.e., 500-foot buffer) of each of the five PSAs. Detailed descriptions of the sampling design and data collection methodology, data analysis and results, and representative photographs of the aquatic surveys are presented in subsequent sections. The following report documents sensitive resources (primarily seagrass and live oyster) frequency of occurrence, distribution, percent cover (seagrass only), as well as delineated boundaries (acreage extents) for each sensitive resource identified.

2.0 Methodology

2.1 Aquatic Sensitive Resource Surveys (seagrass and oyster): PA4, SS1, SS2, HI-E, and MI PSAs

2.1.1 Sampling Design and Data Collection

The seagrass and oyster survey was conducted with a systematic, analytical methodology utilizing wading visual and hand detection intercept sampling (i.e., feeling the bay bottom by hand) in conjunction with a modified Braun-Blanquet rapid visual assessment technique (Braun-Blanquet 1972; Fourqurean 2001). The implementation of wading presence/absence (i.e., percent frequency) and Braun-Blanquet techniques allowed for the landward and bayward delineation of seagrass to determine seagrass bed extents (acreage) while also providing species composition and percent cover (i.e., relative abundance) information. Triton personnel travelled to respective survey areas by vehicle (where accessible), and in shallow-draft outboard skiffs ranging in length from 17- to 25-feet. Skiffs draw less than one foot of water and prop-washing was strictly avoided. Sample data points were collected along pre-defined transects, orienting from the shoreline and extending waterward within each respective PSA. Transects were spaced at 100-foot (PA4, SS1, SS2, HI-E) or 2,000-foot intervals (MI). Transect spacing for MI was established from pre-approved transects that were developed as part of a prior study component to assist with the development of the DEIS. Orienting from the shoreline, Triton utilized hand detection sampling spaced at 10-foot intervals and a modified Braun-Blanquet rapid visual quadrat assessment conducted at every 5th (i.e., 50-feet) sampling interval. Sample transects and sample stations are shown in the enclosed Aquatic Resources Survey Data View Maps (see Figures below) and the following were surveyed:

a. PA4 Site: 106 total transects; 2,380 total sample stations (N = 1,895 total hand detection feels; N = 485 quadrats)
b. SS1 Site: 174 total transects; 11,166 total sample stations (N = 9,219 total hand detection feels; N = 1,947 quadrats)
c. SS2 Site: 117 total transects; 2,407 total sample stations (N = 1,727 total hand detection feels; N = 680 quadrats)
d. HI-E Site: 82 total transects; 1,969 total sample stations (N = 1,528 total hand detection feels; N = 441 quadrats)
e. MI Site: 14 total transects; 359 total sample stations (N = 308 total hand detection feels; N = 51 quadrats)

At each sample station, Triton personnel identified composition of substrate, determined presence/absence of seagrass, and identified seagrasses to species. To determine presence or absence of seagrass, survey staff conducted a visual and hand feel detection on the bay bottom, centered on the transect line. For the Braun-Blanquet data collection points, a 0.25m^2 quadrat was randomly tossed within 1-meter of the transect line. Triton conducted each quadrat assessment by visually identifying each seagrass species present and estimating percent cover for each species within the 0.25m^2 quadrat. Percent cover, as defined for this purpose, was the fraction of the total quadrat area that was obscured by a particular species when observed from an overhead view. Seagrass was not removed or disturbed with the hand detection or rapid visual assessment techniques. Seagrass species and Braun-Blanquet data were recorded according to Tables 1 and 2, respectively.

Table 1. Seagrass species key.

Abbreviation	Common Name	Scientific Name
0	Not present	N/A
A	Algae	N/A
H	Shoalweed	*Halodule wrightii*
Ha	Clovergrass	*Halophila englemannii*
R	Beaked ditch-grass (Widgeon)	*Ruppia maritima*
S	Manatee grass	*Syringodium filiforme*
T	Turtle grass	*Thalassia testudinum*
W	Seagrass wrack material	N/A

Table 2. Braun-Blanquet abundance (S) scoring key.

