DRAFT
ENVIRONMENTAL ASSESSMENT

BENEFICIAL USE OF DREDGED MATERIAL
CORPUS CHRISTI SHIP CHANNEL IMPROVEMENT PROJECT
NUECES AND SAN PATRICIO COUNTIES, TEXAS

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LIST OF ACRONYMS & ABBREVIATIONS

BMPs	best management practices
BU	beneficial use
CBBEP	Coastal Bend Bays and Estuaries Program
CCSC	Corpus Christi Ship Channel
CCSCIP	Corpus Christi Ship Channel Improvement Project
CEQ	Council on Environmental Quality
CMC	Criteria Maximum Concentration
CWA	Clean Water Act
cy	cubic yards
DMPA	dredge material placement area
DO	dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ERL	effects range low
ERM	effects range medium
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
ft	Feet/foot
GLO	General Land Office
GOM	Gulf of Mexico
GOMFMC	Gulf of Mexico Fishery Management Council
HDD	horizontal directional drilling
HPAC	Habitat Areas of Particular Concern
HTL	High Tide Line
MAFMC	Mid-Atlantic Fishery Management Council
mcy	million cubic yards
MHT	mean high tide
MLLW	mean lower low water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAVD88	North American Vertical Datum of 1988
NDP	Nueces Delta Preserve
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge
PAs	placement areas
PCL	Protective Concentration Levels
POCCA	Port of Corpus Christi Authority
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
SAFMC	South Atlantic Fishery Management Council
SAV	submerged aquatic vegetation
TCEQ	Texas Commission on Environmental Quality

TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
U.S.	United States
USACE	U.S. Army Corps of Engineers, Galveston District
USFWS	U.S. Fish and Wildlife Services
WQS	Water Quality Standards
WRDA	Water Resources Development Act

1. INTRODUCTION

The U.S. Army Corps of Engineers, Galveston District (USACE) has prepared this Draft Environmental Assessment (EA), herein, in accordance with the National Environmental Policy Act (NEPA), Public Law 91-190, and regulations for implementing the procedural provisions of the NEPA, 40 Code of Federal Regulations 1500-1508. This EA evaluates potential impacts associated with the beneficial use placement of dredged material from the authorized dredging of the Inner Harbor segment of the Corpus Christi Ship Channel (CCSC) for the Corpus Christi Ship Channel Improvement Project (CCSCIP), Final Environmental Impact Statement (FEIS) notified in the Federal Register / Vol. 68, No. 75 / Friday, April 18, 2003. A draft Finding of No Significant Impact (FONSI) for this project is attached to this Draft EA.

1.1. Background

The CCSCIP was initially authorized by Congress under the Water Resources Development Act (WRDA) of 2007. The CCSCIP was reauthorized by Congress in WRDA 2014, and Congress reaffirmed its commitment to the CCSCIP under the Water Infrastructure Improvements for the Nation Act of 2016. The CCSCIP authorizes the widening of the CCSC, including the Inner Harbor Channel, from 400 feet (ft) to 530 ft, an additional 200 ft of barge shelves on either side of the channel, and deepening from 47 ft to 54 ft mean lower low water (MLLW). The FEIS for the CCSCIP was published in April 2003. It evaluates every CCSC segment proposed in the project and associated dredge material placement plans of the new work and 50 years of anticipated maintenance material volumes. The Inner Harbor segment is located from Stations 1080+00 to Viola Turning Basin (Station 1561+00), the dredging of the Inner Harbor as part of the CCSCIP has been fully authorized; construction of the CCSCIP began in 2019 and is currently ongoing.

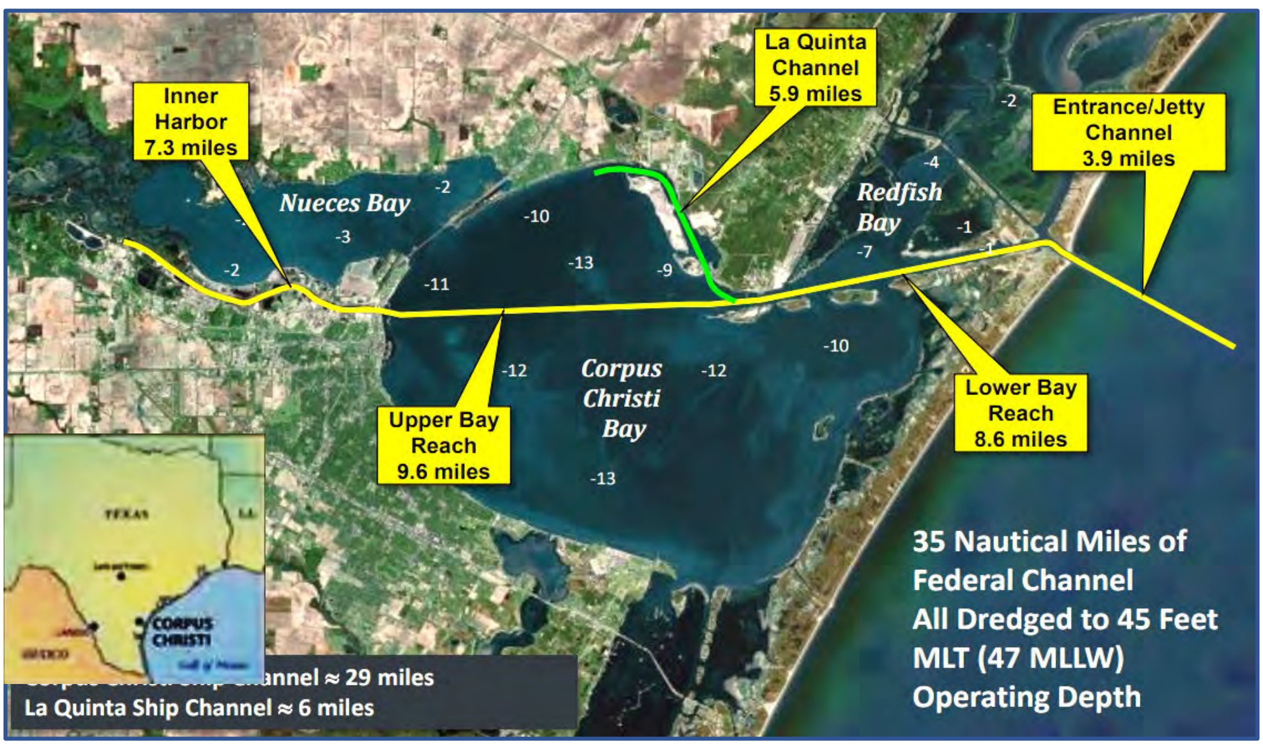

Figure 1-1: Corpus Christi Ship Channel Reaches
Source: USACE 2018

At the time of publication, the CCSCIP FEIS authorized the placement of dredged material into several upland confined placement areas located along the Inner Harbor Channel. This proposed CCSC Beneficial Use Project (Project) is intended to provide management strategies for disposal of dredged material for improvement and future maintenance dredging projects to alleviate critical capacity issues along the CCSC. This alternate disposal site provides for a beneficial way to utilize a large amount of new work material while preserving capacity at nearby confined facilities better suited for receiving maintenance dredged material. The area could also be used as an alternate site for future maintenance material to extend the life of the upland placement areas by allowing time for management between dredging cycles to include activities such as dewatering, damping, and levee raises. The Project provides beneficial use (BU) for dredged material to areas within the Nueces Bay Estuary. This EA serves to evaluate practicable alternative BU locations, assess effects anticipated from the proposed Project, and propose best management practices (BMPs) and measures to avoid and minimize any identified anticipated adverse effects.

1.2. Project Purpose and Need

The Project's defined purpose and need is to beneficially utilize the placement of approximately 5 million cubic yards (mcy) of dredged material generated from the Inner Harbor to the Viola Turning Basin of the CCSC as part of the CCSCIP. The Project's dredge material will be used beneficially to combat erosion and sea level rise, nourish degrading habitat, and bolster local economic commercial entities. Refer to Appendix A – Figure 1 for a vicinity map of the project study area.

2. ALTERNATIVES ANALYSIS

The USACE analyzed multiple alternatives for the beneficial placement of material dredged via pipeline from the Inner Harbor of the CCSC. Each of the assessed placement alternatives is discussed further below.

The USACE has previously employed and aims to provide environmentally and economically responsible ways to utilize dredged materials to benefit local communities and improve eroded coastlines through BU. In the Beneficial Use Planning Manual, published by the U.S. Environmental Protection Agency (EPA) and USACE in 2007, BU is defined as using dredged material "in a manner that will benefit society and the natural environment." Dredged material can be used beneficially for three categories: engineered uses such as construction, agricultural and product uses such as aquaculture or topsoil, and environmental enhancement purposes such as wildlife habitat or wetland restoration (EPA and USACE 2007). Potential BU categories considered for the dredged material from the Inner Harbor segment of the CCSCIP include habitat nourishment and development, erosion protection, beach nourishment, parks and recreation, and construction/industrial development, which are all described in the 2007 Beneficial Use Planning Manual.

2.1.1. Types of Beneficial Use

The USACE evaluated seven potential BUs for the proposed dredged material as defined in the joint EPA and USACE Beneficial Use Planning Manual (2007) and the 2015 Dredging and Dredge Material Engineering Manual (USACE). Not all forms of BUs material were assessed but a reasonable array of practical uses based on the local needs were considered. The various potential uses were evaluated based on their need within the general project area of the Inner Harbor, Nueces Bay, and surrounding wetland areas). Each of these uses were further described in the sections below and evaluated for their ability to meet the environmental and public needs of the Nueces Bay ecosystem and surrounding area. The needs of the Nueces Bay ecosystem and public needs of the natural areas are described in the Coastal Bend Bays and Estuaries Program (CBBEP) published Coastal Bend Bays Plan (CBBEP 2020). The types of BU are considered below as either "preferred" meaning the type would provide overall benefit to the Nueces Bay area or "not preferred" meaning the use is either not applicable to the project area or there is not an immediate need for the use type in this particular Project area.

Habitat Nourishment

The use of dredged material for habitat nourishment, restoration, or establishment of various habitat types is a preferred alternative use of dredged material over conventional placement options (USACE 2015). Within any habitat, several distinct biological communities may occur such as in the creation of a dredged material island that results in benefits to shallow aquatic habitats, wetlands, and potentially uplands depending on the elevation of the dredged material placement. The creation of dredged material islands creates and nourishes transitional habitats and diversity of habitats with longer lengths of aquatic/land shorelines where there would otherwise be limited transitions and isolated habitats. The environmental impact of most habitat BU projects may be expressed as a loss of open-water habitat or subtidal systems and changes in local hydrology based on this conversion. In general, the need for more habitat is considered more critical in areas that have lost or are losing considerable habitat of that type (USACE 2015). Wetland marsh habitat nourishment is often the most desirable form of BU of dredged material in the coastal environment as these habitats are often vulnerable and experience the most loss due to dynamic coastal changes and processes.

The use of dredged material for salt marsh nourishment in the Nueces Bay project study area is considered a preferred BU type as this area has experienced significant wetland loss and degradation over the last century due to restriction of freshwater and sediment inflows, saltwater intrusion, subsidence, extreme shifts in salinity regimes, and erosion.

Bird Island Creation/Restoration

Along the Coastal Bend, colonial waterbird rookeries offer protection to wading and ground-nesting birds from predators, human disturbance, and other environmental threats on protected islands. Approximately 25 species of colonial birds use the Texas coast as breeding and nesting habitat, and over half of those are in decline (TPWD 2019). Colonial waterbirds and their nests, eggs, and chicks are protected under the federal Migratory Bird Treaty Act and by Texas Parks and Wildlife (TPWD) Code. The birds are especially vulnerable during the nesting season when they concentrate for several months in colonies and remain in them until their chicks have fledged. Island creation using dredged material is considered a BU of material in coastal habitats where the islands would be utilized by birds and wildlife as well as provide recreational opportunities for local populations (USACE 2015). New bird island construction could be considered a BU of material where there is a need for nesting habitat in an area lacking suitable islands, and if the benefits for the birds will exceed any negative effects of construction of an island to benthic organisms and current flow. Restoration or improvement of existing islands is often preferred where there is a demonstrated use of the islands by colonial species and the islands have been degraded. Restoration of existing rookery islands often involves the use of dredged material to restore or increase the land size of the island and increase elevation of the nesting sites out of threat of waves and tides, as well as other reinforcements of the perimeter to contain sediment and prevent further erosion.

Nueces Bay contains several oyster shell islands and former oil and gas drill sites that currently act as rookery sites, as well as the delta islands that remain. The use of dredged material for bird islands would provide for a BU of material; however, CBBEP recently conducted restoration of bird islands within Nueces Bay in 2021. The causeway island restoration project was complete in time for the 2022 nesting season (Tunnell 2022). Therefore, bird island creation or restoration was not considered a preferred use for this project.

Beach Nourishment

A desirable, cost-effective alternative to combat shoreline erosion and degradation is beach nourishment. Beach nourishment is the use of sandy dredged material transported by truck, split-hull hopper dredge, or hydraulic pipeline to an eroding beach. Beach nourishment results in immediate changes in the topography or bathymetry of the replenishment areas, and subsequent destruction of nonmotile benthic communities. However, a well-planned beach nourishment operation can minimize these effects by taking advantage of the resiliency of the beach and nearshore environment and its associated biota and by avoiding sensitive resources (USACE 2015).

The ideal sediment to be used for beach nourishment is dependent on the grain size, which must closely match the native beach material. The USACE generally recommends a sand fraction of 80% to determine whether material should be analyzed further for beach renourishment. Sediment containing excess silt and clay fraction typically disqualifies the material from being considered suitable for nourishment activities in sandy areas. Preliminary borings of the subsurface material at the proposed new work dredging locations indicate the material is not suitable for beach nourishment. Additionally, the nearest beach is located over 25 miles away on the gulf coast and would require transport of material by barges. Therefore, the BU of material for beach nourishment was not considered a preferred use for this project.

Sacrificial Erosion Protection

Erosion protection provides an alternative BU for dredged material as the proper fill type can reinforce channel bottoms, riverbanks, streambeds, and shorelines. For long-term erosion control, dredged material may be transferred to and from open-water areas through hydraulic equipment whereby to establish underwater berms, stabilize riverbanks, and construct levees or dikes.

Similar to beach nourishment, dredged material placed on or in front of shoreline protection structures can improve longevity of the project area by adding fill to a sediment-starved system. Another BU for dredged material has been implemented as a widespread practice by several local and state agencies as well as private clients where dredged material is then pumped onsite and dewatered to construct dikes and levees (USACE 2015). While such methods can be financially advantageous, the efficacy of primary conditions should be considered when designing erosion protection from BU of dredged material; for example, placement area bathymetry, wave activity or energy, navigation proximity, and comparative material characteristics such as grain and containment size.

The use of dredged material as sacrificial erosion protection in the Nueces Bay project study area is considered a preferred BU type as the area has experienced significant sediment loss and degradation over the last century due to restriction of freshwater, sediment inflows, subsidence, extreme shifts in salinity regimes, and erosion. By reinforcing constructed breakwaters with dredged material to provide erosion protection, the integrity of the structure can be preserved and the forces of wave and tidal action on the breakwaters and newly placed material can be dampened.

Parks and Recreation

One of the more common BUs for dredged material is to establish multipurpose, nonprofit recreational land, especially in urban areas, to offer amenities such as fishing, nature trails, picnic structures, sports fields, and other green spaces for community members to enjoy. A secondary benefit, the planning and support of such land fosters an environment for native plant growth and wildlife habitat preservation where visitors can experience and observe natural conservation areas.

The creation of parks and recreational facilities, using dredged materials as the foundation, serves the public interest through development of potentially otherwise unusable sites. Careful consideration and planning must be taken when using dredged material for parks and recreational purposes as such development relies heavily on financial investments and sediment quality and contamination, which vary based on project complexity (USACE 2015).

In accordance with the CBBEP, the use of dredged material in the Nueces Delta Preserve (NDP) project study area is considered a preferred BU type, although indirectly. While this is an already existing nature preserve and recreational site, the area supports community outreach through educational programs and conservation efforts. This site has a continued need for further preservation and restoration of the land by which locally dredged material can satisfy. The use of BU material to nourish the degraded habitats and protect the land from further erosion would indirectly benefit the parks and recreation aspect of the NDP and Nueces Bay, which depend on the natural environments and wildlife for recreational activities. Other parks and recreational projects were not considered feasible due to the time constraints of the project and the complexity of development, as well as lack of prioritized recreation projects over other uses such as habitat nourishment. As such, the BU of dredge material for parks and recreation was not considered a preferred use for this project.

Industrial Development

A category of BU as defined by the EPA and USACE Beneficial Use Planning Manual (2007) is *Construction/Industrial Development*: the use of dredged material, that would otherwise be placed in a confined placement area otherwise go unused, to expand or raise the height of the land base, primarily near waterways to support commercial and industrial activities. The Dredging and Dredged Material Management Engineer Manual, Chapter 5 Beneficial Uses of Dredged Material, published by the USACE in 2015 describes that it is important "to identify how, when, and where dredged material from a navigation project can fulfill an economic need while not overlooking biological BUs and environmental considerations and limitations." There is a well-recognized economic need for developable land surrounding the CCSC, as congestion in the Inner Harbor Channel has increased and has created an overall lack of land available for further economic expansion of the industries that rely on the channel. Most undeveloped land surrounding the channel contains wetland habitat and floodplain that would be unavoidable by future development projects as available uplands becomes more and more limited. Whether regionally or locally, there have been a multitude of industrial harbor and port development projects from Oregon to Texas and other states where shipping terminals, barge-fleeting areas, and storage facilities were established by a dredged material foundation (USACE 2015). Land development continues to prove successful as a BU of dredged material management, and industrial facility construction further provides local economic advancement and growth. Socioeconomic benefits exist by means of future job growth on the horizon of expansion from industrial facilities along the southern portion of Nueces Bay, all from the proper placement of dredged material.

As a cost-effective method, the use of hydraulic equipment to collect and disburse fill material within the same general vicinity reduces transportation expenses and offsets the need to locate a dredged material placement area. Particularly in the Nueces Bay area, potential dredged material would be extracted from the vicinity and in turn be used on the southern shoreline to further expand industrial development. With the additional benefit of dredged material remaining in the vicinity, the biological and environmental characteristics already align, thus avoiding a potential concern of undesirable environmental impacts.

Based on the location and purpose of the dredged material, the BU for industrial development is considered a highly preferred method for further consideration. Refer to Section 4.4 of this report for additional analysis and discussion on the BU of dredged material specifically related to industrial development in the Nueces Bay area.

Combination of Beneficial Use Types

Based on the evaluation above of the different BU types, there are three types of preferred BUs of dredged material that would help satisfy priority needs of the project area and were considered for further analysis: habitat nourishment, erosion protection, and industrial/commercial land development. The CBBEP Coastal Bend Bay Plan uses of bird island creation, beach nourishment, and parks and recreation were not included in the analysis due to their lack of feasibility for the Project area, low priority of need, and requirement for complex coordination and funding procurement with non-federal entities. Therefore, these alternatives were not practical or retained for further analysis.

2.1.2. Site Alternatives

The following site alternatives analysis seeks to determine which specific BU placement sites best satisfy the selection criteria of the project, including the use of a combination of BU placement sites. The objective of the project that would beneficially use the material dredged from the Inner Harbor of the CCSC in such a way as to satisfy the selection criteria listed below. The BU placement sites included in the analysis were selected based on their proximity to the material source (Inner Harbor), agency awareness of the need for material in these locations based on the CBBEP Coastal Bend Bays Plan as well as timing and financial constraints. The Project and BU placement site alternatives considered have been formed to be consistent with the goals and recommendations within Coastal Bend Bays Plan (CBBEP 2020). A total of seven alternative BU placement sites were reviewed as part of this alternatives analysis in addition to the No-Action alternative.

The alternatives are screened based on their ability to meet the following selection criteria:

1. Satisfies the project's purpose and need.
2. Provides adequate capacity to accommodate 5 mcy of material using minimal sites and area.
3. Located within 5 miles of the Inner Harbor to minimize environmental impacts of transporting material to the site via pipeline.
4. Beneficial use placement would provide benefit to area and surrounding areas of habitat or other beneficial land uses.
5. Dredged material is suitable in composition for placement at a given location.
6. Proposed use compatible with existing surrounding land use(s) and aesthetics.
7. Minimizes harmful environmental impacts to the maximum extent practicable.
8. Minimizes impacts to properties of Federal interest.

Table 2-1 below summarizes the BU placement site alternatives and their ability to meet the selection criteria. Following the summary table is a discussion of each site alternative. Refer to Appendix A – Figure 2 for a detailed map of alternative sites considered. Figure 2-1 below shows the locations of alternative sites evaluated.

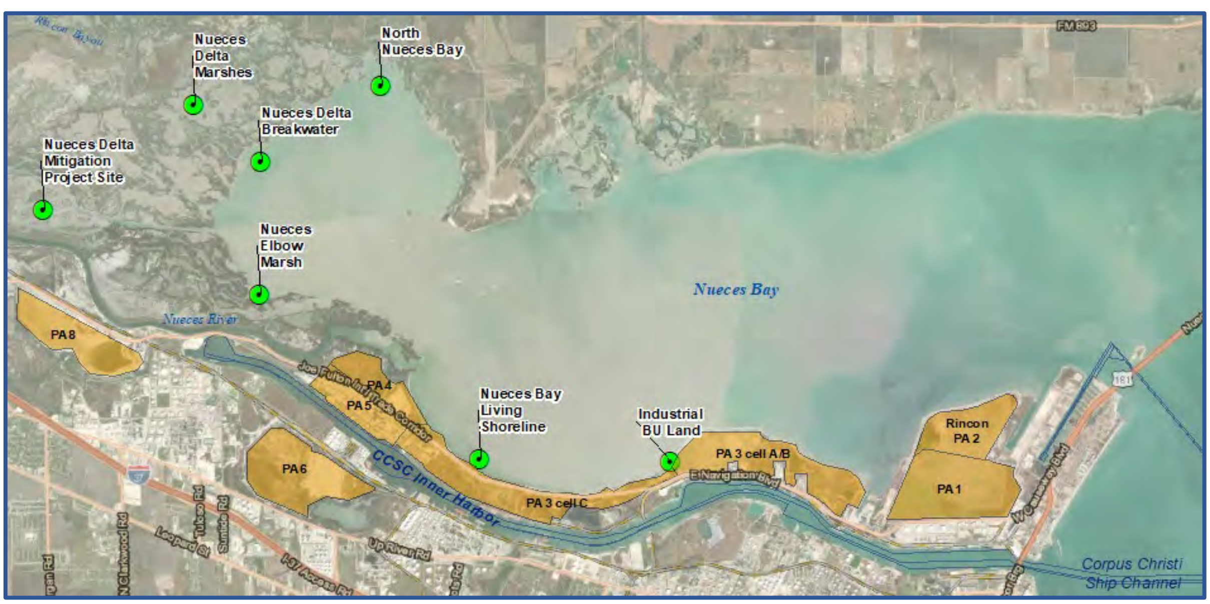

Table 2-1: Summary of Tier II Beneficial Use Alternatives Screening

Type of Placement Area: BU Area	No Action	North Nueces Bay	Nueces Delta Mitigation Site	Nueces Delta Marsh	Delta Breakwaters	Elbow Marsh	Living Shoreline	Industrial BU Site
1. Satisfies the project's purpose and need	YES	YES	YES	YES	YES	YES	YES	YES
2. Provides adequate capacity to accommodate 5 mcy of material.	X	X 320,000 cy	X 320,000 cy	X 500,000 cy	X 1 mcy	X 1 mcy	X 750,000 cy	X 2.5 mcy
3. Located within 5 miles of the Inner Harbor to minimize environmental impacts of transporting material to the site via pipeline. Additional equipment such as booster pumps required.	YES	X	YES	YES	YES	YES	YES	YES
4. Beneficial use placement would provide benefit to area and surrounding areas of habitat or other beneficial land uses.	X	YES	YES	YES	YES	YES	YES	YES
5. Dredged material is suitable in composition for placement at a given location.	YES	YES	YES	YES	YES	YES	YES	YES
6. Proposed use compatible with existing surrounding land use(s) and aesthetics.	YES	YES	X	YES	YES	YES	YES	YES
7. Minimizes harmful environmental impacts to the maximum extent practicable.	YES	X	X	YES	YES	YES	YES	YES
8. Minimizes impacts to properties of Federal interest.	X	YES	X	YES	YES	YES	YES	YES
Carried Forward for Environmental Assessment? (number of screening criteria met)	**X** (4)	**X** (5)	**X** (4)	**YES** (6)	**YES** (6)	**YES** (6)	**YES** (6)	**YES** (6)

X - does not meet criteria, YES – does meet criteria

No-Action Alternative

The No-Action Alternative would be to use the identified existing upland confined Inner Harbor Placement Areas (IH-PA), as identified in the CCSCIP FEIS, without the identification of options for beneficial placement of material. The CCSCIP FEIS states that the placement areas available for use for dredged material from the Inner Harbor include IH-PA 1, 2, 3A, 3B, 3C, 6 and 8. These facilities are all located along the Inner Harbor Channel and would provide upland confined material placement. At the time of the FEIS publication, there was concern over potential contamination of the sediments to be dredged from the Inner Harbor, so BU was not considered; however, contaminant testing was not requested or conducted for the FEIS to verify these concerns (USACE 2003). At the time of the FEIS publication, capacity of the placement areas (PAs) was anticipated to provide sufficient capacity for the new work and maintenance dredged material for 50 years. However, the predictive technology since 2003 has greatly improved, along with changes in design to account for hard material (deeper) and ship simulation (wider) resulting in higher estimated quantities of dredged material expected to be generated from the new work construction. During detail design by the USACE in 2022, it has been determined that significant levee raises to existing placement areas would be needed to accommodate the new work material. Representative sampling demonstrates a high amount of sand in the new work material which complicates levee raising stability and terminal height. In addition, logistically, beneficial long-pump placement of a large quantity of new work material preserves capacity at near-by placement areas for future routine maintenance dredging. The No-Action Alternative was considered during analysis; however, it does not fulfill the Project's purpose and need to find placement areas sufficient to contain the material that must be dredged to construct the proposed channel. Based on this analysis, the No-Action Alternative does not meet selection *criteria 1* (meets purpose and need), *criteria 4* (beneficial to surrounding area), or *criteria 8* (minimize impacts to federal interests) and therefore was not considered a practicable alternative. The No-Action Alternative was previously fully evaluated as the preferred alternative to dredge material placement in the CCSC Deepening and Widening FEIS and is therefore not considered for further evaluation within this EA. The No-Action Alternative is depicted in Appendix A – Figure 2.

North Nueces Bay

The North Nueces Bay site was considered as a potential BU area for habitat restoration and erosion protection. This location is approximately 3.5 miles north of the Viola Turning Basin and 5 miles north of the central Inner Harbor Channel and has historically experienced loss of land mass and wetland marsh loss due to subsidence and erosion. This site was evaluated to potentially provide BU placement opportunity for approximately 320,000 cubic yards (cy) of material that would raise approximately 100 acres of open-water area to a desired elevation for marsh restoration. This area was reviewed for the potential presence of submerged aquatic vegetation (seagrasses) and oyster reefs and was found to have a high likelihood of presence for both special aquatic habitats and therefore would not satisfy selection *criteria 7* (minimizes harmful environmental impacts), as the placement of material could potentially impact oyster reef or SAV in this area. Additionally, this location would require a longer length of pipeline to transport the dredged material since it is the furthest distance from the channel, thus not meeting selection *criteria 3* (minimize distance of transporting material to the site via pipeline).

Nueces Delta Mitigation Project Site

The Nueces Delta Mitigation Project marsh restoration site was selected as a potential BU area for habitat restoration and enhancement. This location is approximately 2 miles northwest of the Viola Turning Basin - 5 miles north of the central Inner Harbor Channel and is previous marsh restoration site that was started in 1991 and completed in 1997 by the USACE and Port of Corpus Christi Authority (POCCA) to mitigate salt marsh habitat loss from the CCSC 45 ft dredging project (Hill et al., 2011). This site was evaluated to potentially provide BU placement opportunity for approximately 320,000 cy of material that would further nourish the area to a desired elevation for marsh restoration. This area contains existing marsh restoration cells that would be difficult to avoid with the dredged material placement, and thus would not satisfy selection *criteria 6* (compatible with existing land use and aesthetics) and *criteria 7* (minimizes harmful environmental impacts), as the placement of material could potentially impact the existing cells that are part of the previously authorized Federal mitigation project.

Nueces Delta Marshes

The Nueces Delta is located on the northeast terminus of Nueces Bay, where the Nueces River outflows into the bay through Rincon Bayou and a complex array of freshwater bayous. The Nueces Delta has historically suffered from marsh habitat loss due to many factors including subsidence, erosion, reduction of freshwater inflow, increases in salinity, loss of hydrology, and expansion of open-water areas. This location is approximately 2 miles north of the Viola Turning Basin and 5 miles northwest of the central Inner Harbor Channel. The USACE evaluated the BU placement of material into large open-water areas within the marsh to achieve habitat restoration and enhancement of the marsh. This alternative would provide opportunity for BU placement of approximately 500,000 cy of material to raise the substrate elevation to the ideal elevation to support salt marsh growth and achieve desired habitat restoration within the existing complex. This alternative BU location meets all selection criteria except for selection *criteria 2* (capacity to accommodate 5 mcy of material) and was therefore considered for further evaluation as an alternative to be considered in combination with other BU alternative sites to provide for adequate placement volumes. The existing condition of the Delta Marsh is further discussed in Section 4.4.

Nueces Delta Breakwater

The CBBEP has proposed to construct two breakwater structures along the historic edge of the Delta Marsh to provide protection from further erosion and encourage sediment retention and accretion within the delta. This location is approximately 1.5 miles north of the Viola Turning Basin and 4 miles northwest of the central Inner Harbor Channel. The USACE evaluated the construction of another breakwater structure to extend the authorized CBBEP project as well as the BU of material for sediment accretion and sacrificial erosion protection of the breakwater structures. This alternative would provide an opportunity for BU placement of approximately 1 million cy of material around the breakwater structures. This alternative BU location meets all selection criteria except for selection *criteria 2* (capacity to accommodate 5 mcy of material) and was therefore considered for further evaluation as an alternative to be considered in combination with other BU alternative sites to provide adequate placement volumes. The existing condition of the Nueces Delta Breakwater area is further discussed in Section 4.4.

Nueces Elbow Marsh

The “Elbow Marsh” site is situated on the northeast terminus of Nueces Bay, where the tidal portion of the Nueces River outflows into the bay. This location is approximately 0.5 miles north of the Viola Turning Basin and 3.5 miles northwest of the central Inner Harbor Channel. Similar to the Nueces Delta Marsh discussed above, the USACE evaluated the BU placement of material into large open-water areas within the marsh to achieve habitat restoration and enhancement of the marsh. The USACE also evaluated the placement of dredged material at the tidal edge of the marsh complex to provide erosion protection and marsh habitat creation to combat the significant subsidence and resulting marsh loss experienced in this area. This alternative would provide opportunity for BU placement of approximately 1 million cy of material to raise the substrate elevation to the ideal elevation to support salt marsh growth and achieve desired habitat restoration within the existing complex, restoring the marsh to historical extents. This alternative BU location meets all selection criteria except for selection *criteria 2* (capacity to accommodate 5 mcy of material) and was therefore considered for further evaluation as an alternative to be considered in combination with other BU alternative sites to provide for adequate placement volumes. The existing condition of the Elbow and Delta Marsh is further discussed in Section 4.4.

Nueces Bay Living Shoreline

The POCCA has previously constructed revetment and armored erosion protection along the south shoreline of Nueces Bay to protect the shoreline from continued erosion and loss of land base. This location is approximately 2 miles east of the Viola Turning Basin and directly north of the central Inner Harbor Channel. The USACE evaluated the BU placement of material for sediment accretion and sacrificial material to provide erosion protection of the shoreline and resulting overtopping of water onto the adjacent roadway. The resulting placement of material would eventually act as a living shoreline when naturally vegetated as low tidal marsh habitat or tidal flat area. This alternative would provide opportunity for BU placement of approximately 750,000 cy of along approximately 13,000 ft of shoreline, extending the “Living Shoreline” to approximately 400 ft from the current revetements. This alternative BU location meets all selection criteria except for selection *criteria 2* (capacity to accommodate 5 mcy of material) and was therefore considered for further evaluation as an alternative to be considered in combination with other BU sites to provide adequate placement volumes.

Industrial Beneficial Use

As discussed in Section 2.1.1 above, the BU of dredged material for development of industrial or commercial projects was considered a preferred use in the vicinity of the CCSC as this area currently experiences congestion and lacks developable land to further promote economic growth. The USACE evaluated the BU of dredged material to support industrial land development for this Project. The Industrial BU would consist of the placement of dredge material within open-water areas of Nueces Bay. The Industrial BU would consist of containment berms established using dredged material and raise the land base of up to a 200-acre area to elevations several feet above the water level. Additionally, the Industrial BU would provide shoreline stabilization along the Joe Fulton International Trade Corridor. The Industrial BU alternative could provide the opportunity to beneficially use up to 2.5 million cy of material that would otherwise be placed in Federal confined PAs and not beneficially utilized. The Industrial BU Site satisfies all the selection criteria and was therefore considered a practicable alternative if used in conjunction with, and after completion of, all other practicable BU alternatives for the Project.

Combination of BU Sites

Due to no individual identified BU placement sites’ ability to provide for the projected total dredge material placement capacity of 5 mcy, the utilization of a combination of BU placement sites was considered a practicable alternative for the Project. The combination of sites would include those that best fulfilled the selection criteria, the purpose and need of the project, and together provided the opportunity to beneficially utilize an estimated 5 mcy of dredge material. An alternative BU site that did not meet the overall Project purpose and need was not considered for the combination of alternatives. Based on the screening analysis, the BU placement sites alternatives carried forward for further environmental assessment is a combination of the BU placement sites including Nueces Delta Marsh, Delta Marsh Breakwaters, Elbow Marsh, Living Shoreline, and the Industrial BU Site. Together, these BU placement sites provide the capacity of approximately 5 mcy of beneficially used dredged material. Therefore, the utilization of a combination of BU sites meets all screening criteria and best satisfies the purpose and need of the project while minimizing environmental impacts. The selected sites were also influenced by correspondence and input from resource agencies and local organizations including the CBBEP Coastal Bend Bays Plan (CBBEP 2020) and as identified in the Texas Coastal Resiliency Master Plan (GLO 2019). Stakeholder involvement through meeting and coordination letters (Appendix F) provided valuable guidance for alternative development, screening, and ultimately proposed action progress.

3. PROPOSED PROJECT

The proposed Project consists of the placement of dredge material in five BU sites: Nueces Delta Marsh, Nueces Delta Breakwaters, Elbow Marsh, Living Shoreline, and Industrial BU Site. New work material dredged from the CCSCIP Inner Harbor segment will be transferred hydraulically through pipelines to the identified BU placement areas. The dredging is anticipated to begin at the westerly dredge limit (Station 158+555) at Viola turning basin and move towards the easterly dredge limit in the Inner Harbor (Station 134+000). The dredged material has been allocated to the BU placement sites based on proximity (limiting the length of dredge pipeline required) and material suitability, as discussed further within the EA. Four primary sections have been allocated from the dredged material volume and dedicated to the selected material BU placement areas as discussed in the sections below. Section 3.5 below further discusses the BMPs proposed for the project. Refer to Appendix A – Figure 3 for a detailed map of the proposed project. Figure 3-1 below depicts the general layout of the project.

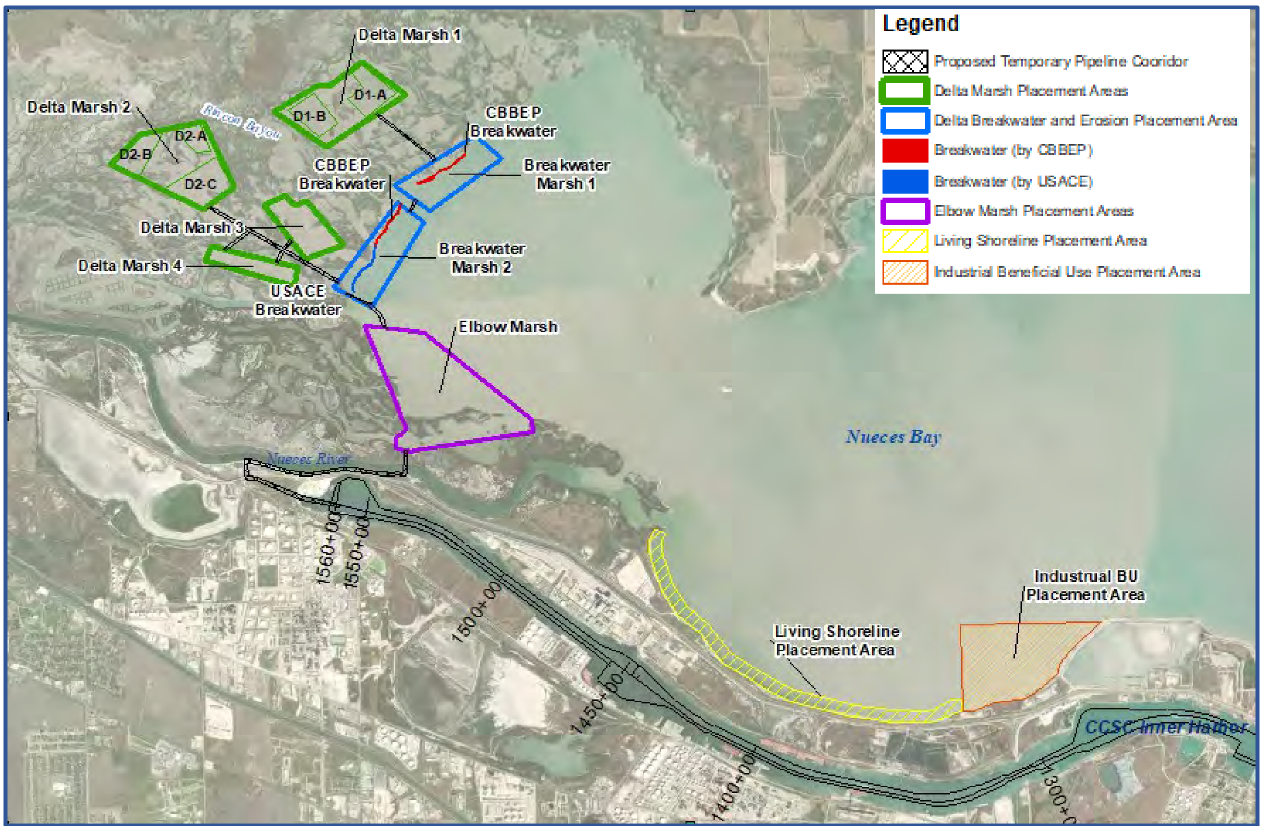

Figure 3-1: Proposed Project

3.1. Delta Marsh Placement and Breakwaters

Dredged material would be piped overland and within temporary pipeline corridors to designated mostly open-water areas within the Nueces Delta Marsh (see Appendix A – Figure 4).

The pipeline would extend from the end of the Inner Harbor Channel to a crossing point across the Nueces River, utilizing existing culverts, roadway rights-of-way and unvegetated riverbank. The crossing of Nueces River would include the temporary laying of the pipeline perpendicularly across Nueces River, approximately 330 ft long, within a dredged trench to allow the pipeline to remain below the grade of the natural river bottom to avoid impact to navigation of the river and avoid impoundment of water or sediment within the river. The width of the temporary crossing pipeline corridor would be approximately 100 ft. Once the pipeline is crossed through the Nueces River, the pipeline would be temporarily placed along a designated alignment to the Delta Marsh Placement Areas, while avoiding existing marsh areas to the maximum extent practicable. The temporary pipeline corridor would measure approximately 100 ft wide and provide access to the material pipelines and establish designated corridors for support vehicles and equipment. Elevation controls, such as grade stakes, will be placed within open-water areas to ensure target marsh elevations are achieved. Support vehicles, such as marsh buggies, will be utilized during construction to monitor elevations and dredged material settling. As material is placed, the pipeline would be moved within the designated temporary corridors and open water areas as much as practicable to minimize temporary disturbance of vegetated areas while also moving in conjunction to achieve target marsh elevations.