S	Interpretation
0	Species absent from quadrat
0.1	Species represented by a single solitary short shoot, < 5% cover
0.5	Species represented by a few (< 5%) short shoots, < 5% cover
1	Species represented by many (> 5%) short shoots, < 5% cover
2	Species represented by many (> 5%) short shoots, 5 – 25% cover
3	Species represented by many (> 5%) short shoots, 25 – 50% cover
4	Species represented by many (> 5%) short shoots, 50 – 75% cover
5	Species represented by many (> 5%) short shoots, 75 – 100% cover

Wading visual, hand detection, and Braun-Blanquet survey methods terminated at approximately -3.0 feet NAVD88 due to safety concerns (ship traffic, currents, etc.) and inability to effectively and efficiently sample seagrass in deeper waters via wading. In waters > -3.0 feet NAVD88, when necessary, Triton confirmed the bayward edge of seagrass by surveying from a vessel utilizing an integrated sampling approach of side-scan, ground-truthing with diving, and use of a post-hole grab. Transects terminated at 30-feet past the bayward edge of seagrass (i.e., minimum of three consecutive sample stations) or the leading slope of deep-water channels (for safety concerns), whichever occurred first.

In areas where oyster reef and/or shell were encountered during the wading surveys (i.e., ≤ -3.0 feet NAVD88), a grab from the bay bottom was utilized to determine whether the substrate encountered was live oyster or a combination of shell gaper, halves, fragments, or shell hash. A grab was only utilized if shell type could not be visually identified. All live oyster identified was circumnavigated to delineate the boundary, providing spatial acreage estimates. In waters beyond -3.0 feet NAVD88, Triton staff consolidated readily available current oyster geospatial data from National Oceanic Atmospheric Administration (NOAA) National Centers for Environmental Information; Gulf of Mexico Data Atlas to identify any known existing oyster reef locations within the survey areas. Once consolidated, Triton staff surveyed these locations by sounding to verify/determine oyster boundaries and acreage extent.

Substrate composition was recorded at each sample point, providing substrate profile and frequency of occurrence information. Substrate was recorded according to the key in Table 3.

Table 3. Substrate key.

Abbreviation	Type
M	Mud
S	Sand
C	Clay
G	Gravel
SH	Shell (gaping, halves, fragments, or shell hash)
OY	Live Oyster

Representative bottom elevations and depth of soft sediment were collected with a sounding rod (tide-adjusted) within each survey area; primarily in areas of identified sensitive resources (i.e., seagrass beds) and occurred at approximately 300-foot transect intervals, every 10-feet.

The High Tide Line (HTL) elevation for the survey area (+2.76 ft NAVD88) has been recently verified by the USACE (SWG-2015-00417). The HTL is the upper limit of USACE jurisdiction along tidal shorelines, and in the absence of jurisdictional wetlands, which may extend above the HTL. The MHW line elevation for this area (+1.01 ft NAVD88) was obtained from the National Oceanic and Atmospheric Administration's (NOAA) Tide Station No. 8775296: USS Lexington. The MHW line demarcates the upper limit of "navigable waters and USACE jurisdiction under Section 10 of the Rivers and Harbors Act of 1899."

Positional locations of the Mean High Water (MHW) and High Tide Line (HTL) tidal elevation lines were recorded along the shorelines of each of the five PSAs. Staff biologists surveyed the shoreline at discrete point locations to locate the MHW and HTL elevations using a Trimble R8 RTK, sub-centimeter GPS unit. Once the tidal boundary field survey was complete, positional and elevation data for MHW and HTL tidal boundaries were post-processed in the office and overlaid onto recent aerial imagery.

All survey data was recorded with a Trimble RTK GPS receiving real-time corrections from the VRS Network, or GEO 7x handheld GPSs, and complied with the USACE Standard Operating Procedures (SOP) for recording jurisdictional delineations with a GPS. Benchmarks were surveyed every morning prior to initiation of daily surveying activities and in the evening after daily survey completion. An SOP Table is included in Exhibit D. Position coordinates were recorded and then plotted in the office with ArcGIS 10.6 and ArcGIS Pro software.

2.1.2 Data Analysis

Determining presence/absence (i.e., frequency of occurrence) of seagrass by hand detection at each sample station was calculated as follows:

$$F_O = (\sum O_S / N_H)$$

where F_O = seagrass percent frequency of occurrence, O_S = seagrass occurrence, and N_H = number of total hand detection sampling stations. The presence/absence component of the survey facilitated delineation of seagrass acreage extent throughout the survey areas.

The data from each Braun-Blanquet data collection point was analyzed to quantify percent cover (i.e., seagrass relative abundance) and frequency by species encountered within the survey areas. These data provided species composition information, frequency of occurrence by species, as well as seagrass percent cover estimates. Percent cover was calculated as follows:

$$VC_S = (\sum Q_S / N_Q)$$

where VC_S = mean seagrass percent vegetative cover, Q_S = quadrat score, and N_Q = number of total quadrats.

Percent frequency by seagrass species was calculated with the following equation:

$$F_{OS1} = (\sum O_{S1} / N_Q)$$

where F_{OS1} = seagrass percent frequency of occurrence by species, O_{S1} = seagrass occurrence by species, and N_Q = number of total quadrats.

Substrate data was quantified by summing the total occurrence of substrate type and dividing by total number of substrate sample stations, providing substrate composition information for each respective survey area. Summary statistics (N, minimum, maximum, and mean) for depth of soft sediment and elevation was calculated for each BU survey placement area.

2.2 Meteorological Observations and Photographic Record

Triton documented general meteorological conditions on daily field sheets. The selected tide station for the project was determined to be the USS Lexington, Corpus Christi Bay, TX - Station ID: 8775296. Daily air and water temperatures were accessed via the National Oceanic and Atmospheric Administration's webpage at: (https://tidesandcurrents.noaa.gov/stationhome.html?id=8775296). The USS Lexington was selected as the primary tidal reference station for the Project because it provides a better representation of the interior bay systems of the project area and is less susceptible to stronger tidal amplitudes from large passing vessel traffic and onshore run-up from the Gulf of Mexico near the jetties (i.e., Port Aransas tide gauge). It has also been Triton's experience that the USACE and Licensed State Land Surveyors both typically delineate the +1.01-foot NAVD88 contour for MHW, which is the same MHW value utilized by the USS Lexington tide gauge.

Due to the lack of wind data at the USS Lexington, Corpus Christi Bay, TX station for the survey period, daily wind speed, direction, and gusts were obtained from the Port Aransas, TX - Station ID: 8775237. The Port Aransas, TX station data was accessed via the National Oceanic and Atmospheric Administration's webpage at: (https://tidesandcurrents.noaa.gov/stationhome.html?id=8775237).

Additionally, Triton staff photograph documented the field survey collections and have included representative images of habitats and general site conditions in Exhibit A.

3.0 Results

3.1 Aquatic Sensitive Resource Surveys (seagrass and oyster): PA4, SS1, SS2, HI-E, and MI PSAs

3.1.1 Summary (combined across PSAs)

A total of 493 transects were surveyed, and 18,281 sample data points were collected during the survey: including 2,380 at PA4, 11,166 at SS1, 2,407 at SS2, 1,969 at HI-E, and 359 at MI (Table 4). Seagrass was encountered at PA4, SS1, and HI-E PSAs. No seagrass was detected at placement areas SS2 or MI PSAs. The delineated extents of seagrass totaled 150.36-acres (Table 5) across all survey areas and was most

abundant at SS1 (106.33-acres), followed by PA4 (25.32-acres), then HI-E (18.71-acres). Shoalweed *Halodule wrightii* (20.5%), and widgeon grass *Ruppia maritima* (11.4%) were observed in greatest frequency, but turtle grass *Thalassia testudinum* (6.8%), manatee grass *Syringodium filiforme* (< 0.1%), and clover grass, *Halophila englemannii* (0.5%) were also encountered, representing diverse seagrass communities, particularly at PA4 and SS1 PSAs (Tables 6 and 10).

Table 4. Total Number (N) of Transects, Hand Detection Points, Braun-Blanquet Quadrat Points, and Total Sampling Points by PSA and Combined Across All PSAs.

Survey Area	Transects (N)	Hand Detection Points (N)	Quadrat Points (N)	Total Sample Points (N)
PA4	106	1,895	485	2,380
SS1	174	9,219	1,947	11,166
SS2	117	1,727	680	2,407
HI-E	82	1,528	441	1,969
MI	14	308	51	359
Total	**493**	**14,677**	**3,604**	**18,281**

Table 5. Summary of Seagrass and Live Oyster Acreages by PSA and Combined Across All PSAs.