The first segment of material from the channel would originate from approximately Station 158+555 (e.g., Viola Turning Basin) to approximately Station 148+000, or until the target elevations of the Delta Marsh Placement Areas is reached. The material would be strategically placed within the designated open-water areas within the Delta Marsh Placement Areas to raise the substrate elevation sufficiently to allow and encourage the reestablishment and enhancement of the marsh vegetation. The target elevation of material placement within the Delta Marsh Placement Areas is an average of 2 feet NAVD88 (2.76 MSL), with maximum elevation of 3 feet NAVD88 (3.76 MSL). It is anticipated that the material would settle after placement occurs due to effluent of water from the slurry and natural compaction of the sediments once removed from the saturated environment. The material placement would result in inherent mounding, diffusion, and elevation differences across the placement areas due to local placement points, material composition and settlement variations, which would result in the natural habitat transitions sought after. The placement of material will be targeted to maintain approximately 30% open-water areas within the marsh complex to allow for water exchange and maintain aquatic organism habitat in the area. The placement would occur within the large open-water areas and utilize the natural marsh edge as containment for the material. Material placement will be targeted to avoid existing consolidated marsh vegetation to the best extent possible. Section 3.5 below further discusses the BMPs proposed for the project. Further, construction controls such as hay bells may be utilized to prevent impacts to nearby channels adjacent to the Delta Marsh Placement Areas.

Dredged material will also be beneficially used as sacrificial erosion protection on either side of the 4,000 ft of future CBBEP-sponsored breakwater structures near the Delta Marsh Placement areas. It is anticipated the CBBEP breakwater would be constructed and stabilized prior to material placement. The USACE would also construct an additional 2,000 ft of Delta Marsh Breakwater (as designed) to extend the CBBEP breakwater. The Delta Marsh Breakwaters will be constructed along the bay edge of the marsh, which has suffered from extensive erosion and loss of vegetation. The Delta Marsh Breakwaters will be located at the historic extent of the marsh to encourage sediment accretion within the marsh to restore the historic area to pre-erosive conditions. The BU material would be placed behind and in front of the breakwaters to support the structure, encourage additional sediment accretion, protect against further erosion, and act as sacrificial protective buffer for the breakwater against tide and wave action from Nueces Bay. Material will be placed to extend approximately 800 feet in front of the breakwater structures, which are designed with a crest elevation of 3.5 feet NAVD88. The Delta Marsh Placement Areas and Breakwaters would require the placement of approximately 2 mcy of dredged material to achieve the desired habitat nourishment and elevation restoration for the area.

3.2. Elbow Marsh

The second allocation of dredged material for BU would consist of the placement of material placed within and in front of the Elbow Marsh Area, an area of the Nueces River Delta located directly north of the Nueces River Tidal mouth and south of the Delta access Channel (also called the Mitigation Channel) (see Appendix A – Figure 5). Material from the Inner Harbor approximately between Stations 148+000 and 146+600, or until the target elevations of the area are reached, would be beneficially used to combat ongoing erosion and subsidence within the Elbow Marsh Area. Material will be placed along the bay edge, extending to the historic edge of the marsh, and providing a sacrificial erosion buffer to nourish and protect against further erosion. Material placement would occur using the same methods and BMPs as those utilized in the Delta Marsh Placement Areas. The placement would avoid existing marsh vegetation to the maximum extent possible. The Elbow Marsh Area would require approximately 1 mcy of BU dredged material placement to achieve the desired habitat nourishment and elevation restoration along approximately 6,500 ft of marsh edge.

The pipeline would provide material directly to the Elbow Marsh Area utilizing the temporary access corridor previously discussed. Once material is placed at the Elbow Marsh Area, the pipeline would be removed along the designated alignment, and the Nueces River Tidal crossing trench would be left to naturally restore with sediment from within the Nueces River. There would be no permanent impacts from the pipeline crossing of the Nueces River.

3.3. Living Shoreline

The Living Shoreline Area would extend approximately 400 ft out from the existing Nueces Bay mean high tide (MHT) mark and would consist of the strategic placement of dredged material to provide elevation and substrate for potential future oyster reef, seagrass, or intertidal marsh habitat establishment (see Appendix A – Figure 6). Additionally, the BU placement of material within the Living Shoreline Area would protect and buffer the existing shoreline from further erosion due to gradual sea level rise, tidal exchanges, and wave forces. The material would be placed using the pipeline extending from the center of the Inner Harbor Channel, directly north through existing culverts to cross under roadway and railroad infrastructure, through existing placement areas, to the south shoreline of Nueces Bay where it would be maneuvered within open water or along unvegetated shoreline to the placement locations. The target elevation within the Living Shoreline Area is +3 ft NAVD88 at the existing mean high tide (MHT) line with a gradual slope to meet with existing bathymetry approximately 400 ft from the existing MHT line. There would be no temporary access corridors established for the Living Shoreline Area placement as the pipeline would remain within open water of Inner Harbor, POCCA rights-of-way, or predesignated culvert crossings. Approximately 750,000 cy of material would be allocated from the Inner Harbor dredge volume to be placed as the living shoreline substrate. This material would likely originate between approximate Stations 146+000 and 145+000 and 133+000 and 131+000 or until the target area and elevations are reached.

3.4. Industrial Beneficial Use

Representative sampling identified higher concentrations of some metals (as discussed in Section 4.5.3) between approximate Stations 133+000 and 145+000 (i.e., Tule Lake Turning Basin). This material would be allocated for BU with the creation of an industrial land located along the CCSC. This Industrial BU Site would be approximately 200 acres and located in currently open-water areas adjacent to the south shore of Nueces Bay the existing confined South Shore Dredge Material Placement Area (DMPA) Cell B (see Appendix A – Figure 6). The material would be placed using the pipeline previously discussed. Material with higher clay content from the new work dredging would be utilized to create a containment berm on the two peripheral sides of the Industrial BU Site. Dredge material with a higher sand content would be placed within the berm to ensure material is contained within the designated area and the placement does not impact water quality. The establishment of the Industrial BU Site is anticipated to require approximately 2.5 mcy of material to reach an elevation of minimum 4 ft NAVD88. Proposed BMPs of open-water placement are further discussed in Section 3.5 below. See Appendix A – Figure 6 for a detailed view of the proposed Industrial BU area.

3.5. Best Management Practices

Best management practices (BMPs) would be adhered to during BU placement activities to minimize adverse effects. The following discussion of BMPs is presented prior to environmental assessment of effects for the purpose of setting the minimum protective conditions of the action. Environmental effects from the proposed project would be limited with implementation of the following BMPs.

When considering impacts, it was assumed that at a minimum BMPs identified throughout this chapter would apply during project construction. Assumed BMPs are based primarily on widely accepted industry, state, and federal standards for construction activities. Examples include but are not limited to:

- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting idling of vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest area necessary to safely operate during construction and restoring staging area and access routes to result in no permanent loss.
- Minimizing project equipment and vehicles transiting between the staging area and restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicle access to the immediate needs of the project, and coordinating and sequencing work to minimize the frequency and density of vehicular traffic.
- Minimizing use of construction lighting at night and when in use, directing lighting toward the construction activity area and shielding from view outside of the project area to the maximum extent practicable.

Stakeholder involvement through agency coordination during project development aided in the development of BMPs that would be implemented in the specific BU placement areas to protect valuable resources as discussed below.

Wetlands and Special Aquatic Sites

- Where appropriate, hay bales or other sediment barriers would be placed at points along open-waterways and freshwater bayous and streams to protect the hydrologic connections of the marsh areas to freshwater and tidal exchange sources as well as SAV.
- Approximately 30% open-water area will be left within the delta and elbow marsh BU placement areas.
- Material would be allowed to naturally mound to target elevations with natural gradual sloping to existing grade and effluent channels naturally form to create the desired wetland mosaic complex within the delta marsh area.
- Placement of material will avoid covering existing consolidated vegetated marsh areas, to the best extent practicable.

- Temporary impacts from the material pipeline or vehicles used within vegetated wetland areas would be restored as closely as practicable to pre-project elevations utilizing dredged material following the removal of the temporary material pipeline from the placement area.

Water and Sediment Quality

- Placement will adhere to TCEQ Water Quality Certification.
- Hay bales or other type ditch plugs or berms will be used near existing access channels and tidal sloughs that are directly adjacent to or in close proximity to target placement areas, particularly for the channels connecting to Rincon Bayou and South Lake to reduce turbidity impacts and sediment migration from the placement areas.

- Containment during open water placement at the Industrial BU site will be created with material berms or turbidity curtains, determined by the contractor, to minimize sediment suspension in Nueces Bay.

Fish and Wildlife Resources (and Protected Species)

- Project equipment and vehicles transiting between the dredging area and the BU sites will be minimized to the extent practicable, including but not limited to using designated routes and confining vehicle access to the immediate needs of the project.
- Use of construction lighting at night shall be minimized, directed toward the construction activity area, and shielded from view outside of the project area to the maximum extent practicable.
- The following conservation measures would be implemented to minimize the potential for adverse effects to Eastern black rail:
    - avoid marsh placement of material from March 1 through September 30 (breeding, nesting, chick rearing, and molting season).
    - If this timing restriction cannot be achieved, then the following will take place: No material for marsh restoration will be placed in high marsh dominated by dense overhead cover that meets the target marsh elevation for black rail habitat.
    - minimize traffic in temporary access routes, pipeline routes, or staging areas that occur within identified black rail habitat
    - areas of high marsh habitat will be left intact to provide refugia for the black rail to ensure escape access routes.
- The following conservation measures would be implemented to minimize the potential for adverse effects to whooping crane:
    - Seasonal timing restriction between October 15 and April 15 in which construction should be avoided if possible.
- The following conservation measures would be implemented to minimize the potential for adverse effects to manatees:
    - If a manatee is observed within 100 yards of active work zone, all precautions will be implemented to ensure protection of the manatee.
- To minimize adverse effects to Texas Diamondback Terrapin, material placement will be avoided to the best extent practicable in the Elbow Marsh during terrapin nesting season between May 1 and July 31. If placement is not able to be avoided during nesting season, all efforts will be made to avoid placement of material within emergent shell hash areas along the shoreline to the best extent practicable.

- Material will be placed from the back of the marsh area first, working towards the bay, to allow for fish and wildlife to seek refuge or vacate the area prior to material placement within the open-water area. Coordination with Texas Parks and Wildlife Department (TPWD) Kills and Spills team will be conducted to avoid, minimize, or report fish kills that may occur during material placement.

Recreation Aesthetics and Land Use

- Access to Nueces River Tidal, Rincon Bayou, Unnamed Bayou, and other major tributaries and bayous within the delta marsh commonly used by recreational fishing vessels will be maintained throughout the project and following the placement of material.

The BMPs listed above seek to avoid and minimize potential adverse effects as a result of the Project. The following EA assumes the BMPs are utilized to the fullest extent practicable when determining possible environmental effects of the Project.

4. ENVIRONMENTAL ASSESSMENT

The following section presents the environmental assessment of the preferred project alternative, which is the BU of dredged material placement in five sites: the Delta Marsh, Delta Marsh Breakwaters, Elbow Marsh, Living Shoreline, and Industrial BU area. This section presents a description of the environmental resources and baseline conditions for environmental resources and other disciplines, that could be affected by implementing the proposed alternative in compliance with the NEPA, the Council on Environmental Quality (CEQ), and 32 CFR 775 guidelines. The level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

This section describes the environment of the study area that forms the basis for evaluation of the potential environmental impacts of the Project. The scope of the affected environment considered for this EA includes all areas within and surrounding the proposed BU sites. This “Proposed Study Area” is generally defined as Nueces Bay, the southern shoreline of Nueces Bay, and the Nueces Delta Marsh.

Resource areas addressed include historic and cultural resources, wetlands and special aquatic sites, water and sediment quality, wildlife and fish resources, protected species, freshwater inflows, sediment resources, recreation and land use, socioeconomics, and environmental justice (EJ). The affected environment discussions presented below describe the existing conditions of the environment and would include existing effects to the environment by historic and current projects in the vicinity. Cumulative impacts will be evaluated in a subsequent section at the end of this document. The Project would not cause effect to prime or unique farmlands, as defined by the Farmland Protection Policy Act, or floodplains, a resource requiring consideration per Executive Order 1988 (Floodplain Management).

4.1. General Environmental Setting

The greater Coastal Bend of Texas includes natural waterways and rivers, major bays, restricted bays, lagoons, estuaries, narrow barrier islands, and dredged intracoastal canals and channels. The Nueces Bay Estuary system includes Nueces Bay, Corpus Christi Bay, and Oso Bay. Corpus Christi Bay is the largest bay in Texas. The estuary is connected to the Gulf of Mexico (GOM) through a single direct passage, Aransas Pass, and indirectly by the GIWW and Packery Channel (Ward 1997).

Nueces Bay is the main receiving waterbody of the Nueces River, which contributes approximately 587,000-acre ft of freshwater to the estuary and bay system annually (TWDB 2022). Nueces Bay feeds into Corpus Christi Bay through a restricted passage approximately 3 miles wide between Rincon Point in Nueces County and Indian Point in San Patricio County (TWDB 2022). Nueces Bay is bordered to the south by Nueces County and to the west and north by San Patricio County, while Corpus Christi Bay adjoins waters at the east. According to TPWD, Nueces Bay spans 19,518 acres and is the second largest of the bay systems as it abuts Corpus Christi Bay, which covers 95,997 acres and eventually flows into the GOM (TPWD 2022).

Nueces Bay is tidally influenced, and the Nueces River is tidally influenced for approximately 12 miles upstream of the Nueces Bay inlet. Nueces Bay is shallow with mostly flat unconsolidated sand and muddy bottom and averages 2.5 ft of water depth (USGS 2001). Some small shell and tidal flat islands exist in the interior of the bay, which serves as bird nesting sites and oyster reefs. Some of these shell islands have been reinforced and restored by CBBEP and other National Fish and Wildlife Foundation Gulf Environmental Benefit Fund projects within the last two decades.

The environment surrounding Nueces Bay is mostly undeveloped coastal wetlands and brackish marsh, within the Nueces Delta bordering the west and southwest to the Nueces River. Revetment enforced and undeveloped bay shoreline exists along the south edge of the bay where the industrial peninsula extends into the bay as a result of construction for the CCSC Inner Harbor Channel between 1935 and 1960, and associated POCCA development along the Joe Fulton International Trade Corridor. The southern edge of the bay is owned by POCCA and contains various industrial developments and infrastructure. The northern side of Nueces Bay is primarily undeveloped and agricultural, with some historic oil and gas well infrastructure and pad sites. Some individual residential parcels have bulkheads along the bay shore and private piers. The small city of Portland lies on the northeastern corner of the bay and Texas Highway 35 extends to the Nueces Bay Causeway, dividing Nueces Bay and Corpus Christi Bay at Indian Point.

The Nueces Delta is an area of vegetated wetland marshes, mud flats, and open water located where the Nueces River historically flowed into Nueces Bay (Ward 1997). The delta covers approximately 28-square miles and is almost entirely within the NDP.

4.2. Existing Threats to Environment

Current existing threats to the environment of the Project study area include freshwater and sediment losses that contribute to the degradation of wetlands within the Nueces Delta, subsidence, continuous sea level rise, severe tropical storms and hurricanes, and industrial development.

Further discussed in the sections below, the Nueces River historically contributed freshwater and sediment inflows into Nueces Bay, thereby creating and nourishing the Nueces Delta marsh and wetland area. Impoundments and diversions of the river to support human development and freshwater supply needs have drastically altered the freshwater and sediment inflow regimes to the Nueces Delta and Nueces Bay. These activities, as well as manmade coastal infrastructure, have altered sediment budget and resulted in a sediment sink upstream of the Nueces Delta, causing the disintegration of marsh systems, deltas, inlets, bird island habitat, oyster reefs, and other eco-geomorphologic systems (Moya et al., 2012). The westernmost shoreline of Nueces Bay at the Nueces Delta is rapidly eroding, with a documented erosion rate of 8.2 ft per year (GLO 2019).

Sea level continues to rise along the Texas coast, and the rate of change has increased in recent years due to global-warming driven eustatic sea level change caused by increased volume of water in the oceans, caused by the addition of water from melting glaciers and ice sheets, and the expansion of ocean water as it warms with increasing temperatures, and relative sea level rise caused by subsidence, or the sinking of land due to soil compaction and/or withdrawal of subsurface liquids (EPA 2016). Sea level rise along the mid-Texas coast has increased more than 0.2 inch per year from 1937 to 2020. The relative sea level trend for the project study area was measured as 0.21 inch per year with 95% confidence interval of ±0.04 inch per year based on mean sea level data from 1983 to 2020 (Gauge #8775870). This is equivalent to a change of 1.78 ft over the course of 100 years (NOAA 2021).

The coastal bend of Texas, lying on the western edge of the GOM, is subject to occasional tropical storms, cyclones, and hurricanes. The probability of a hurricane making landfall on any 50-mile portion of the Texas coast is approximately every six years (Roth 2010). Texas has been affected by several hurricanes and severe storms during the last century with the top five costliest for Texas having all occurred since 2000 (NOAA 2021). Storm surge is a dangerous effect of tropical storms in the GOM that threatens the coastal environment with each storm or hurricane. Storm surge is the abnormal rise of water level over and above the predicted astronomical tides resulting from winds of tropical storms and hurricanes. Storm surge can be seen to affect even inland waters such as tidal rivers and the Nueces Delta system as it moves through bays. The coastal environment can be dramatically affected by surges from extreme hurricane events which can cause significant structural changes to barrier islands, destruction of low-lying lands, destruction of critical infrastructure, inundation of coastal shorelines with salt water, and severe damages to essential wildlife habitat (Needham and Keim, 2012).

4.3. Historic and Cultural Resources

4.3.1. Existing Conditions

Historically, the area of Nueces Bay and the City of Corpus Christi emerged as population centers and ports during and following the Mexican American War in the 1840s. Federal involvement with navigation improvements in Corpus Christi Bay began with passage of the Rivers and Harbors Act of 1878. The first direct channel between Aransas Pass and Corpus Christi, the Turtle Cove Channel, was dredged to a depth of 8.5 ft by 1909. In 1922 the Turtle Cove Channel was renamed the CCSC. The channel has been deepened and widened multiple times since then to accommodate larger ships. What is today called the Inner Harbor Channel began in 1935 and was further extended and constructed in the 1950s by the USACE, creating the industrial peninsula that now forms the south shore of Nueces Bay.

The historical geology of the Nueces River Valley as of 125,000 years ago shows that the river and wide river valley extended for many more miles long and wide than currently seen. Terraced deposits over thousands of years from the river formed the historic geological formations that currently sit in the Nueces Delta region. The Beaumont and Deweyville formations underly the Nueces Delta, overlaid with alluvial sediments carried by the river. The Nueces River historically would have shifted through and across the delta over time, bringing sediments from upstream and depositing them into the delta to build more marsh substrate and support the shoreline. The Nueces River has been forced to remain on its current course to the south with modern development and the industrialization of the area, thus cutting off this supply of fresh alluvial sediments and freshwater supply to the delta (Bissel 2020).

The Nueces River Delta was used historically by native Americans and early Mexican and Texan settlers in the area. The Project study area focuses on the lower half of the delta area which has historically been undevelopable and uninhabitable due to the thick soft, muddy alluvial sediments. The area could possibly have been used as hunting and foraging area but has likely remained inaccessible to human influences for its whole history due to the inhospitable conditions.

4.3.2. Future Conditions with the Proposed Action

A review of the cultural background determined that no submerged archaeological investigations have been conducted within 3 miles of the Project. No wrecks have been reported within 3 miles of the Project. The nearest reported prehistoric site is 0.7 miles northwest of the proposed Delta Marsh BU areas. Any historical roads, railroads, and historical ferry crossings would have been located northwest of the Project’s locations, on the upper delta land that is more firm and consolidated uplands. The potential for presence of historic and cultural resources at any of the proposed BU sites is considered low. The Texas Historical Commission (THC) has issued concurrence for the Assessment of Archaeological Potential conducted for the Project. Refer to Appendix B for the assessment conducted and the THC concurrence letter. The Project would therefore not be anticipated to affect cultural or archeological resources.