Survey Area	Acres (Seagrass)	Acres (Live Oyster)
PA4	25.32	0.13
SS1	106.33	2.32
SS2	0.00	0.00
HI-E	18.71	0.96
MI	0.00	0.00
Total	**150.36**	**3.41**

Table 6. Frequency (N) of Seagrass Detections and Percent Frequency of Seagrass, Combined Data Across PSAs.

Abbreviation	Frequency (N)	Percent Frequency
0	8,634	58.8
A	47	0.3
H	3,004	20.5
Ha	77	0.5
R	1,678	11.4
S	1	0.0
T	998	6.8
W	238	1.6
Combined seagrass	**5,758**	**39.2**
Total	**14,677**	**100.0**

A combined 3,604 Braun-Blanquet quadrats were assessed across all PSAs (Table 7). Seagrass percent cover, as indicated by Braun-Blanquet quadrat scores (S), varied from 0 (i.e., absent) to 5 (75 – 100%). The

mean Braun-Blanquet score across all survey areas was 2 (rounded from 1.5) and indicated seagrass percent cover of roughly 5 – 25% within the combined survey areas (Table 7).

Table 7. Summary of Braun-Blanquet Data by PSA and Combined Across PSAs. N = number of quadrats, range represents the minimum and maximum Braun-Blanquet (S) values.

Survey Area	N	Range (S)	Mean (S)
PA4	485	0 - 5	1.6
SS1	1,947	0 - 5	1.9
SS2	680	-	0.0
HI-E	441	0 - 5	1.7
MI	51	-	0.0
Combined	**3,604**	**0 - 5**	**1.5**

Live oyster comprised 3.41-acres (Table 5) across all PSAs and included 0.13-acres at PA4 (N = 2 reefs), 2.32-acres at SS1 (N = 2 reefs), and 0.96-acres at HI-E (N = 37 reefs). No live oyster was identified at SS2 or MI. Live oyster was encountered with relatively low frequency at PA4 (0.5%), SS1 (1.1%), SS2 (0.0%), HI-E (2.6%), and MI (0.0%; Table 11).

Geospatial oyster data from the NOAA National Centers for Environmental Information; Gulf of Mexico Data Atlas was obtained and assessed for oyster presence in waters greater than -3.0 feet NAVD88. The desktop analysis indicated no oyster presence in waters greater than -3.0 feet NAVD88 in any of the placement area survey boundaries.

Six substrate types were encountered within the seagrass survey areas and included mud, sand, clay, gravel, shell (gaping, halves, fragments, or shell hash), and live oyster. Predominant substrate types observed included sand (74.1%), mud (15.1%), clay (5.4%), and shell (4.3%; Table 8). Live oyster was encountered with a frequency of 1.0% across all sample stations and survey areas.

Table 8. Frequency (N) and Percent Frequency by Substrate Type, Combined Data Across PSAs.

Abbreviation	Frequency (N)	Percent Frequency
M	2,205	15.1
S	10,851	74.1
C	788	5.4
G	17	0.1
SH	631	4.3
OY	151	1.0
Total	**14,643**	**100.0**

Depth of soft sediment ranged from 0.0 – 2.6 feet and averaged 0.1 feet across all survey areas (Table 9). Bottom elevations averaged -1.1 feet and ranged from -10.8 feet to +2.1 feet (vertical datum: NAVD88; Table 9).

Table 9. Summary Depth of Soft Sediments (DSS) and Elevation Data by Survey Area and Combined Across PSAs. N = number of sample points, range represents the minimum and maximum DSS and Elevation (feet) values. Vertical Datum: NAVD88.

Survey Area	DSS (N)	DSS (range)	DSS (mean)	Elevation (N)	Elevation (minimum)	Elevation (maximum)	Elevation (mean)
PA4	868	0.0 - 1.8	0.2	868	-7.1	1.1	-1.0
SS1	4,741	0.0 - 1.8	0.2	4,686	-6.0	2.0	-0.6
SS2	1,255	0.0 - 1.9	0.2	1,257	-10.8	1.1	-3.0
HI-E	554	0.0 - 2.6	0.3	498	-7.2	1.7	-1.2
MI	308	0.0 - 0.0	0.0	308	-2.1	2.1	0.2
Combined	**7,726**	**0.0 - 2.6**	**0.1**	**7,617**	**-10.8**	**2.1**	**-1.1**

3.1.2 PA4 PSA

One-hundred and six transects were surveyed and 2,380 sample points (N = 1,895 hand detection, N = 485 quadrats) were collected at PA4 (Table 4). Four seagrass beds were delineated within the PA4 survey boundary and totaled 25.32-acres (Table 5 & Figure 2). Seagrass was observed at 50.3% of all sampling locations and was comprised primarily of shoalweed (39.5%) and widgeon grass (10.8%; Table 10). Clover grass and turtle grass were also present in low frequency. Bare substrate (i.e., void of seagrass) was encountered at 48.0% of sample locations. Seagrass species co-occurred at 7.3% of sampling locations.