4.4. Wetlands and Special Aquatic Sites

4.4.1. Existing Conditions

Wetlands and special aquatic sites located in the study area include estuarine wetlands and unconsolidated bottom intertidal and subtidal areas. There are some areas of known submerged aquatic vegetation within Nueces Bay and the Nueces Bay Delta. Oyster reefs are known to occur sparsely within Nueces Bay. The below sections discuss each of these habitats in detail. A habitat assessment was completed and is provided as Appendix C.

Wetlands

The Nueces Delta region of the study area contains wetland areas classified by the USFWS National Wetland Inventory as Estuarine intertidal unconsolidated shore and irregularly exposed (E2USM) and estuarine intertidal emergent, with persistent species and regularly flooded areas (E2EM[1N]). These emergent areas are comprised of species such as Cordgrass (*Spartina* spp.), saltgrass/shoregrass (*Distichlis* spp.), and sedges (*Cyperaceae* spp.). Nueces Bay, Rincon Bayou, Nueces River Tidal, and other unnamed bayous within the Nueces Delta are classified as estuarine subtidal with unconsolidated bottom (E1UBL). Refer to Appendix C – Habitat Assessment for maps depicting the habitats of the Nueces Delta and Nueces Bay Project study area, including a depiction of identified wetland marsh habitat and tidal mud flat habitat.

Historically, the wetlands of the Nueces Delta were observed to be much more densely vegetated, and extended further into the bay than currently observed, see Figure 4-1 below. The coastal wetlands, specifically the wetlands of the Nueces Delta have been affected by multiple factors which have contributed to the rapid loss of wetland marsh area and receding shoreline including gradual sea level rise and accelerated loss due to server storm surge events, subsidence, and loss of sediment input due to impoundment of the Nueces River upstream and directed flow of the Nueces River away from the delta system. These factors combined have contributed to significant wetland marsh area within the delta and the shoreline of the delta being eroded approximately 800 ft from historical limits (see Figure 4-1). Currently, Rincon Bayou serves as the main freshwater inflow to the delta area, with other secondary unnamed bayous and tributaries to the north and south of Rincon Bayou. The marsh is a complex of tidal open waterways and channels, open water and unvegetated areas, and vegetated intertidal wetland marsh islands and peninsulas.

Figure 4-1: Comparison of Nueces Delta based on aerial imagery 1956-2022

Along the south shore of Nueces Bay, wetlands exist above the MHT line and are classified as estuarine intertidal unconsolidated shore or emergent that is irregularly flooded (E2USP). Vegetation along the shoreline could consist of species such as coastal searocket (*Cakile lanceolata*), bushy seaside-tansy (*Borrichia frutescens*), saltmarsh false foxglove (*Agalinis maritima*), salt grass (*Distichlis spicata*), dwarf saltwort (*Salicornia bigelovii*), salt-meadow cord grass (*Spartina patens*), gulf cordgrass (*Spartina spartinae*), shoreline seapurslane (*Sesuvium portulacastrum*), annual seepweed (*Suaeda linearis*), and emergent black mangrove (*Avicennia germinans*) (Lloyd Engineering, Inc. 2018). These wetland areas would be subject to tidal flooding events, erosion, and seasonal changes and likely vary in size and distribution across years as evident in progression of aerial imagery through the last two decades (Google Earth 2022). Continuous erosion and shoreline loss in this area adversely affects wetland habitat and potential for persistent wetland vegetation establishment. The western shore of Nueces Bay where the Nueces Delta wetland complex begins is eroding at a rate of 8.2 ft per year (GLO 2019).

Submerged Aquatic Vegetation

Submerged aquatic vegetation (SAV) includes salt tolerant aquatic grasses (seagrasses) and attached macro-algae. Macro-algae, or seaweed, could be found in the project study area within the shallow open-water areas of the Nueces Delta or along the shoreline of Nueces Bay. Algae can grow on the bottom substrate of the shallow open-water areas or algae blooms can appear in the water column given the right combination of nutrients, light, and temperatures. Algae blooms can negatively affect dissolved oxygen concentrations and lead to fish kills. Some fish and aquatic species as well as birds could forage on algae as a primary food source. Overall algae would not be considered a vulnerable or particularly valuable resource within the Nueces Delta marsh or Nueces Bay.

SAV can be found in areas of bay waters that are shallow and protected from wave actions and turbidity carried by swift currents. SAV meadows provide many benefits to the ecosystem including help to dampen the effects of strong currents, prevent erosion, enhance water clarity, provide protection to fish and invertebrates, and prevent scouring of bay bottoms (TPWD 1999). SAV helps to reduce wave action with their above ground leaf structure and erosion with their below ground root and rhizome structure, thus keeping the substrate firm and maintaining water clarity (TPWD 1999).

SAV species found in Texas include shoal grass (*Halodule beaudettei*), manatee grass (*Cymodocea filiformis*), widgeon grass (*Ruppia maritime*), clover grass (*Halophila engelmanni*), and turtle grass (*Thalassia testudinum*). SAV beds in Nueces Bay are limited to the shoal grass and widgeon grass species and are subject to frequent episodic changes dependent on freshwater inflows and water quality conditions (Pulich et al., 1997). Widgeon grass is technically not seagrass, as it is found in freshwater and brackish water conditions. Shoal grass and widgeon grass can grow relatively quickly in bare areas under the right salinity and light conditions (TPWD 1999). If light, nutrient, and salinity conditions are favorable, SAV can establish in open bay bottom. Due to the significant erosion of the existing marsh, open water gaps conditionally support SAV, however, SAV occurrence in Nueces Bay is considered rare and sparse, and generally seagrass is not considered a dominant resource in the Nueces Delta and estuary (Pulich et al., 1997).

The sparse historically documented areas of SAV within Nueces Bay occur east of the Project study area or along the north shoreline. Based on a 2019 observation by a biologist from TPWD, small patches of *Ruppia maratima*, or widgeon grass, have reportedly been observed to occur in isolated subtidal open-water areas within the Nueces Delta marsh (TPWD 2022). As marsh habitat is lost due to increasing water levels and replaced with open-water areas, the opportunity for SAV, or widgeon grass, to establish increases. TPWD has mapped historical SAV beds across the Texas coast in their seagrasses dataset (TPWD 2022). Data around Nueces Bay was derived from aerial photos from 1994-1996 and processing of digital imagery in 2004. This dataset shows SAV historically located on the northern shore of Nueces with none identified within the Nueces Delta or southern shore from these years. Based on this historical data, it is possible that SAV could currently be in these northern bay areas, although a recent survey has not been conducted to confirm this dataset. SAV is not documented to occur along the southern shoreline or along the Nueces Delta shoreline (TPWD 2022b). Refer to Appendix C – Habitat Assessment for maps depicting the habitats of the Nueces delta and Nueces Bay Project study area.

Oyster Reefs

Eastern oysters (*Crassostrea virginica*) are present throughout the Texas coast although at a substantially reduced amount than historically recorded (Ybarra 2021). Most oyster reefs are subtidal or intertidal, and can be found near passes and cuts, and along the edges of wetlands. Oyster reefs may be formed wherever there is a hard substrate and adequate currents to bring nutrients and for future recruits to set. Currents carry nutrients to the oysters and take away sediment and waste filtered by oyster. Oyster reefs provide ecologically important functions including maintaining or improving water quality and providing productive habitats. Many organisms, including mollusks, polychaetas, barnacles, crabs, gastropods, amphipods, and isopods, can be found living on the oyster reef, forming a very dense community. Oyster reefs are dependent upon food resources from the open bay and wetlands. Many organisms feed on oysters including fish, such as black drum (*Pogonias cromis*), crabs (*Callinectes* spp.), and gastropods such as the oyster drill (*Thais haemastoma*). When oyster reefs are exposed during low tides, shore birds use these intertidal reef areas as resting places (TPWD 2019).

Historically, oyster reefs extended across Nueces Bay and were dense enough to form natural land bridges between the north and south. Shell dredging in the early 1900s in Nueces Bay removed a significant amount of oyster shell to be used as construction material during the rapid development of Corpus Christi (Ybarra 2021). The process of dredging these oysters destroyed the bay’s hard-bottom surface needed for oyster colonization.

Oyster reefs could be located within the Nueces Bay study area, although living oyster reefs are not commonly found in Nueces Bay due to high salinity conditions, some oyster reefs have been observed on the northern side and along the northern shore of Nueces Bay and in the center of the bay around shell islands and bird nesting islands (GLO 2022). Average salinities in the study area range from 30 to 36 parts per trillion (ppt), with dry years having salinity levels above 32 ppt and wet years around 25.5 ppt (Montagna et al., 2021). While oysters can survive for limited times in salinities ranging from 5 to 40 ppt, they thrive best within a range of 10 to 25 ppt. A common oyster predator, the oyster drill snail, also survives best at higher salinities, meaning oysters in Nueces Bay would be subject to greater risk of predation by oyster drills. See Appendix C – Habitat Assessment for a map of historical oyster locations in the study area.

Summary

The Project area contains low tidal marsh wetlands, intertidal mud flats, and subtidal open-water areas. Refer to Appendix C – Habitat Assessment for depictions of these habitat areas within the Project study area. SAV, specifically *Ruppia maritima,* could potentially be within the shallow open-water areas, but would vary in distribution seasonally and depending on salinity conditions. Oysters are unlikely to be within any of the Project areas based on available data and historical records of distribution.

4.4.2. Future Conditions with the Proposed Action

Material will be placed within open-water areas of the degraded Nueces Delta marsh to restore elevations conducive to the creation of intertidal estuarine wetlands. Approximately 206 acres of open water would be nourished to elevations of estuarine marsh. Approximately 395 acres of open water area will be nourished with material to provide marsh elevations and sacrificial erosion protection to existing vulnerable marsh areas. Additionally, an estimated 120 acres of intertidal living shoreline and erosion protection would be converted from open bay shoreline and approximately 200 acres of open-water bay area would be converted to industrial beneficial use land. The approximately 100 ft wide temporary pipeline corridor would temporarily affect approximately 8.7 acres of wetland areas, 3.6 acres of intertidal mud flat, and 15.6 acres of open-water area. There are approximately 1.7 acres of historical oyster bed near the breakwater location, however oysters were not found here during the bathymetry survey for the breakwater. There are areas of potential *Ruppia maritima* SAV habitat within the Nueces Delta marsh open-water areas that may be converted to intertidal wetland marsh due to the BU placement and overall Project purpose and need. Refer to Appendix C – Habitat Assessment for detailed figures of the placement areas and estimated habitat areas. The following table summarizes the estimated areas of wetlands and special aquatic sites within each of the placement areas.

Table 4-1: Wetlands & Special Aquatic Areas within Proposed BU Placement Sites

Wetlands & Special Aquatic Areas	Wetland Low Marsh (acres)	Tidal Mud Flat (acres)	Historical Oyster Habitat (acres)	Open Water Subtidal (acres)	Potential *Ruppia maritima* presence?
Delta Marsh	8.54	19.65	0.00	206.27	Yes
Breakwater Erosion Protection	15.25	3.92	1.68	155.95	Yes
Elbow Marsh	31.50	4.85	0.00	239.66	No
Living Shoreline Placement Area	2.17	0.00	0.00	117.67	No
Industrial BU Placement Area	0.00	0.00	0.00	200.0	No
Pipeline Corridors	8.73	3.59	0.00	15.57	Yes

Temporary direct adverse impacts to existing marsh from the placement of flotation pipelines and other equipment needed to transport dredged material to the designated placement areas would be minimal. Created and nourished marsh would provide a substrate for the establishment of a variety of wetland plant species which would further aid in sediment accretion in the sediment-depleted Nueces Delta. An adequate amount of SAV is expected to remain in the open-water areas within the proposed BU placement areas after material placement, and SAV would be encouraged to establish in the newly elevated areas once settlement has occurred and water clarity restored.

Open-water habitat within the Project area would decrease as a direct impact of the proposed material placement and would be replaced by emergent estuarine marsh habitat over time after material has settled and stabilized at existing marsh elevations. The reduction in the amount of open water within the proposed disposal areas is expected to enhance the health of the surrounding delta, which is starved of sediment and has been shrinking as open-water areas have grown in recent years; see Figure 4-1. The exact acreage of habitats expected to be directly impacted by the Project is difficult to determine since specific disposal area designs and disposal alignments would not be developed until just prior to the placement based on site conditions at that time.

The direct effects associated with the Project consist of the permanent placement of material into waters of the United States (U.S.) immediately adjacent to and along existing shorelines and within the Nueces Delta marsh open-water areas. Indirect effects would be temporary turbidity in the bay or delta during placement activities that could adversely affect seagrasses. However, the fill material would have the beneficial effect of nourishing degraded saltmarsh and restoring historic elevations of the areas. It would be overall beneficial to convert open-water unconsolidated estuarine habitat to vegetated intertidal emergent wetlands and beneficial to temporarily impact isolated areas of SAV for the long-term beneficial effects of restoring marsh elevations and nourishing degraded marsh habitats. Long-term indirect impacts of the Project would be beneficial to wetland and special aquatic sites as the result would be an increase in area of wetland habitat and tidal flat transitional zones, and future protection against the loss of wetland area. BMPs, as discussed in Section 3.5, would minimize indirect adverse impacts to open-water and SAV areas by limiting the extent of placed sediments and the migration of suspended sediments out of the placement areas. The Project will minimize adverse indirect affects surrounding wetland marsh areas as the Project would utilize BMPs to limit the impact during placement operations.

Oyster data from the Texas GLO shows oyster shell areas (not distinguished between dead or alive) within Nueces Bay and sparsely along the delta shoreline, based on 2007 data. There are no oysters documented on the south shore of Nueces Bay (NOAA/OCM 2015). Propensity for future oyster reef establishment and likelihood of success of oyster reef restoration efforts within Nueces Bay is considered low based on multiple factors affecting the bay including temperature, salinity, and historical oyster presence data (Beseres Pollack et al. 2019). The placement of material for BU would not directly impact oyster reefs and is not anticipated to temporarily, adversely affect oyster reefs. Conversely, the construction of the breakwater structures and living shoreline could result in long term beneficial effects to oyster reefs by providing substrate for future recruitment of oyster colonization to the nourished areas.

4.5. Water and Sediment Quality

4.5.1. Existing Water Quality Conditions within Nueces Bay and Corpus Christi Inner Harbor

The 1998 Texas Water Quality Inventory and Clean Water Act (CWA) 303(d) List of impaired waters initially listed Nueces Bay (Segment 2482) for not meeting the oyster water use. The listing resulted from zinc in oyster tissue levels being greater than the health assessment comparison value of 700 mg/kg. In 2006, a Total Maximum Daily Load (TMDL) was implemented in Nueces Bay for zinc in oyster tissue. The TMDL established a total zinc criterion for surface water in Nueces Bay of 29 µg/L.

As part of the Texas Commission on Environmental Quality (TCEQ) TMDL Program, sampling was performed biannually for zinc in water, sediment, and tissue from April 2008 through July 2013 (Figure 4-2). In the most recent sampling conducted in July 2013, Nicolau and Hill (2013) reported a mean water temperature of 28.93°C. Mean salinity was 38.20 ppt with Station 18866 located in back, or western portion of Nueces Bay having the highest salinity at 40.09 ppt. Mean pH was 7.93. Mean dissolved oxygen (DO) % and mg/L were 90.94 and 5.65, respectively. Dissolved zinc concentrations ranged from 0.65 ug/L at Station 12960 to 11.1 ppb at Station 13432. Total zinc concentrations in water samples ranged from 3.12 ug/L at Station 12960 in the Nueces River Tidal segment to 32.60 ug/L at Station 13425 in Nueces Bay.

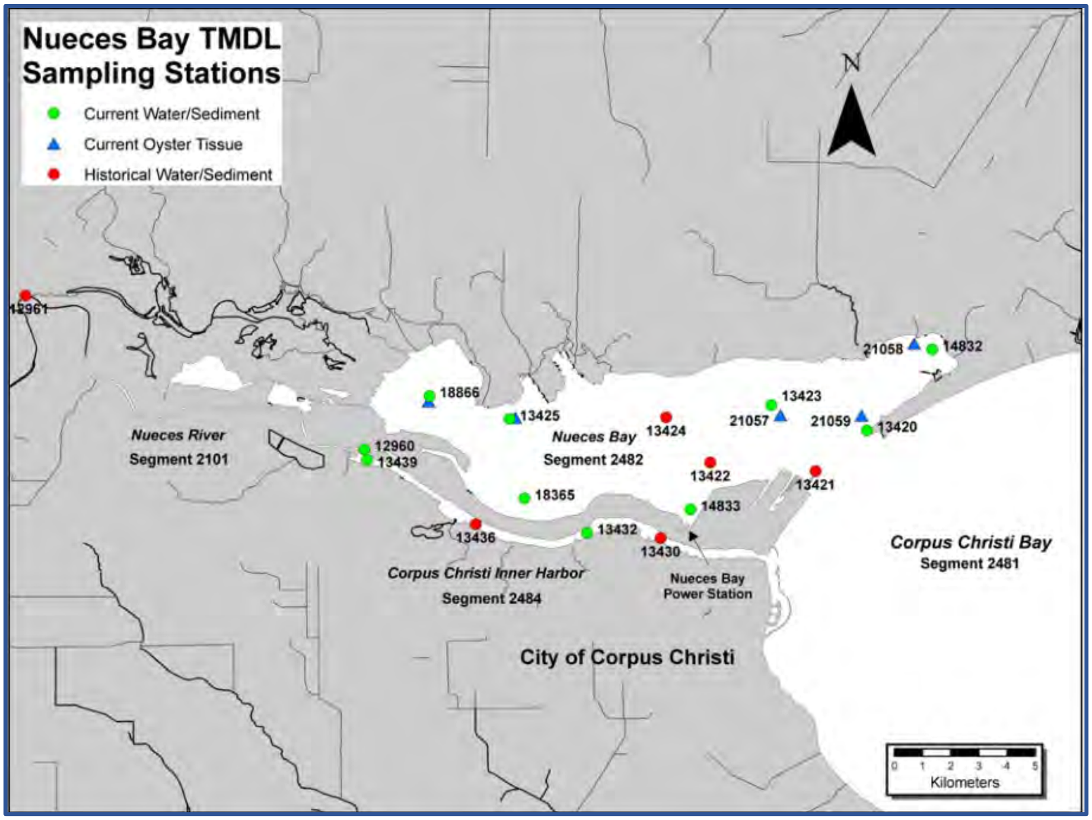

Figure 4-2: Map of Center for Coastal Studies Nueces Bay TMDL sampling locations.
Source: Nicolau and Hill (2013)

4.5.2. Existing Sediment Quality within Nueces Bay

In the most recent sampling conducted in July 2013, Nicolau and Hill (2013) report that most Nueces Bay stations have TOC concentrations indicative of low enrichment. TOC values in Nueces Bay ranged from 2650 mg/kg at Station 14833 to 12,700 mg/kg at Station 13420. Silt-clay values in the surficial sediment layer ranged from 18.90% at Station 14833 in Nueces Bay to 94.00% at Station 12960 in the Nueces River Tidal segment. Silt-clay values in the Corpus Christi Inner Harbor ranged from 28.20% to 88.60% at Station 13432 and Station 13439, respectively. Zinc in sediment concentrations ranged from 16.90 mg/kg at Station 18866 in Nueces Bay to 202.00 mg/kg at Station 13439 in the Corpus Christi Inner Harbor segment. Mean sediment Zinc concentrations in Nueces Bay were the lowest values recorded for the Year-seven sampling period at 34.41 mg/kg and ranged from 15.90 to 61.00 mg/kg (Figure 4-3). Current surficial levels of zinc collected from this study are below TCEQs 410 mg/kg criteria.