A total of 485 quadrats were assessed at PA4 (Table 7). Seagrass percent cover, as indicated by Braun-Blanquet scores (S) ranged from 0 (i.e., not present) to 5 (i.e., 75 – 100%) at PA4. The combined mean Braun-Blanquet (S) score was 2 (rounded from 1.6), indicating seagrass percent cover (i.e., relative abundance) of roughly 5 – 25% of the total PA4 survey area (Table 7). Seagrass percent cover for quadrats solely contained within the delineated seagrass beds indicated healthy, robust stands of seagrass.

Live oyster was mapped at two locations on the southern side of PA4 and encompassed a combined 0.13-acres (Table 5 & Figure 2). Live oyster was encountered at only 9 sampling stations (0.5%; Table 11), an additional indicator of the low prevalence of live oyster within PA4.

Six substrate types were encountered within PA4 and included mud, sand, clay, gravel, shell (gaping, halves, fragments, or shell hash), and live oyster. Predominant substrate types observed included sand (79.9%), mud (11.1%), and shell (6.6%; Table 11). Live oyster was encountered with a frequency of 0.5% and gravel was intercepted at only 0.3% of sample stations within PA4.

Depth of soft sediment averaged 0.2 feet and ranged from 0.0 – 1.8 feet, indicating the presence of soft sediments within some areas of PA4 (Table 9). Bottom elevations at PA4 averaged -1.0 feet and ranged from -7.1 feet to +1.1 feet NAVD88.

3.1.3 SS1 PSA

One-hundred seventy-four transects (N = 11,166 total sample points; N = 9,219 hand detection, N = 1,947 quadrats) were evaluated at SS1 (Table 4). Seagrass was observed in highest abundance at SS1 when compared to all other PSAs. Three seagrass beds were delineated within the SS1 survey boundary and encompassed 106.33-acres (Table 5 & Figure 4). Seagrass was observed at 44.5% of all sampling locations and was comprised primarily of shoalweed (21.9%), widgeon grass (11.0%), and turtle grass (10.8%; Table 10). Clover grass and manatee grass were also represented in low frequency. Bare substrate (i.e., void of

seagrass) was encountered at 52.9% of sample locations. Various seagrass species co-occurred at an estimated 6.6% of sampling stations.

A total of 1,947 quadrats were quantified at SS1 (Table 7), and seagrass percent cover ranged from 0 (i.e., not present) to 5 (i.e., 75 – 100%). The combined mean Braun-Blanquet (S) score was 2 (rounded from 1.9), indicating seagrass relative abundance (i.e., percent cover) of roughly 5 – 25% of the total SS1 survey area (Table 7). Seagrass percent cover for quadrats solely contained within the delineated seagrass beds indicated healthy, robust, and diverse stands of seagrass within SS1.

Live oyster was delineated at SS1 at two locations and totaled 2.32-acres (Figure 4). Both live reefs are located on the northern side of SS1. Live oyster was encountered with relatively low frequency (1.1%; Table 11) of the total sampling stations.

Six substrate types were encountered within SS1 and included mud, sand, clay, gravel, shell (gaping, halves, fragments, or shell hash), and live oyster. Prevalent substrate types observed included sand (73.5%), mud (15.0%), clay (6.6%), and shell (3.7%; Table 11). Live oyster (1.1%) and gravel (< 0.1%) were rarely intercepted.

Depth of soft sediment averaged 0.2 and ranged from 0.0 – 1.8 feet, indicating the presence of soft sediments within some areas of SS1 (Table 9). Bottom elevations at SS1 varied from -6.0 feet to +2.0 feet and the mean bottom elevation was calculated at -0.6 feet NAVD88.