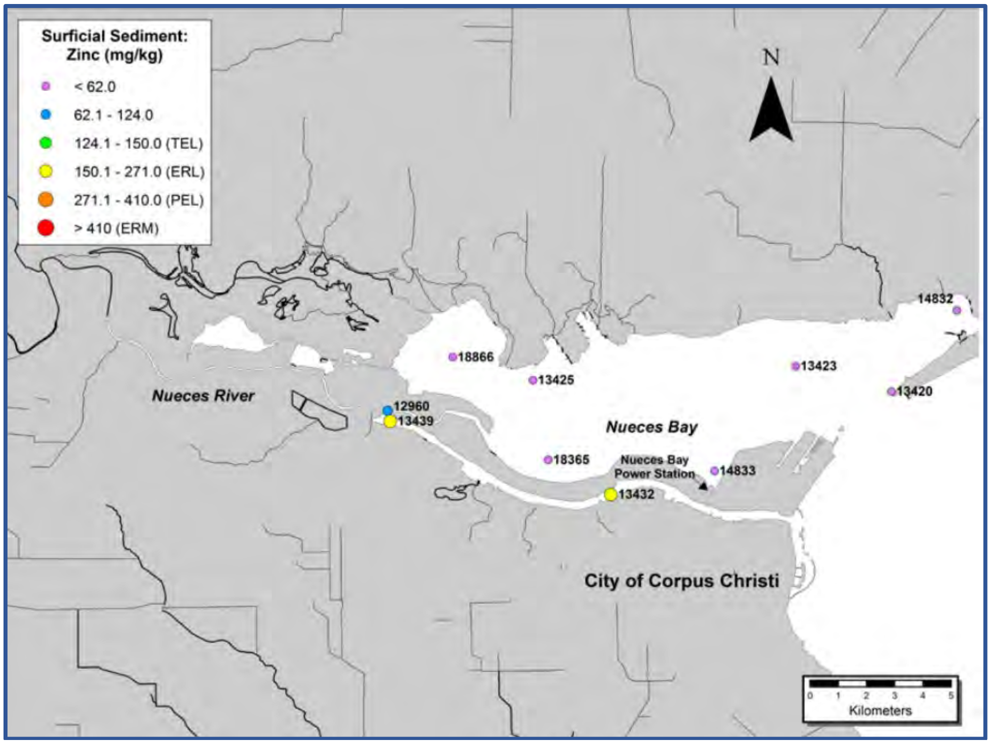

Figure 4-3: Mean zinc sediment concentrations (mg/kg) for Year-seven sampling.

Source: Nicolau and Hill 2013

4.5.3. Existing Sediment Quality of Dredged Material Proposed for Beneficial Use

In support of the CWA Section 404 sediment evaluation for the dredged material from the Inner Harbor of CCSC, sampling was performed to characterize the material to assess its suitability for BU. In April 2022, sediment, water and elutriate samples were collected with vibracores from 28 locations within the Inner Harbor CCSC from Station 1300+00 to 1560+00 (See Figure 1 - *Site Vicinity Map*, Appendix D). Samples from these stations were composited into 11 samples and split vertically between the top and bottom horizons to create a total of 22 sediment and elutriate samples.

There are no enforceable sediment quality criteria or standards with which to compare concentrations of compounds in sediment. However, there are several different guidelines that are used to look for a cause for concern in sediment samples, one of which is the Effects Range Low (ERL) (Buchman, 2008). When an exceedance of the ERL occurs, the effects range medium (ERM) benchmark value is then evaluated. However, since these sediments are destined for placement within an open-water site for the purpose of BU, it is customary (Hauch, 2012) to also compare to the Human Health Protective Concentration Levels (PCL), provided by the TCEQ as part of the Texas Risk Reduction Program (TRRP, 30 TAC §350).

Sediment chemistry results revealed exceedances of the ERL benchmarks in some of the samples for metals including zinc, copper, cadmium, lead, and mercury. None of the results exceeded the National Oceanic and Atmospheric Administration (NOAA) ERM or PCL benchmarks. No other ERL, ERM, or PCL benchmarks were exceeded for any other analytes tested. Concentrations of zinc across the Inner Harbor project area ranged from 30.1 mg/kg to 381 mg/kg.

Site water and elutriate sample results were compared to Texas Acute Surface Water Quality Standards (WQS), provided by the TCEQ and EPA acute aquatic life metals criteria maximum concentration (CMC) for the protection of aquatic life criteria based on standard laboratory toxicology tests (EPA and USACE 2003). Cyanide was detected in elutriate and water samples in concentrations ranging from <0.0005 to 0.071 µg/L. Out of the 24 elutriate samples tested from the Inner Harbor project area, five of the results were greater than the CMC of 0.001 µg/L and two of those elutriate samples also exceeded the Texas WQS of 0.0056 µg/L. However, cyanide was not detected in sediment samples. None of the other analytes tested exceeded the Region 6 CMC or WQS screening benchmarks in any sample.

These sediments that were assessed in the CWA 404 Evaluation are proposed for placement for the purpose of BU. None of the results of the sediment chemical analysis indicate a cause for concern with the dredging and/or placement of new work material from the Inner Harbor of the CCSC for BU.

4.5.4. Future Conditions with the Proposed Action

Short-term, minor, and direct adverse impacts to water quality in and near the proposed project area are expected during beneficial use placement activities. Minor changes in DO, nutrients, salinity, turbidity, and suspended solids levels could occur due to mixing and the release of sediments into the water column during placement within open-water areas and along the shorelines of the bay.

As the open-water areas within the delta marsh are shallow and not influenced by major currents and experience only subtle tidal fluxes, it would be expected that any impacts from turbidity would not be subjected to passive transport and dispersion and would be restricted to the immediate vicinity of the placement activities and be temporary and minor.

Indirect impacts of marsh and shoreline nourishment with BU dredged material include short-term water quality effects to turbidity with long-term water quality improvements. Restored and nourished areas would increase the surface area of sediments on which physical, chemical, and biological processes for improving water quality would occur, while the exchange of water in and out of the marshes influences water quality via nutrient exchange (Gosselink & Turner, 1978). This can in turn reduce total suspended solids in the water column and reduce phosphorus and nitrogen levels while increasing dissolved oxygen, all of which help maintain or improve local water quality.

Increased marsh elevation, combined with freshwater inflows and rainfall, will decrease marsh salinities in the delta marshes, while tidal channels will maintain the exchange of nutrients and sediments throughout the delta marsh. Concentrations of nutrients could increase locally for short periods following material placement; however, nutrients would be taken up by biota and dispersed by the water. Any impacts would be temporary and minor. The use of barges, other watercraft, and equipment during implementation and monitoring could also result in short-term, minor, adverse impacts to water quality due to potential fuel leaks or vehicle fluid leaks.

USACE has collected a significant amount of water and sediment chemistry data as well as elutriate data that provide information on the constituents that are dissolved into the water column during dredging and placement as discussed above. No significant long-term adverse impacts to water chemistry are anticipated. During marsh and shoreline nourishment, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh or into bayous leading to Nueces Bay. Based on recent sampling, the dredged material is expected to be below required benchmark levels and would be suitable for placement in the aquatic habitat and is not expected to result in adverse effects to aquatic organisms.

Based on the results of the CWA Section 404 evaluation, areas of the Inner Harbor material with sample results indicating the highest concentrations of Zinc, Copper, Cadmium, and Mercury in sediments were located between sampling stations CC-TB-22-06 and CC-TB-22-07W (near Tule Lake turning basin), although none of the results exceeded NOAAs ERM or PCL benchmarks. These stations correlate to the area approximately between Tule Lake Turning Basin and station 133+000. Material from this area would be targeted to be placed within the Industrial BU Site to minimize potential bioaccumulation of these constituents in wildlife within marsh or tidal flat habitats. However, this material shows concentrations of metals similar to background levels of Nueces Bay as discussed above. Based on results from the elutriate testing which indicated none of the samples exceeded the CMC or Texas WQS, with the exception of cyanide from some water and elutriate samples (not sediment samples), the material is suitable to be placed in open-water areas of Nueces Bay and would not result in adverse effects to water quality due to concentrations of metals within the material. Cyanide in water is transformed and degraded by microorganisms and does not build up (bioaccumulate) in tissues of fish and therefore would not cause adverse impacts to water quality through the BU of material from these sample locations (ATSDR 2006). Overall, the placement of material at the Industrial BU site would have direct, temporary, and minor adverse effects to turbidity of the water in Nueces Bay and short term, negligible effects to water quality.

4.6. Freshwater Inflows, Salinity, Tides, and Currents

Freshwater inflows from rainfall, rivers, streams, and agricultural runoff enters the bays along the GOM and mixes with saline waters to form brackish estuaries. Episodic patterns and fluctuations in freshwater inflow, sediment, and nutrient loading occur in Texas estuaries based on prevalence of droughts, severe flooding and rainfall events, and tropical storms and hurricane driven storm surges. Each estuary is unique because of variation in total amounts, seasonal distribution, and manner of freshwater inflow into the system (Powell et al., 2002). The freshwater inflow and salinities within the project study area, as well as tides and currents are evaluated in this section and the proposed project assessed for potential effects to freshwater inflow volume or patterns, salinities of the areas, and tides and currents.

4.6.1. Existing Conditions

Freshwater Inflow

Freshwater inflows to Nueces Bay are regulated upstream of the Nueces River and Rincon Bayous by Lake Corpus Christi and further upstream by Choke Canyon Reservoir, which is on the Frio River and drains into the Nueces River by way of the Atascosa River. Lake Corpus Christi Reservoir was built 1958 with the completion of the Wesley Seale Dam and is one of the largest artificial bodies of water in Texas, reserved for Corpus Christi's municipal water supply. The Choke Canyon Reservoir, also reserved for Corpus Christi municipal water supply, is another massive reservoir with over double the capacity of Lake Corpus Christi. The reservoir was created after the completion of Choke Canyon Dam in 1982 on the Frio River. Freshwater inflows into the Nueces Estuary, which consists of the Nueces River Delta, Nueces Bay, and Corpus Christi Bay, have decreased by 47% since 1940, largely due to construction of these reservoirs with other factors like increasing drought frequency and durations, increased water rights usage of water along Nueces River, and withdrawal of groundwater from the underlying Gulf Coast aquifer (Asquith et al., 1997).

The Nueces River Tidal section starts at the confluence with Nueces Bay in Nueces County for 12 miles to Calallen Dam in Nueces/San Patricio County. The Calallen Dam on the Nueces River segregates the freshwater Nueces River with the Tidal Nueces River. Rainfall within the Nueces River watershed, but not in the Lake Corpus Christi watershed will flow over the dam into Nueces Bay. Additionally, if Lake Corpus Christi reaches full capacity, water is released to maintain the safety and integrity of Wesley Seale Dam. About 1.6 miles downstream from the Calallen Dam is the Nueces overflow channel, also called Rincon Bayou. The overflow channel was constructed by the Bureau of Reclamation in 1995 to divert flow from the Nueces River into Rincon Bayou in the upper Nueces Delta. The City of Corpus Christi also conducts controlled releases of freshwater through a diversion pump and pipeline constructed in 2009, as ordered[1], to maintain freshwater inflow into the estuary. Each month the city is required to "pass through" to the Nueces Estuary an amount of water equal to the measured inflow into the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System up to a target amount (Pulich et al 2002). Because of tidal influence, discharge through the Rincon Bayou channel is not always a result of freshwater inflow into the Nueces River or the ordered freshwater diversions. During high tides, saltwater from Nueces Bay can move up the Nueces River into Rincon Bayou through the Rincon Bayou channel. Also, during low-to-moderate discharges at the Calallen Dam, tidal fluctuation can cause water to flow in or out of Rincon Bayou. However, during the wetter season from August through October most of the flow into Rincon Bayou is freshwater overflow from the Nueces River (USGS 2001).

Salinity

Largely due to recent reductions in freshwater inflows as discussed above, salinities in Nueces Bay can exceed 45 ppt during dry conditions. Nicolau and Hill (2013) reported average salinity of 38.20 ppt within the western portion of Nueces Bay. During dry periods, with little to no freshwater inflow, high evapotranspiration can increase salinities in the delta region over 80 ppt, exceeding bay salinities (Hill et al., 2015). Salinity levels greater than 35 ppt are considered hypersaline as they exceed typical seawater salinity level. When porewater salinities in the Nueces Delta exceed 25 ppt, the delta experiences substantial declines in cordgrass (*Spartina* spp.) marsh (Hill et al. 2015).

The pumping regime to increase freshwater inflows discussed in the section results in large fluxes of salinity that are short in duration before returning to hypersaline. The extreme fluctuation in salinity can be harmful to aquatic organisms. Lower magnitude and longer duration freshwater influx would be needed to continuously moderate salinity levels within the delta (Del Rosario and Montagna 2018).

Tides and Current

The diurnal tidal range in Nueces Bay usually is less than 1 ft and causes the exchange of water between Nueces and Corpus Christi Bays. Water flows into Nueces Bay during rising tide and out during receding tide (USGS 2001). The currents in Nueces Bay are weak and driven by the low tidal fluctuation and freshwater inflow events from the Nueces River, see Figure 4-4 below. Texas coast tide data are provided by NOAA and Texas Coastal Ocean Observation Network tide stations (NOAA, 2022b).

[1] 2001 Amended Agreed Order pertaining to Special Condition 5.B., Certificate of Adjudication No. 21-3214

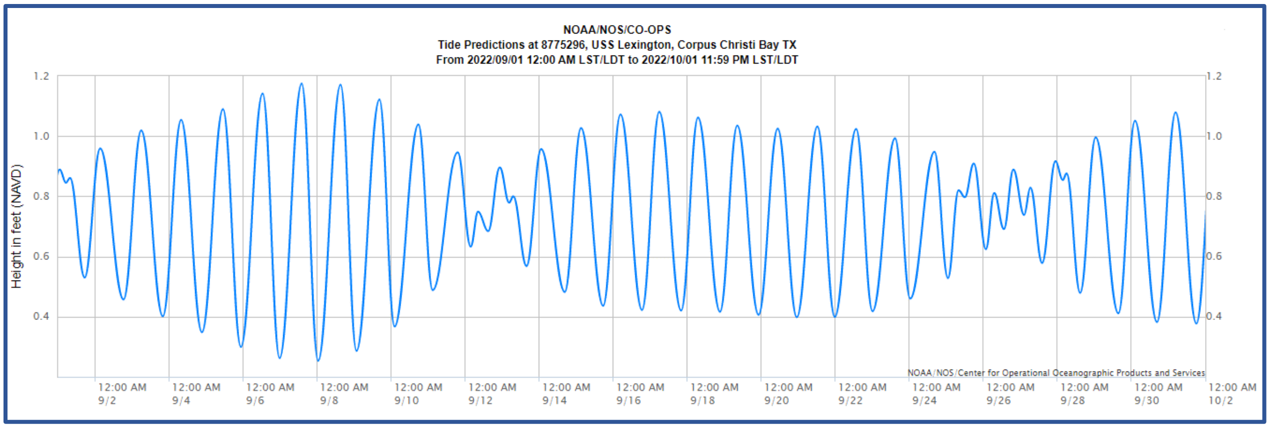

Figure 4-4: One month of predicted typical tides in Nueces Bay (fall)

The water level of Nueces Bay ranges-based seasonality and the diurnal tide and ranges from approximately 0.2 ft MLLW to 1.2 ft NAVD. Changes in water surface elevation could be exacerbated during storm events that cause storm surge or water withdrawal from the bay. The tidal elevation datums around Nueces Bay and the Nueces River Delta are observed for the project area using the USS Lexington Station (NOAA 2022). The table below lists the elevation datums and values in the project area in ft relative to NAVD88.

Table 4-2: Tidal Datums of Nueces Bay (NAVD88)

Datum	Description	Value (ft)
MHHW	Mean Higher High Water	1.02
MHW	Mean High Water	1.01
MTL	Mean Tide Level	0.72
MSL	Mean Sea Level	0.76
MLW	Mean Low Water	0.43
MLLW	Mean Lower Low Water	0.42
NAVD88	North American Vertical Datum of 1988	0.00
HAT	Highest Astronomical Tide	1.35
LAT	Lowest Astronomical Tide	0.09

4.6.2. Future Conditions with the Proposed Action

The proposed project would not have effects to freshwater inflow to Nueces Bay or the Nueces Bay Delta marsh. Tides and currents within Nueces Bay would not be affected by the proposed BU placement of material. Placement of BU material at the bay edge to create sacrificial shores and living shorelines will provide buffer for tidal fluctuations and beneficial effects to tide amplitudes seen within tidal and mud flat areas. The placement of material within open-water areas of the marsh would provide substrate elevation to encourage restoration of wetland marsh areas and the conversion of open-water areas to vegetated marsh areas. An increase in density of marsh vegetation within the delta area would provide beneficial effects to buffer storm surges and gradual sea level rise.

The living shoreline and delta marsh breakwaters would provide a first line of defense against storm surge and daily tidal influences on marshes behind the breakwaters. The intermediate-brackish marshes within the delta used to receive freshwater inflow are becoming more saline and saline marshes that receive normal tidal inflows are converting to open-water or mud flats due to dying marsh grasses in hypersaline conditions. By reducing the frequency of saltwater inundation into the saline and intermediate-brackish marshes, the current saline marshes would be anticipated to start to transition back to intermediate-brackish, and the natural salinity regime associated with the intermediate-brackish marsh can be maintained.

4.7. Sediment Topography/Bathymetry, Shoreline Erosion and Accretion

4.7.1. Existing Conditions

Historical imagery from the 1950s shows that the delta shoreline extended between 500-700 ft further into the Nueces Bay than currently exists (Google Earth 2022). This apparent shoreline erosion has been caused by three main factors as discussed above: sea level rise, subsidence, and loss of sediment input from within the delta (Bissel 2020). As open-water areas emerge within the delta, further sediment is lost through erosion and tidal action against the bay-facing edge of the delta and on the edges of marsh erosion as vegetation dies and structure of the sediment is compromised by loss of root systems. Texas GLO estimates the delta is eroding at 8.2 ft per year, as seen in Figure 4-1 above (GLO 2019).

Currently elevations within the BU areas can be seen from LiDAR elevation data collected across the Nueces Bay area. The delta marsh wetlands areas are approximately 2.0 ft NAVD88, and the open-water areas are approximately -0.5 NAVD88 elevation. Along the elbow marsh, the elevation of the open-water bay is 0 to -3 ft NAVD88. See Figure 2 in the Habitat Assessment (Appendix C) for a map of elevations across the study area.

4.7.2. Future Conditions with the Proposed Action

The Project would provide shoreline protection from erosive forces through the placement of dredged material as sacrificial material in front of the delta marsh breakwater structures and along the historic extent of the delta marsh and elbow marsh areas. The placement of material as sacrificial erosion protection provides a natural buffer for wave energy and storm surge events as well as elevation to combat gradual sea level rise and subsidence that occurs across the project area. The placement of beneficial material within and on the bay edge of the marsh areas would beneficially affect the shoreline erosion and accretion of the marsh area. The breakwaters, and associated erosion protection beneficial use material, would span approximately 6000 ft of the delta marsh edge to provide much needed reinforcement and protection to this vulnerable area.

The living shoreline located on the south shore of Nueces Bay would provide natural elevated substrate for colonization of vegetation and special aquatic sites as well as an approximately 400 ft wide erosion protection buffer along the shoreline. The existing revetment and armoring in various places along the shoreline have been placed by POCC and others to attempt to halt erosion of the shoreline as it encroached back toward the developed area of the peninsula and the roadway corridor. The placement of BU material as living shoreline substrate would provide beneficial effects to shoreline erosion and sediment accretion along 2.5 miles of shoreline.

The placement of BU material as the Industrial BU area protects 5,600 ft of shoreline currently subject to erosion and sediment transport forces causing the loss of land mass to open bay. The erosion on this part of the shoreline threatens the integrity of the adjacent Placement Area 3. The Industrial BU area shoreline would be comprised of dredged clay material and naturally established living shoreline to provide protection against wave and tidal energy erosion.

Introduction of the dredged materials would change the topography and bathymetry of the BU sites. Approximately 70% of the open-water areas within the delta marsh placement areas would increase to an average of approximately 2 feet NAVD88 after settlement with the edges naturally sloped to meet existing natural ground. Additionally, the breakwaters would be designed to slope at a 2:1 slope on the marsh side, and a 3:1 slope on the bay side with the crest elevation of 3.5 feet NAVD88to match the constructed breakwaters authorized by permit SWG-2014-00725-RCC. The breakwaters would slope to meet existing grade of Nueces Bay which ranges from -1.5 to -2.4 feet NAVD88 in these areas. The Elbow Marsh and living shoreline would gradually slope from 3 ft NAVD88 to the existing bay bottom elevation which would be approximately -3 ft NAVD88 to create a natural slope and tidal flat to intertidal marsh transitional zone. Natural mounding and effluent channels that form during placement would be left to encourage the variety of elevations and habitat zones within the placement areas. With the increase in elevation and change in topography, the system will be able to more closely function as nature designed allowing sediments to naturally accrete to protect existing marshes and establish future wetland marsh areas. The BU placement of material in these areas would provide short and long-term beneficial impacts to the area's sediment accretion and topography.