3.1.4 SS2 PSA

One-hundred seventeen transects were surveyed and 2,407 sample points (N = 1,727 hand detection, N = 680 quadrats) were collected at SS2 (Table 4). No sensitive aquatic resources (i.e., seagrass and live oyster) were observed at SS2 (Table 5 & Figure 6). Bare substrate was encountered at 99.5% of all sampling stations. Algae and wrack were encountered at a rate of 0.3% and 0.2%, respectively (Table 10).

Five substrates were identified within SS2 and included sand (94.7%), mud (2.3%), shell (1.7%), clay (0.8%), and gravel (0.5%; Table 11). No live oyster was encountered.

Mean depth of soft sediment was 0.2 and ranged from 0.0 – 1.9 (Table 9). Bottom elevations ranged from -10.8 feet to 1.1 feet and averaged -3.0 feet NAVD88 (Table 9).

3.1.5 HI-E PSA

Eighty-two transects and 1,969 total sample points (N = 1,528 hand detection, N = 441 quadrats) were collected at HI-E (Table 4). Seagrass was observed in lowest abundance at HI-E when compared to the other placement areas where seagrass was identified (i.e., PA4, SS1). Four seagrass beds were delineated within the HI-E survey boundary and encompassed 18.71-acres (Table 5). Seagrass was detected at 45.7% of all sampling locations and was comprised of widgeon grass (29.9%) and shoalweed (15.8%; Table 10). Bare substrate (i.e., void of seagrass) was encountered at 53.7% of sample locations. Wrack was also indicated in low frequency (0.6%). Widgeon grass and shoalweed co-occurred at roughly 6.0% of sampling stations.

A combined 441 Braun-Blanquet quadrats were assessed at HI-E (Table 7). Seagrass percent cover, as indicated by Braun-Blanquet quadrat scores (S), varied from 0 (i.e., absent) to 5 (75 – 100%). The mean Braun-Blanquet score was 2 (rounded from 1.7) and indicated seagrass relative abundance of roughly 5 – 25% cover within the HI-E survey area (Table 7).

Numerous (N = 37), small live oyster reefs were delineated at HI-E and comprised 0.96-acres (Table 5). These were predominately located on the west and northeastern side of the island (Figure 8). Live oyster was encountered with a frequency of 2.6% (Table 11) at HI-E.

Five substrates were observed within HI-E. Common substrates included sand (42.0%) and mud (37.5%). Clay (9.0%), shell (8.8%), and live oyster (2.6%) were encountered with less frequency (Table 11).

Depth of soft sediment averaged 0.3 feet and ranged from 0.0 – 2.6 feet. Mean depth of soft sediments was highest at HI-E relative to all other placement areas and indicated the presence of soft sediments within some areas of HI-E (Table 9). Bottom elevations at HI-E averaged -1.2 feet and ranged from -7.2 feet to +1.7 feet NAVD88.

3.1.6 MI PSA

Fourteen transects and 359 total sample points (N = 308 hand detection, N = 51 quadrats) were assessed at MI (Table 4). No seagrass or live oyster was observed within MI (Figure 10). Bare substrate was encountered with 100.0% frequency and sand (100.0%) was the only substrate type identified (Tables 10 and 11).

Sediments were firm (mean depth of soft sediment = 0.0) and bottom elevations ranged from -2.1 feet to 2.1 feet and averaged 0.2 feet NAVD88 (Table 9).

Table 10. Frequency (N) of Seagrass Detections and Percent Frequency of Seagrass by PSA.

Survey Area	Abbreviation	Frequency (N)	Percent Frequency
PA4	0	909	48.0
	A	0	0.0
	H	748	39.5
	Ha	0	0.0
	R	205	10.8
	S	0	0.0
	T	1	0.1
	W	32	1.7
Combined seagrass		**954**	**50.3**
Total		**1,895**	**100.0**
SS1	0	4,878	52.9
	A	41	0.4
	H	2,015	21.9
	Ha	77	0.8
	R	1,016	11.0
	S	1	< 0.1
	T	997	10.8
	W	194	2.1
Combined seagrass		**4,106**	**44.5**
Total		**9,219**	**100.0**
SS2	0	1,718	99.5
	A	6	0.3
	H	0	0.0
	Ha	0	0.0
	R	0	0.0
	S	0	0.0
	T	0	0.0
	W	3	0.2
Combined seagrass		**0**	**0.0**
Total		**1,727**	**100.0**

Table 10 (Cont'd). Frequency (N) of Seagrass Detections and Percent Frequency of Seagrass by PSA.