4.8. Fish and Wildlife Resources (including Essential Fish Habitat)

4.8.1. Existing Conditions

Wildlife and Bird Values

In general, habitats provided within the project study area include shallow open-water area within the delta marsh, shallow open bay habitat, intertidal mud flats, and estuarine wetland marsh. The Nueces Delta and Elbow marsh areas surrounding Nueces Bay provide valuable and unique habitats for colonial birds, wading birds, shore birds as well as diverse assemblages of reptiles and aquatic species. Colonial and migratory waterbirds likely use islands within Nueces Bay and forage within the delta marsh areas.

The delta marsh provides habitat for Texas Diamondback Terrapin (*Malaclemys terrapin littoralis*) and gulf coast marsh snake (*Nerodia clarkia clarkia*), both Species of Greatest Conservation Need as defined in the 2012 Texas Conservation Action Plan. The Texas Diamondback Terrapin prefers brackish or salt water. They are the only turtle found in estuaries, tidal creeks, and saltwater marshes where the salinity comes close to that of the ocean. While they live in salty water, they drink fresh water. After a rain, they will drink the fresh water flowing on the surface of the bay. In the Nueces estuary area, terrapins utilize elevated areas of vegetated shell hash as nesting sites, which are limited to narrow bands of substrate between the open bay and tidal marsh (Baxter 2015). The Gulf coast marsh snake is generally restricted to the brackish marshes and islands of the mid and upper coastline. It can be found further inland in shallow freshwater marshes. It is likely to occur in the delta area, within the intertidal marsh and closer to the freshwater inflow channels and bayous, but not within the open-water areas of the project areas.

There is a general lack of transitional low marsh or tidal flat area within the delta; marsh edges transition abruptly from open water to eroded marsh edge with little sloping or regularly exposed tidal flats. The southern shoreline of Nueces Bay is eroded and lacks tidal flat area, some areas have revetments or reinforcement that transitions directly to open-water bay with no tidal shoreline area.

Nueces Bay provides a habitat for phytoplankton and nekton. Salinity appears to be the controlling factor for phytoplankton abundance. Low salinities correspond with high phytoplankton numbers, and high salinities could reduce phytoplankton communities. Phytoplankton are fed upon by zooplankton (small crustaceans), fish, and benthic consumers, which are then predated upon by nekton (or fish). Epifauna such as crabs and crustaceans that live on the substrate surface of Nueces Bay and infauna such as mollusks and polychaetes burrowed into the subsurface are likely present across the project study area.

Nekton in Nueces bay and the surrounding delta area could include blue crab, white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*Farfantepenaeus duorarum*), Atlantic Croaker (*Mircopogonias undultaus)*, Bay Anchovy (*Anchoa mitchilli*), Code Goby (*Gobiosoma robustum*), Black Drum (*Pogonias cromis*), Gulf Menhaden (*Brevoortia patronus*), Hardhead Catfish (*Arius felis*), Pinfish (*Lagodon rhomboides*), Sheepshead (*Archosargus probatocephalus*), silversides (*Menidia* sp.), Southern Flounder (*Paralichthys lethostigma*), Spot (*Leiostomus xanthurus*), and Spotted Seatrout (*Cynoscion nebulosus*). Nekton habitat considered Essential Fish Habitat (EFH) is discussed below.

Essential Fish Habitat

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (MSA 16 U.S.C. 1855 (b)), including the Sustainable Fisheries Act (SFA [16 U.S.C. 1801]) amendment of 1996, projects with potential impact to EFH must be analyzed. The EFH is defined by the National Marine Fisheries Service (NMFS) (2004) and approved by the Secretary of Commerce acting through NMFS (50 CFR §600.10) as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (MSA § 3[10]).

The Gulf of Mexico Fishery Management Council (GOMFMC) implements regulations through NMFS for species in its management region. This council is responsible for managing and conserving 35 fish, five crustacea, and 143 species of soft and hard corals along with other members of the classes Hydrozoa and Anthozoa between state waters and the eastern extent of the exclusive economic zone (200 nautical miles offshore) off the Gulf Coast of Texas and neighboring states (GOMFMC 2017). The NMFS Office of Sustainable Fisheries provides oversight and support for the South Atlantic Fishery Management Council (SAFMC) through the development of national policies, guidance, and regulations. The Highly Migratory Species Management Division of NMFS manages an additional four major groups of pelagic fishes: 41 species of sharks, five tunas, one swordfish, and five billfishes (NOAA 2009). The SAFMC and Mid-Atlantic Fishery Management Council (MAFMC) do not have jurisdiction along the Florida Gulf coast. However, some species managed by these councils have EFH identified along this coast (NMFS 2010) as the councils can designate EFH outside their respective regions of jurisdiction (Geo-Marine 2008). EFH for MAFMC-managed species relevant to the Proposed Action Areas (BU Areas) are addressed here.

This section identifies EFH, and Habitat Areas of Particular Concern (HAPC) based on descriptions from several guidance documents by NOAA and fishery management councils. These documents include SAFMC (1998a, b), GOMFMC (1998, 2005), NOAA (2009), and MAFMC and NMFS (2011). The NOAA Fisheries EFH Mapper (NOAA Fisheries 2022) online spatial database was used for supplemental information. HAPC represents a more limited habitat designation for a given species or managed group, are described as ecologically important rare subsets of EFH, and are particularly susceptible to environmental degradation due to proximity to human activities. Such areas may serve as key habitats for migrations, spawning, or rearing of fishes and invertebrates. Some HAPC are geographically defined or habitat-specific, while others are taxa-specific or even life-stage-specific. EFH identified by SAFMC that may be present in the Proposed Action Areas (BU Areas) include the water column, estuarine habitat which includes plant and animal resources living between permanent freshwater bottom and the seaward limits. The project area contains water column and estuarine EFH resources but lacks live/hardbottom.

EFH and HAPC along the Gulf coast of Texas address the following managed taxa:

- Shrimp EFH (GOMFMC 1998, 2016, 2017; SAFMC 1998a, NOAA Fisheries 2022)
    - Brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*Farfantepenaeus duorarum*), white shrimp (*Litopenaeus setiferus*), and royal red shrimp (*Pleoticus robustus*)
- Stone Crab EFH (GOMFMC 2005)
    - Stone crab (*Menippe mercenaria*) and possibly the western Gulf stone crab (*M. adina*)
- Red Drum EFH (GOMFMC 1998, GOMFMC 2005, NOAA Fisheries 2022)
    - Red drum (*Sciaenops ocellatus*)
- Reef Fish EFH (GOMFMC 1998, NOAA Fisheries 2022)
    - 31 species in two families in two orders
- Coastal Migratory Pelagics EFH (GOMFMC 2005, NOAA Fisheries 2022)
    - Cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), and Spanish mackerel (*Scomberomorus maculatus*)
- The following shark species (species-specific EFH) (NOAA 2009, NOAA Fisheries 2022)
    - Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)
    - Blacknose shark (*Carcharinus acronotus*)
    - Blacktip shark (*Carcharinus limbatus*)
    - Bonnethead (*Sphyrna tiburo*)
    - Bull shark (*Carcharinus leucas*)
    - Dusky shark (*Carcharinus obscurus*)
    - Finetooth shark (*Carcharinus isodon*)
    - Great hammerhead (*Sphyrna mokarran*)
    - Lemon shark (*Negaprion brevirostris*)
    - Scalloped hammerhead (*Sphyrna lewini*)
    - Silky shark (*Carcharhinus falciformis*)
    - Smalltail shark (*Carcharinus porosus*)
    - Spinner shark (*Carcharhinus brevipinna*)
    - Tiger shark (*Galeocerdo cuvier*)

Of the managed taxa listed above having EFH in the region, EFH for several penaeid shrimp species, red drum, gray snapper (Lutjanus griseus), and lane snapper (Lutjanus synagris) appear applicable to the project area. The mud flats, sand flats, tidal creeks, and salt marshes within the project area probably act as nursery areas for penaeid shrimp and offer foraging opportunities and shelter for several life stages of red drum, gray snapper, and lane snapper. Nursery areas included as EFH consist of tidal freshwater, coastal wetlands (e.g., intertidal marshes, tidal forests, and mangroves), estuaries, nearshore flats, and submerged aquatic vegetation (GOMFMC 1998, SAFMC 1998a). HAPCs include all coastal inlets, all state-identified nursery habitats of importance to this group, and state-identified overwintering areas (GOMFMC 1998, SAFMC 1998a). Tidal creeks and salt marshes serving as nurseries are perhaps the most important habitats for penaeid shrimp (GOMFMC 1998, SAFMC 1998a, b).

Nueces Bay does not appear to contain any other EFH or HAPC based on the definitions and descriptions given in SAFMC (1998a, b), GOMFMC (1998, 2005, 2006), NOAA (2009), and MAFMC and NMFS (2011) or spatial data in NOAA Fisheries (2022). The below-listed EFH taxa includes much or all of Nueces Bay and surrounding coastal waters according to NOAA (2009) and the written descriptions of EFH provided by GOMFMC (1998, 2016) and spatial data in NOAA Fisheries (2022):

- Shrimp EFH (brown, pink, and white shrimp EFH but not royal red shrimp EFH)
- Coastal migratory pelagics (mackerels) EFH
- Red drum EFH
- Gray and lane snapper EFH
- Reef fish EFH
- Atlantic sharpnose shark (GOM stock) EFH
- Blacktip shark (GOM stock) EFH
- Bonnethead shark (GOM stock) EFH
- Bull shark EFH
- Lemon shark EFH
- Scalloped hammerhead EFH
- Spinner shark EFH

Narrowing the scope of EFH further to those habitats present in the Proposed Project Areas (BU Areas), it appears that shrimp EFH (brown, pink, and white shrimp [Fig. 4-5, 4-6, 4-7), red drum EFH (Fig. 4-8), gray snapper EFH (Fig. 4-9), and lane snapper EFH (Fig. 4-10) occur in the project area, where it may act as a nursery area for penaeid shrimp and for many life stages of red drum, gray snapper, and lane snapper.

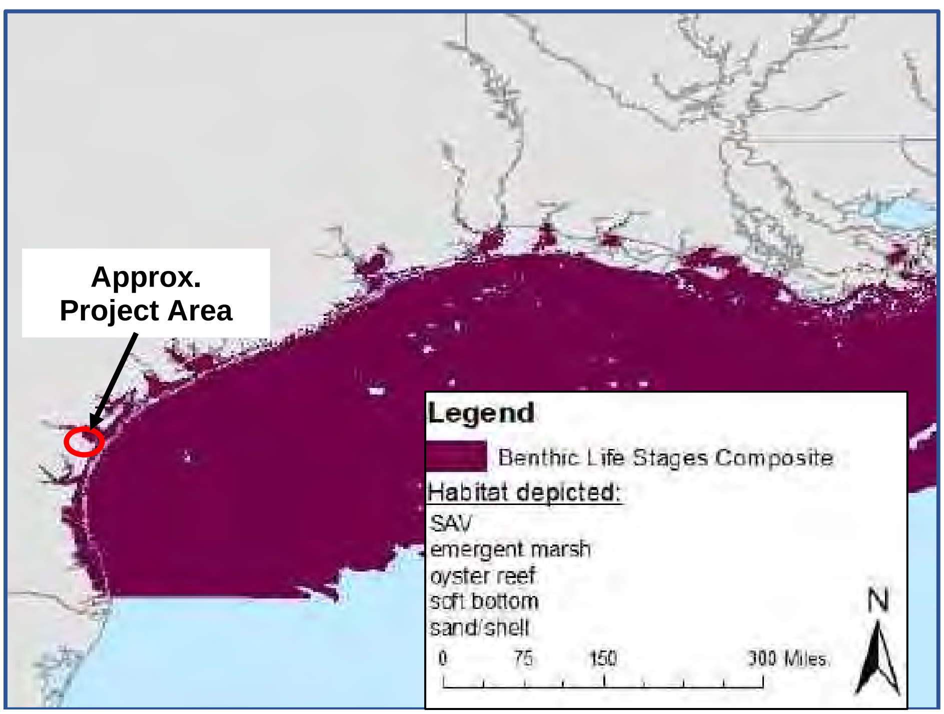

Figure 4-5: Brown Shrimp (*Farfantepenaeus aztecus*) EFH for All Life Stages in and Around the Proposed Action Areas (Beneficial Use Areas)

Source: Figure 62 of GOMFMP (2016)

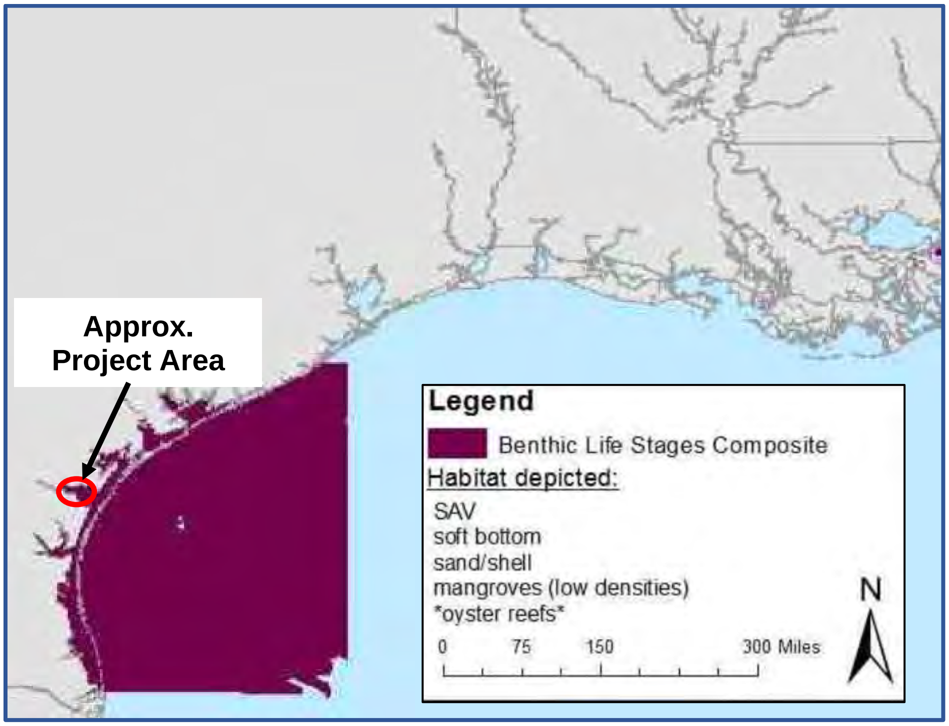

Figure 4-6: Pink Shrimp (*Farfantepenaeus duorarum*) EFH for All Life Stages in and Around the Proposed Action Areas (BU Areas)

Source: Figure 64 of GOMFMP (2016)

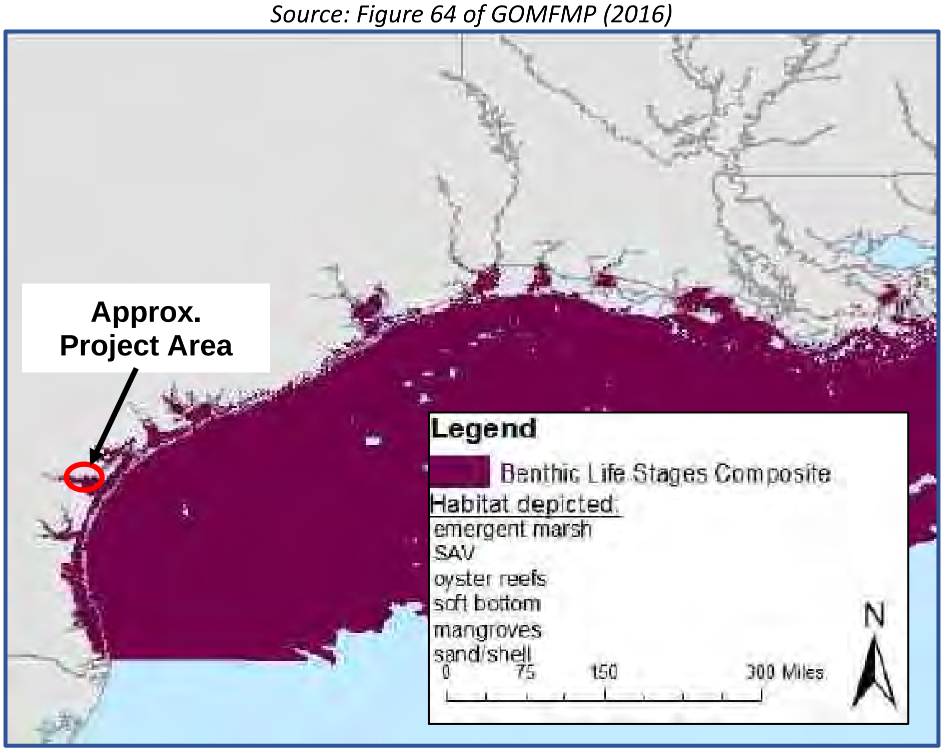

Figure 4-7: White Shrimp (*Litopenaeus setiferus*) EFH for All Life Stages in and Around the Proposed Action Areas (BU Areas)

Source: Figure 63 of GOMFMP (2016)

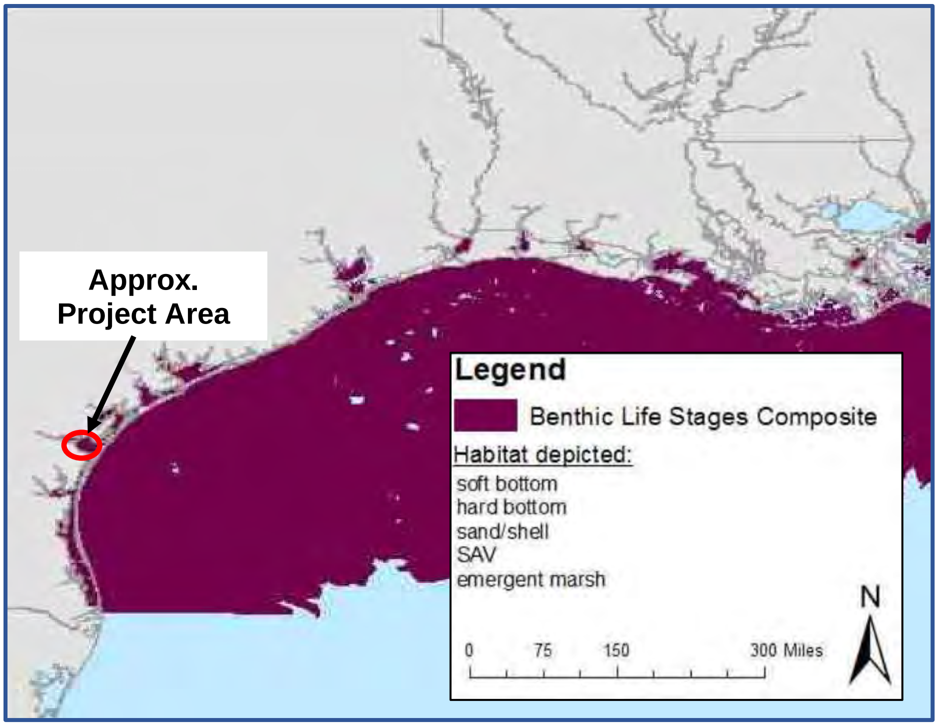

Figure 4-8: Red Drum (*Sciaenops ocellatus*) EFH for All Life Stages in and Around the Proposed Action Areas (BU Areas)

Source: Figure 7 of GOMFMP (2016)

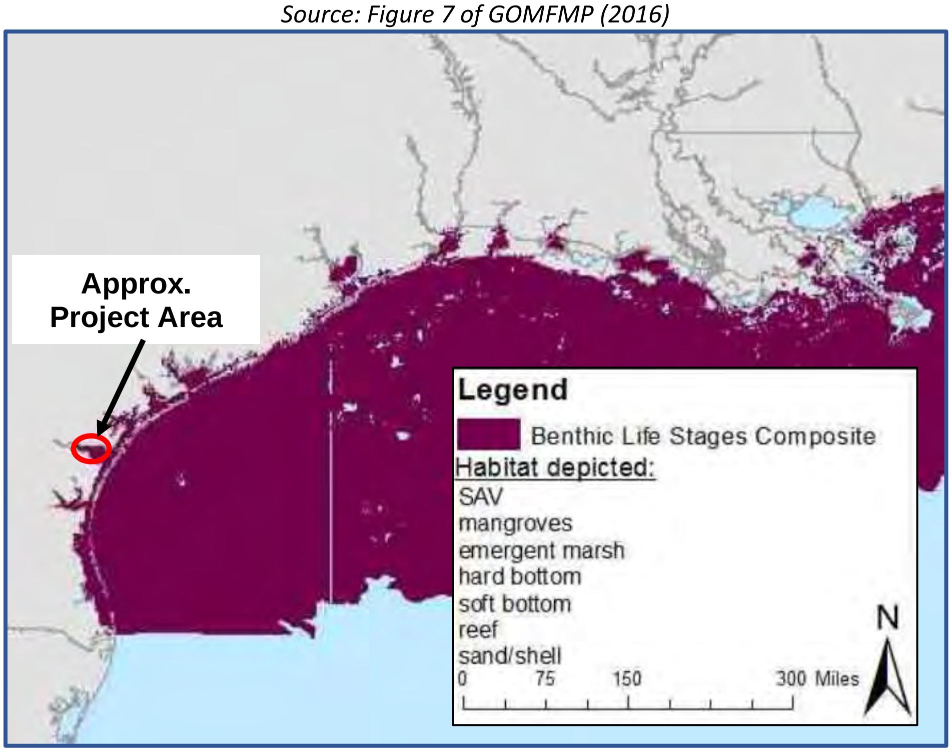

Figure 4-9: Gray Snapper (*Lutjanus griseus*) EFH for All Life Stages in and Around the Proposed Action Areas (BU Areas)

Source: Figure 16 of GOMFMP (2016)

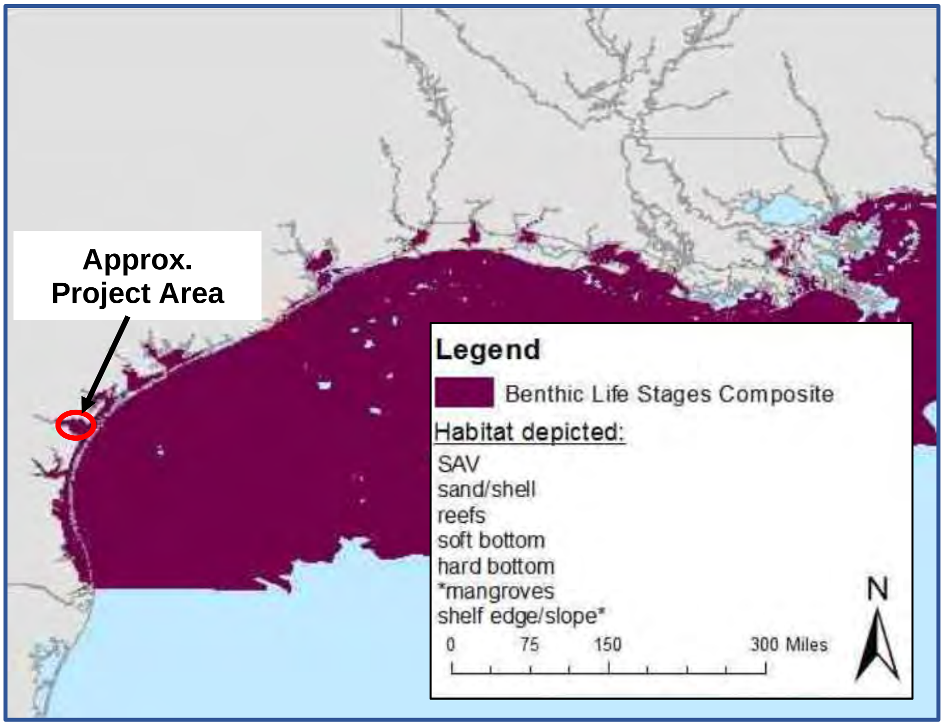

Figure 4-10: Lane Snapper (Lutjanus synagris) EFH for All Life Stages in and Around the Proposed Action Areas (BU Areas)
Source: Figure 18 of GOMFMP (2016)

4.8.2. Future Conditions with the Proposed Action

Wildlife and Bird Values

The placement of material in open-water areas would have adverse direct, short term, and minor impacts on benthic species in Nueces Bay. However impacted species would be expected to recolonize living shoreline areas and remaining open-water areas, and the direct loss of individuals would not substantially impact the overall diversity or abundance of benthic species in Nueces Bay. Although marsh restoration would result in the loss of deep open-water habitat in the restoration units, wildlife species currently utilizing this habitat would not be expected to be adversely affected. Most of these species are mobile allowing them to relocate into adjacent open-water habitats outside benefit to aquatic species.

The project would create tidal flats and transitional marsh area between open-water and established wetlands, therefore providing long term beneficial effects to Texas diamondback terrapin habitat and nesting site prevalence. The project would not impact gulf coast marsh snakes as these individuals would not be present in the open-water placement locations. The project is anticipated to convert open water and some potential widgeon grass habitats to wetland marsh and intertidal flat habitat and would create living shoreline and intertidal shore to protect existing marsh wetlands from erosion. The project would create new areas of habitat for use by wildlife species for shelter, nesting, feeding, roosting, cover, nursery grounds, and other life requirements as an indirect impact of material placement. This would provide an overall long-term and major beneficial effect to colonial birds and other wildlife values in the area.

Essential Fish Habitat Assessment

There are EFHs for brown shrimp, pink shrimp, white shrimp, red drum, gray snapper, and lane snapper within the Proposed Action Areas (BU Areas) according to GOMFMC (1998, 2006), NOAA (2009), and spatial data in NOAA Fisheries (2022). In general, the placement of dredged material in the Proposed Action Areas (BU Areas) could potentially produce the following adverse effects to some or all of the species having EFH in the project area:

- Temporary water column perturbations (turbidity plumes, release of chemical contaminants, lowering dissolved oxygen concentrations)
- Mortality of benthic organisms
- Changing the bathymetry of the site
- Altering the sediment composition of the site

Dredged material is anticipated to originate from the CCSC and analysis of borings within the dredge prism indicates between 12.3% and 28.2% silt and between 25.1% and 69.1% clay content (see Figure 4-11 below). Sediment within Nueces Bay had 18.9% to 94.0% silt and clay fraction in a study conducted and reported by Nicolau and Hill (2013). Thus, the composition of dredged sediment originating from the estuary is expected to be similar to the fine sand that is currently found at the area proposed for the nearshore placement area.

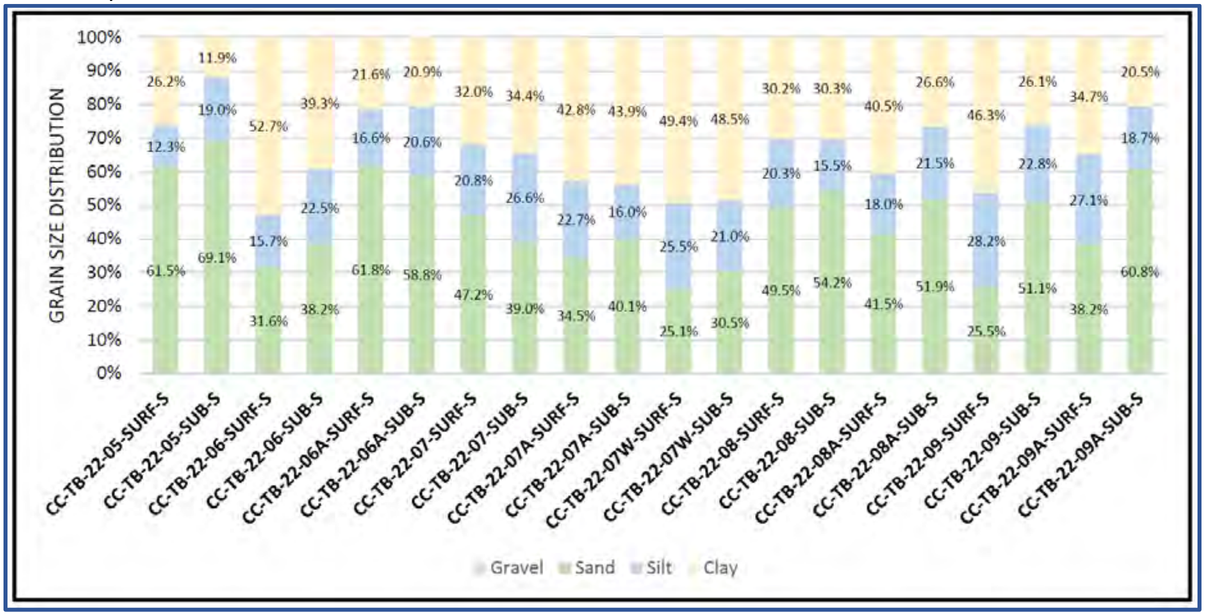

Figure 4-11: Grain Size Distributions from Inner Harbor Sediment Samples

Potential Impacts to Penaeid Shrimp Larvae

Penaeid shrimp such as brown, pink, and white shrimp have planktonic life stages that include planktonic eggs and larvae. The planktonic larvae enter estuaries such as Nueces Bay from offshore waters but the eggs, very early larval stage, and the latter juvenile stages are normally associated with open Gulf waters. Impacts to the planktonic larvae and other zooplankton at the BU Areas, resulting from dredged material placement may include mortality due to entrainment in the sediment plume and interference with filter-feeding caused by a temporary increase in suspended sediments. These impacts are expected to be short-term and localized and are not expected to significantly affect planktonic conditions in the region, especially considering that steps are taken in CWA 404 testing to evaluate and prevent deleterious effects on zooplankton and other organisms of the water column before the dredged material is deemed suitable for BU.

Potential Impacts to Red Drum, Gray Snapper and Lane Snapper

Red drum spawn offshore in large aggregations of hundreds to thousands of individuals. The pelagic eggs hatch in less than two days and the larvae eventually find their way into tidal creeks inside estuaries such as those in Nueces Bay (MacEachran and Fechhelm 1998). There, they settle out of the water column and become associated with the substrate. These post-larval red drums do not leave the tidal creeks until they are about 20 to 25 centimeters total length, at which time they move from the tidal creeks to the open shallow waters of the estuary (MacEachran and Fechhelm 1998).

Gray and lane snapper spawn in open Gulf waters over a variety of structures and the eggs are laid on the substrate where they are then fertilized. The early larval stage is planktonic (Anderson 2002, MacEachran and Fechhelm 2005). The planktonic larvae find their way into a variety of estuarine habitats such as SAV beds and mangroves. The larvae quickly grow into the pre-juvenile life stage and then the juvenile stage and by the time they reach about 80 millimeters total length, they move into shallow rocky areas and coastal reefs where the adults are commonly found (Anderson 2002, MacEachran and Fechhelm 2005).

Pelagic larvae of these EFH fish species can be smothered by resuspended sediment (Suedel 2011). Though information is limited, most studies on the effects of dredging and dredged material placement on fish communities have focused on larvae and eggs in estuarine environments (e.g., Auld and Schubel 1978, Johnston and Wildish 1981). Results from these studies suggest that if the placement of dredged material does not significantly affect these sensitive life stages, fishes and commercial fisheries will be similarly unaffected by placement events (EPA 1993).

The juvenile and mature life stages in these EFH fish species are generally not adversely affected by dredged material placement due to their high mobility (EPA 1983). During a placement event, the greatest impacts to these fishes may be from increased turbidity within the dredged material plume, which may temporarily limit the feeding efficiency of visually oriented predators and reduce the oxygen exchange capacity of their gills via the clogging of opercular cavities and gill filaments (Doudoroff 1957, EPA 1993) and the physical abrasion of filtering and respiratory organs (Suedel 2011). Younger juveniles may be more susceptible to the effects of released dredged material (EPA 1995). The reduction in oxygen exchange capacity in the gills of young juveniles and the effects of decreased dissolved oxygen associated with a turbidity plume can be more pronounced compared to effects on adults and older juveniles. However, highly mobile fishes are likely to avoid the dredged material plume. It is possible that dredged material deposition at a nearshore placement area provides attractive foraging opportunities for actively predacious species by temporary displacement of epibenthic forage species.

Turbidity tests done by Wallen (1951) using montmorillonite clay (a 2:1 smectite clay) particles and 16 warm-water fish species showed no behavioral changes in fish until the turbidity levels were extremely high (nearing 20,000 parts per million (ppm) of silicone dioxide). Further, the Wallen (1951) study showed that most fish withstood concentrations above 50,000 ppm before mortality took place, and many of the fish were able to endure concentrations of more than 100,000 ppm for a week or longer before succumbing when turbidity reached between 175,000 and 225,000 ppm. In highly turbid conditions, harmful dissolved substances (whether natural or manmade) can impair the gas exchange capacity of the gills at least as much as can particulate matter (Doudoroff 1957). The impairment of gill function in advanced life stages of fish ascribable to chemically inert suspended particles can apparently only occur when turbidity is exceedingly high (Doudoroff 1957), and so it is thought to affect fish gill functions only minimally during dredged placement activities.

Placement of dredged material at the BU Areas are expected to minimally affect juvenile and mature red drum, gray snapper, and lane snapper. Only a localized area will be affected by dredged material operations, and fish populations are not geographically limited to the BU Areas; therefore, the presence of such species within the affected area during dredged material placement operations is expected to be minimal. If these species are traveling through the immediate area during dredged material placement activities, the fishes may modify their route during discharge operations. Adult fishes within and immediately adjacent to the placement area may experience a temporary reduction in the oxygen exchange capacity of their gills due to clogging and physical abrasion (Suedel 2011). A minor decrease in dissolved oxygen can occur due to an increase in the biological oxygen demand associated with the dredged material. Additional stress in adult fishes can occur due to avoidance reactions (EPA 1995). However, conditions that could impact pelagic fishes are expected to be short-term (measurable in hours) and localized (<1 mile), and the effects on adults and larger juveniles living within the water column are not expected to be significant given their ability to quickly avoid the localized area of dredged material placement activities.

Effects Summary and Conclusions

EFH exists throughout the Proposed Action Areas (BU Areas) for brown, pink, and white shrimp, red drum, and gray and lane snapper. Effects to the water column, such as increased turbidity, are expected to be temporary. Direct effects of sedimentation are not expected to be substantial due to the mobility of most life stages of these EFH species and the lack of geographic constraints within the vicinity of the project area. Benthic infaunal organisms and sessile organisms that serve as prey or provide microhabitats to these EFH species are expected to be affected by dredged material placement activities. Penaeid shrimp such as brown, pink, and white shrimp generally prefer soft sediment and this species may therefore find the placement of fine sediment attractive and may even benefit from placement activities at the BU Areas. Overall, the effects on EFH and federally managed species in the area are expected to be minimal.

The EFH species that occur within the BU Areas are not likely to experience an overall negative effect considering the following:

- Dredged material to be used for BU is soft sediment suitable for some of these species.
- The BU Areas within Nueces Bay represent a tiny fraction of the total area designated as EFH for each of these species by NOAA.

No significant effects are expected to occur for the large, highly motile species. Limited effects to larval and post-larval red drum and to early larval gray and lane snapper may occur during active dredged material placement activity, however. Overall, only minimal effects are expected for EFH species.

Overall, effects to EFH species as a result of the Proposed Action are expected to be minimal and short-term. No significant or long-term effects on EFH are expected. Correspondence between USACE and NOAA Fisheries, Southeast Region, Habitat Conservation Division on 23 Aug 2022 regarding the Proposed Action resulted in NOAA concurrence with the USACE conclusion of no significant impacts. Agency coordination letters related to EFH consultation are provided in Appendix F.

4.9. Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) and the NMFS are the regulatory and enforcement agencies which implement the ESA of 1973. USFWS has jurisdiction over threatened and endangered terrestrial species, the manatee, and nesting sea turtles, while the NMFS has jurisdiction over all other threatened or endangered marine wildlife, including seaward sea turtles. The ESA is meant to protect and recover imperiled species and their ecosystems. Threatened and Endangered species, and their designated Critical Habitats, are protected by the ESA. The project study area includes terrestrial (wetland marsh) area within San Patricio County and aquatic areas within Nueces Bay which is bordered by San Patricio and Nueces Counties.

The TPWD is responsible for listing animal or plant species of conservation concern as threatened or endangered under the authority of state law. The TPWD has also listed Species of Greatest Conservation Need as defined in the 2012 Texas Conservation Action Plan. Species of Greatest Conservation Need are not listed as threatened or endangered, however they are included in this discussion based on their special designation by the state of Texas. The project study area was assessed using USFWSs Information for Planning and Consultation (IPaC) system, NOAAs state data, and the TPWDs element occurrence data (TXNDD 2019).

4.9.1. Existing Conditions

The following Federal and state-listed threatened and endangered species are known to occur in San Patricio and Nueces counties within the habitat types present in the study area; inclusion in the list does not imply that the species occurs within the Project Area, but only acknowledges the potential for its occurrence. Species listed as threatened or endangered that would not occur in the habitat types present in the Project area or study area are not included in the list. Refer to Appendix E for a comprehensive list of all threatened and endangered species that are listed in Nueces and San Patricio County areas. Species were not considered for further assessment if their habitat is not found within the Project Area or study area (including Black Lace Cactus, Slender Rush-pea, and South Texas Ambrosia).

Table 4-3: Threatened and Endangered Species Potentially in Project Area

Common Name	Scientific Name	Federal Status	State Status	Habitat
BIRDS				
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	E	E	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species
Piping Plover	*Charadrius melodus*	T	T	Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Red Knot	*Calidris canutus rufa*	T	T	Utilizes Texas' coast for migration and wintering habitat where it forages on beaches, oyster reef, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides.
Whooping Crane	*Grus americana*	E	E	Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrants via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties. Project area includes unlikely foraging ground, but not nesting habitat.
Eastern Black Rail	*Laterallus jamaicensis jamaicensis*	T	T	Found in salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of *Salicornia*. Eastern black rails occupy relatively high elevations along heavily vegetated wetland gradients, with soils moist or flooded to a shallow depth. It requires dense overhead perennial herbaceous cover with underlying soils that are moist to saturated (occasionally dry) interspersed with or adjacent to very shallow water.
Reddish Egret	*Egretta rufescens*	-	T	Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear. Project area includes possible foraging ground, but not nesting habitat.
White-faced ibis	*Plegadis chihi*	-	T	The county distribution for this species includes geographic areas that the species may use during migration. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
MAMMALS				
West Indian Manatee [a]	*Trichechus manatus*	T	-	Species inhabit large, slow-moving rivers, river mouths, and shallow coastal areas such as coves and bays.

Common Name	Scientific Name	Federal Status	State Status	Habitat
REPTILES				
Green Sea Turtle[b]	*Chelonia mydas*	T	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the GOM. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September).
Hawksbill Sea Turtle[b]	*Eretmochelys imbricata*	E	E	Inhabit tropical and subtropical waters worldwide, in the GOM, especially Texas. Hatchlings and juveniles are found in open, pelagic ocean and closely associated with floating algae/SAV mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water more than 65 ft deep. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand.
Kemp's Ridley Sea Turtle [b]	*Lepidochelys kempii*	E	E	Inhabits tropical, subtropical, and temperate waters of the northwestern Atlantic Ocean and GOM. Adults are found in coastal waters with muddy or sandy bottoms. Nesting in Texas occurs on a smaller scale compared to other areas (i.e., Mexico); nests April through August.
Leatherback Sea Turtle [b]	*Dermochelys coriacea*	E	E	Inhabit tropical, subtropical, and temperate waters worldwide, including the GOM. Nesting is not common in Texas (March to July). Most pelagic sea turtles with the longest between nesting and foraging sites can dive to depths of 4,000 ft.
Loggerhead Sea Turtle [b]	*Caretta caretta*	T	T	Inhabits tropical, subtropical, and temperate waters worldwide, including the GOM. They migrate from feeding grounds to nesting beaches/barrier islands and some nesting does occur in Texas (April to September). Beaches that are narrow, steeply sloped, with coarse-grain sand are preferred for nesting. Juveniles and young adults spend their lives in open ocean, offshore before migrating to coastal areas to breed and nest. Foraging areas for adults include shallow continental shelf waters.
INSECTS				
Monarch butterfly	*Danaus plexippus*	C	-	Monarchs migrate through the coastal areas of Texas in the spring and fall to and from breeding grounds in Mexico and could use the region for foraging on nectar plants. Texas is home to some Monarchs all year round with year-round breeding.