Survey Area	Abbreviation	Frequency (N)	Percent Frequency
HI-E	0	821	53.7
	A	0	0.0
	H	241	15.8
	Ha	0	0.0
	R	457	29.9
	S	0	0.0
	T	0	0.0
	W	9	0.6
Combined seagrass		**698**	**45.7**
Total		**1,528**	**100.0**
MI	0	308	100.0
	A	0	0.0
	H	0	0.0
	Ha	0	0.0
	R	0	0.0
	S	0	0.0
	T	0	0.0
	W	0	0.0
Combined seagrass		**0**	**0.0**
Total		**308**	**100.0**

Table 11. Frequency (N) and Percent Frequency by Substrate Type and PSA.

Survey Area	Abbreviation	Frequency (N)	Percent Frequency
PA4	M	209	11.1
	S	1,511	79.9
	C	32	1.7
	G	5	0.3
	SH	124	6.6
	OY	9	0.5
Total		**1,890**	**100.0**
SS1	M	1,385	15.0
	S	6,777	73.5
	C	604	6.6
	G	4	0.0
	SH	344	3.7
	OY	102	1.1
Total		**9,216**	**100.0**
SS2	M	39	2.3
	S	1,606	94.7
	C	13	0.8
	G	8	0.5
	SH	29	1.7
	OY	0	0.0
Total		**1,695**	
HI-E	M	573	37.5
	S	641	42.0
	C	138	9.0
	G	0	0.0
	SH	134	8.8
	OY	40	2.6
Total		**1,526**	**100.0**
MI	M	0	0.0
	S	308	100.0
	C	0	0.0
	G	0	0.0
	SH	0	0.0
	OY	0	0.0
Total		**308**	**100.0**

3.2 Meteorological Observations and Photographic Record

Daily meteorological and tide conditions are presented in Exhibit B. Air temperature ranged from a low of 66 °F on May 13th to a survey high of 84 °F on May 27th. Clear skies to heavy rainfall were encountered. Wind velocities ranged from 0.0 miles per hour (mph) to 20.2 mph. Surveys were not conducted in inclement weather (i.e., thunder/lightning storms, winds speed greater than 25 mph). According to the National Weather Service data, precipitation received in nearby Corpus Christi during the survey period totaled 12.2 inches. Heaviest rainfall occurred on May 20th and totaled 4.5 inches. Meteorological reports indicated that May 2021 was the third wettest month on record for Corpus Christi and totaled 11.3 inches. Tide levels ranged from +1.09 feet NAVD88 on May 6th to +2.79 feet NAVD88 on May 19th.

4.0 Conclusion

Comprehensive sensitive aquatic resources surveying across five PSAs (PA4, SS1, SS2, HI-E, and MI) allowed for the quantification of marine sensitive resource(s) to document presence, distribution, percent cover (seagrass only) as well as delineated boundaries (i.e., acreage extents) for seagrass and live oyster within each BU placement area as well as combined across all PSAs. Aquatic resources surveying indicated the presence of both seagrass and live oyster within the survey boundaries of three PSA locations (PA4, SS1, and HI-E). Seagrass and live oyster were not detected at two of the five PSAs (SS2 and MI).

Specifically:

- A total of 150.36-acres of seagrass and 3.41-acres of live oyster were identified and delineated across all survey areas.
- PA4 contained 25.32-acres of seagrass and 0.13-acres of live oyster, respectively.
- SS1 comprised the greatest abundance of sensitive aquatic resources and included seagrass (106.33-acres) and live oyster (2.32-acres).
- HI-E contained 18.71-acres of seagrass and 0.96-acres of live oyster, respectively.
- No sensitive aquatic resources (seagrass or live oyster) were encountered within placement areas SS2 or MI.

In summary, the sensitive aquatic resources results, and maps can be utilized as a project planning tool to inform the permitting process. Specifically, the delineation of sensitive resources should facilitate decisions regarding avoidance or minimization measures to sensitive aquatic resources, while also informing habitat restoration project locations, such as beach nourishment or other habitat enhancement initiatives. To conclude, the sensitive aquatic resources data contained herein should enable preparation and fully support the DEIS.

5.0 Literature Cited

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Figure 1.
Project Vicinity Map