Source: TPWD 2022; NOAA 2022; NMFS 2022

E = Endangered; T = Threatened; C= Candidate

a. Protection of manatees is under jurisdiction of USFWS, even though they are an aquatic species.

b. Sea turtle species are protected in the aquatic environment under the jurisdiction of NOAA Fisheries, and in the terrestrial environmental (nesting) under the jurisdiction of USFWS.

4.9.2. Future Conditions with the Proposed Action

The ESA, as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend (16 United States Code 1531–1543). The ESA is administered by the Department of the Interior, through the Service, and by the NOAA, through the NMFS. Section (7)(a)(2) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that are proposed or listed as endangered or threatened, as well as their designated critical habitat, if applicable. It is the responsibility of each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species.

The following Federally-listed threatened (T) and endangered (E) species have habitats that potentially occur within the project area: Northern Aplomado Falcon (*Falco femoralis septentrionalis*) (E), piping plover (*Charadrius melodus*) (T), rufa red knot (*Calidris canutus rufa*) (T), whooping crane (*Grus americana*) (E), eastern black rail (*Laterallus jamaicensis jamaicensis*) (T), West Indian manatee (T), loggerhead sea turtle (*Caretta caretta*) (T), Kemp's ridley sea turtle (*Lepidochelys kempii*) (E), green sea turtle (*Chelonia mydas*) (T), leatherback sea turtle (*Dermochelys coriacea*) (E), and hawksbill sea turtle (*Eretmochelys imbricate*) (E), and monarch butterfly (*Danaus plexippus*) (C).

The following species descriptions and evaluations propose effect determinations for these listed species.

Northern Aplomado Falcon

Northern Aplomado falcons are permanent residents in South Texas occurring in savannas, open woodlands, grassy plains, coastal prairies, and desert grasslands. In the Gulf Coast region of Texas and Mexico, the species occupies coastal prairie habitat, coastal savannahs, marshes, and tidal flats with few trees, mesquite, yucca and cactus, or other tall succulent shrubs. In northern Mexico, southeastern Arizona, New Mexico, and west Texas, the species has a strong association with Chihuahuan desert grasslands with scattered tall yuccas. In the southwestern U.S., the northern Aplomado falcon uses old nests of ravens and other raptors. Nests can be found in Spanish dagger (*Yucca treculeana*), mesquite (*Prosopis* spp.), and manmade structures like power poles. Nests built in Spanish dagger are typically 6 to 10 ft. off the ground and average 1 to 3 ft. in diameter. Nesting/breeding activities occur between February 1 and August 31; however, this species is territorial, and pairs may stay near and defend their nest or nest site throughout the year. Since 1997, over 100 captive-reared young have been released annually along the Texas Gulf Coast. To date, this program has resulted in the establishment of at least 37 Aplomado pairs that have produced over 92 young in the wild (TPWD 2022). Their diet consists primarily of birds, but also includes insects, small snakes, lizards, and rodents.

The project areas could provide potential foraging habitat for Aplomado falcons, although unlikely. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, the project ***may affect, but is not likely to adversely*** affect Aplomado falcons.

Piping Plover

The piping plover is listed federally as threatened. It is a small shorebird that inhabits coastal beaches and tidal flats. Approximately 35% of the known global population of Piping Plover winters along the Texas Gulf Coast, and breeds on the northern Great Plains and around the Great Lakes. Piping plovers forage and roost among a mosaic of beach and bay habitats and move among these habitats in response to tides, weather conditions, human disturbance, and prey abundance. Foraging habitats include bayside flats and islands, the intertidal zone of ocean beaches, channel cuts created by storm driven water, and shorelines of ephemeral ponds, lagoons, and estuarine wetlands. Roosting habitats include back-beach areas, dunes, wrack microhabitats, inlets, and river mouths (USFWS 2009). Critical habitat for piping plover has been established. The nearest critical habitat is located on Indian Point, approximately 6 miles from the closest proposed BU site.

The project areas could provide potential foraging habitat for piping plover, although unlikely. Within the project areas, Piping Plovers could potentially be found within the tidal mud flat habitat areas. Refer to Appendix C – Habitat Assessment for depiction of the tidal mud flat habitat areas identified within the project area. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, the project ***may affect, but is not likely to adversely*** affect Piping Plover.

Red Knot

The red knot, which was federally listed as threatened in January 2015, is a medium-sized shorebird that breeds in the central Canadian arctic but can be found on the Texas coast during migration and winter. During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Critical habitat has not been designated for this species. Habitats used by red knots in migration and wintering areas are similar in character: generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are most frequently found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks (USFWS, 2013). In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans.

The project areas could provide potential foraging habitat for red knots, although unlikely. Within the project areas, Red Knots could potentially be found within the tidal mud flat habitat areas. Refer to Appendix C – Habitat Assessment for depiction of the tidal mud flat habitat areas identified within the project area. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, the project ***may affect, but is not likely to adversely*** affect Red Knot.

Whooping Crane

Whooping cranes are the tallest bird in North America, reaching up to 5 ft in height. According to NOAA Fisheries (2022), four distinct geographic population exist in the wild with one of which – Aransas Wood Buffalo Population – migrates from Aransas National Wildlife Refuge (NWR) northeast of Rockport, Texas, (100 miles southwest of the Project area) to Wood Buffalo National Park in Alberta Canada. Critical habitat has been designated for the whooping crane on the coast, 100 miles south of the project area in the Aransas NWR. This species could be an incidental visitor to the project area during migration, as Nueces and San Patricio County is located within the central whooping crane migration flyaway. Whooping cranes could potentially forage in marshes for invertebrates, small vertebrates, and some plant material such as Carolina wolfberry fruits which could be in the vicinity of the project area.

The project areas could provide stopover foraging habitat for Whooping cranes, although highly unlikely as more suitable habitat is located north of the Project Area at the Aransas NWR. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, the project ***may affect, but is not likely to adversely*** affect Whopping crane.

Eastern Black Rail

The eastern black rail is the most secretive of the secretive marsh birds and one of the least understood species in North America. The sparrow-sized bird with slate gray plumage and red eyes lives in remote wetlands of the Midwest and along the coasts of the Atlantic and Pacific oceans and the GOM. Because it only comes out at night, prefers to walk hidden in tall grasses instead of flying and rarely makes a call, very little is known about its behavior and habitat needs. Not much is known about the subspecies diet, but they are probably opportunistic foragers. Their bill shape suggests generalized feeding methods such as gleaning or pecking at individual items, thus a reliance on sight for finding food. Examination of specimens collected indicates a diet of small aquatic and terrestrial invertebrates, as well as small seeds. Foraging most likely occurs on or near the edges of stand of emerging vegetation -- both above and below the high-water line.

Within the project areas, dredged material would be placed into open-water areas and severely degraded and fragmented marsh habitat. Within the project area, Eastern Black Rails could potentially be found within the wetland low marsh habitat areas. Refer to Appendix C – Habitat Assessment for depiction of the low marsh habitat areas identified within the project area. Adjacent to the marsh beneficial use placement areas, intact marsh habitat is present and could be suitable habitat for eastern black rail however material would not be placed in these areas. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, the project ***may affect, but is not likely to adversely*** affect Eastern Black Rail.

Reddish Egret

The reddish egret is not a federally listed threated or endangered species but is state listed as threatened. The reddish egret inhabits coastal tidal flats, salt marshes, shores, and lagoons, where it utilizes the calm shallow waters, protected bays, and estuaries to forage for fish, frogs and crustaceans. Breeding takes place during the spring months and nests are built by both sexes on the ground in Texas. Clutch size ranges from 3 to 4 eggs, with both sexes participating during incubation (TPWD 2019).

Within the project areas, Reddish Egrets could potentially be found within the tidal mud flat and low marsh habitat areas. Refer to Appendix C – Habitat Assessment for depiction of the habitat areas identified within the project area. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, ***adverse impacts are not anticipated*** to Reddish Egret.

White-faced Ibis

The White-faced ibis is not a federally listed threatened or endangered species but is state-listed as threatened. The White-faced ibis can be found in marshes, preferably freshwater, and forages on insects, newts, worms, crayfish, frogs, and small fish. They are colonial nesters in reeds and beds of bulrush, or sometimes in trees. The male and female both share in the parenting responsibilities of incubation and brooding of the nestlings. Nestlings initially are covered with a dull, blackish down and are noted to be uncommonly timid. In Texas, they breed during spring and summer, and winter along the Gulf Coast (TPWD 2019).

Within the project areas, White-faced Ibis could potentially be found within the tidal mud flat and low marsh habitat areas. Refer to Appendix C – Habitat Assessment for depiction of the suitable habitat areas present in the project area. With BMPs employed to avoid placement of material in vegetated areas and avoid breeding season, ***adverse impacts are not anticipated*** to White-faced Ibis.

West Indian Manatee

The Federally threatened West Indian Manatee is an aquatic mammal. They inhabit brackish water bays, large rivers, and salt water, and feed upon submergent, emergent, and floating vegetation with the diet varying according to plant availability (USFWS, 2008). Historically, the manatee inhabited the Laguna Madre, Gulf, and tidally influenced portions of rivers. Currently manatees are extremely rare in Texas waters and the most recent sightings are likely individuals migrating or wandering from Mexican waters.

The West Indian Manatee could potentially occur within the open-water shallows of the project study area but would be transient. Refer to Appendix C – Habitat Assessment for depiction of the open-water habitat areas present in the project area. Any placement occurring within open-water areas would adhere to BMPs including observing for potential manatees in the area. Therefore, the project ***may affect but is not likely to adversely affect*** the West Indian manatee.

Sea Turtles

The green sea turtle is federally and state-listed as threatened. Along the coast of Texas, green sea turtles are known to nest on barrier islands on the middle coast and lower coast, especially at Padre Island National Seashore. Hatchling green sea turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses (submerged aquatic vegetation) and marine algae. The species is generally found in reefs, bays, inlets, and estuaries, especially dominated by seagrasses and algae. However, the green sea turtle migrates into deeper marine waters between foraging grounds and nesting beaches with adults migrating every few years from coastal foraging areas to waters off the original nesting beaches. (NOAA Fisheries 2022).

The hawksbill sea turtle is listed as federally and state-listed as endangered. The hawksbill sea turtle is primarily found in tropical coral reef environments. This species is highly migratory and has been observed inhabiting a wide variety of habitats, from open ocean and lagoons to mangrove swamps. The probability of a nesting occurrence near the project is incredibly low given the rarity of nesting on the Texas coast and the very few sightings of these species in nearshore marine environments.

The Kemps ridley turtle is listed federally and state-listed as endangered. The Kemp’s ridley sea turtle is found in the GOM in Mexico and the U.S. (NOAA Fisheries 2022). Nesting is limited to the beaches of the western GOM, primarily in the Mexican State of Tamaulipas, but also along the Texas coast and infrequently in other U.S. states (NOAA Fisheries 2022). The Kemp’s ridley is one of the rarest sea turtles in the world. Its numbers precipitously declined between the late 1940s through the mid-1980s with low-recorded nest populations of 702 (NOAA Fisheries 2022). Outside of nesting, Kemp's ridleys are usually found in the nearshore and inshore waters of the northern GOM. Adult Kemp's ridleys primarily occupy nearshore habitats that contain muddy or sandy bottoms where prey can be found (NOAA Fisheries 2022). Kemp's ridley hatchlings and small juveniles enter the water and quickly swim offshore to open ocean developmental habitat where they associate with floating sargassum (*Sargassum sp*.) seaweed. This species is relatively common in inshore waters of Texas and has a broad preference for hard-shelled marine invertebrates.

The leatherback sea turtle is listed as federally and state-listed as endangered. The species has been federally listed as endangered since 1970. The only critical habitat is designated in the U.S. Virgin Islands (USFWS, 2018). The leatherback sea turtle is the largest, deepest diving and most migratory of all sea turtles; It also has the largest range. Adults can reach 4 to 8 ft. (1.2 to 2.4 m) in length and weigh 500 to 2,000 pounds. Found worldwide, their primary nesting beaches in the Atlantic are on the northern coast of South America and at various locations around the Caribbean. A few nests in Florida and on the GOM coastline in Mexico. The historical range included the GOM and Texas waters. One leatherback nest was located at Padre Island National Seashore in 2008. Due to the transient nature of this species and the fact that their preferred habitat is deep open ocean, it is unlikely for the leatherback sea turtle to occur.

The loggerhead sea turtle is listed federally and state-listed as threatened. Loggerhead turtles are found throughout the world in mid-latitude warm ocean waters. The turtle is found throughout the GOM, with more nesting occurring from Mississippi to Florida; occasional nesting occurs in the western GOM (USFWS 2018). Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches. During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the GOM, Bahamas, Greater Antilles, and Yucatan. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (USWFS 2018). Coral reefs, rocky places, and shipwrecks are often used as feeding areas. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and it is often in association with other species of sea turtles. This species is common in inshore waters of Texas and has a broad preference for hard-shelled marine invertebrates.

All five sea turtle species are listed to potentially occur within Corpus Christi Bay, and subsequently Nueces Bay, however they would likely occur along the GOM beaches or within dense SAV meadows of inshore Redfish Bay. It is unlikely that any sea turtles of any species would be located within the waters of Nueces Bay, and if so, they would be transient. There are no adequate beach nesting sites within Nueces Bay for nesting to occur; therefore, nesting turtles would not occur in the project study area. Therefore, the project would have ***no effect*** on aquatic sea turtles or nesting sea turtles.

Monarch Butterfly

On December 15, 2020, the USFWS announced that listing the monarch as endangered or threatened under ESA is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants (85 FR 81813). The monarch is now a candidate species under ESA. Texas is situated between the principal breeding grounds in the north and the overwintering areas in Mexico. Monarchs funnel through Texas both in the fall and spring. During the fall, monarchs use two principal flyways. One traverses Texas in a 300-mile-wide path stretch from Wichita Falls to Eagle Pass.

Monarchs enter the Texas portion of this flyway during the last days of September and by early November most have passed through to Mexico. The second flyway is situated along the Texas coast and lasts roughly from the third week of October to the middle of November. Early each March overwintering monarchs begin arriving from their overwintering grounds in Mexico seeking emerging milkweeds where they lay their eggs before dying. Most of their offspring continue heading north to repopulate the eastern half of the U.S. and southern Canada.

Within a couple of miles of the project study area, there are grasslands, fields, and marshes that could support milkweed and nectar flowering species in the fall and spring that monarchs could use along their migration paths. Suitable habitat is absent in the open-water areas and is generally very limited in the existing marsh areas with only a few nectar flowering plants potentially sporadically growing. Common nectar plants could include sea oxeye, seaside golden rod (*Solidago sempevirens*) and salt marsh aster (*Aster tenufolius*). Milkweed, specifically swamp milkweed (*Asclepias incarnata*) is uncommon in the area. The project would not be impacting vegetated wetland areas and therefore would have ***no effect*** on Monarch Butterfly.

Migratory Birds

Table 4-4 contains a list of migratory birds and migratory birds of conservation concern that may occur within the Project area. While this is not an exhaustive list of all the species that may occur, it is representative of the avian species that may occur with breeding area within the Project area and may be affected by the proposed Project (USFWS 2022). Refer to Appendix E for lists of all migratory birds listed for concern for the project area by the USFWS.

Table 4-4: Typical Breeding Migratory Bird Species Occurring Within the Project Area.

Species	Bird of Conservation Concern in area	Breeding Dates
American Oystercatcher (*Haematopus alliates*)	Yes	April 15 to August 31
Black Skimmer (*Rynchops niger*)	Yes	May 20 to September 15
Chimney Swift (*Chaetura pelagica)*	Yes	Mar 15 to Aug 25
Dickcissel (*Spiza americana*)	No	May 5 to Aug 31
Gull-billed Tern (*Gelochelidon nilotica*)	Yes	May 1 to July 31
King Rail (*Rallus elegans*)	Yes	May 1 to September 5
Painted Bunting (*Passerina ciris)*	No	Apr 25 to Aug 15
Prothonotary Warbler *(Protonotaria citrea)*	Yes	Apr 1 to Jul 31
Reddish Egret (*Egretta rufescens*)	Yes	March 1 to September 15
Sandwich Tern *(Thalasseus sandvicensis)*	No	Apr 25 to Aug 31
Swallow-tailed Kite *(Elanoides forficatus)*	Yes	Mar 10 to Jun 30
Willet *(Tringa semipalmata)*	Yes	Apr 20 to Aug 5
Wilson's Plover *(Charadrius wilsonia)*	Yes	Apr 1 to Aug 20

With BMPs listed in Section 3.5 to avoid placement during breeding and nesting season for migratory birds, the project is not anticipated to adversely affect migratory birds or their habitat. The beneficial placement of material would result in long term beneficial effect to migratory birds by increasing habitat, foraging area, and nourishing existing marsh habitat.

4.10. Recreation, Aesthetics and Land Use

4.10.1. Existing Conditions

The southern shoreline of Nueces Bay is designated as Navigation Use for the POCCA (formerly Nueces County Navigation District No. 1), referenced by the Texas General Land Office (GLO) Coastal Resources Viewer (GLO 2022). Aesthetics and land use for this area are supported by industrial zoning where the area is developed to support refining facilities. Recreational fishing could occur off the shoreline here; however, additional land use is unavailable.

The NDP, a hub for the CBBEP, is located on the western side of Nueces Bay and occupies most of the delta marsh habitat evaluated as the project area. The first parcel of NDP was purchased in 2003, and land was gradually acquired in the area from private landowners (CBBEP 2022). Currently, the NDP comprises more than 10,000 acres of wetland habitat and offers education and recreation opportunities to the public through the CBBEP.

Along the north shore of Nueces Bay in San Patricio County, property is primarily underdeveloped with a limited number of private residential structures, as was evident based on aerial imagery and supporting research per the San Patricio County Appraisal District map (San Patricio CAD 2022). Spanning the entirety of Nueces Bay shoreline, boat launches and/or fishing docks are reserved for private use only); however, this area remains a popular destination for recreational fishing, kayaking, and windsurfing due mostly to the aesthetical appeal of the preserved, undeveloped coastline.

4.10.2. Future Conditions with the Proposed Action

Potential, temporary impacts on commercial or recreational fishing from the proposed project construction would be minor if any, as project activity would be isolated to the southern and western shoreline areas, where public access is minimal. The long-term nature of the project's effects is expected to benefit the ecosystem with significantly sustainable results on the marsh habitat, incidentally, improving aesthetics and recreation use.

4.11. Socioeconomics and Environmental Justice

Federal, state, and local regulations would ensure that human health and safety are not impacted as part of any proposed restoration activities. EO 12898 states that, to the greatest extent practicable, federal agencies must "identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." This order requires lead agencies to identify and address, as appropriate, disproportionately high and adverse environmental effects on minority and low-income populations from projects or programs that are proposed, funded, or licensed by federal agencies.

This section details the socioeconomic conditions and anticipated environmental impacts within the vicinity of the Project area. Socioeconomic factors evaluated in relation to the existing conditions within the project vicinity are not limited to but include culture, education, income, and residence.

4.11.1. Existing Conditions

Potential environmental impacts will apply to the counties within the Study Area that could possibly be affected by the development. For the purpose of the Socioeconomic and Environmental Justice sections the study area includes Nueces County and San Patricio County; both of which border the mouth of Nueces Bay. According to the 2020 data from *American Community Survey* (ACS), a demographic data feature of the United States Census Bureau, Nueces County has an approximate population of 353,178, while the more rural San Patricio County population rests at approximately 68,755. A breakdown of population per race from the 2020 ACS data for both counties is depicted in Figure 4-12 below.

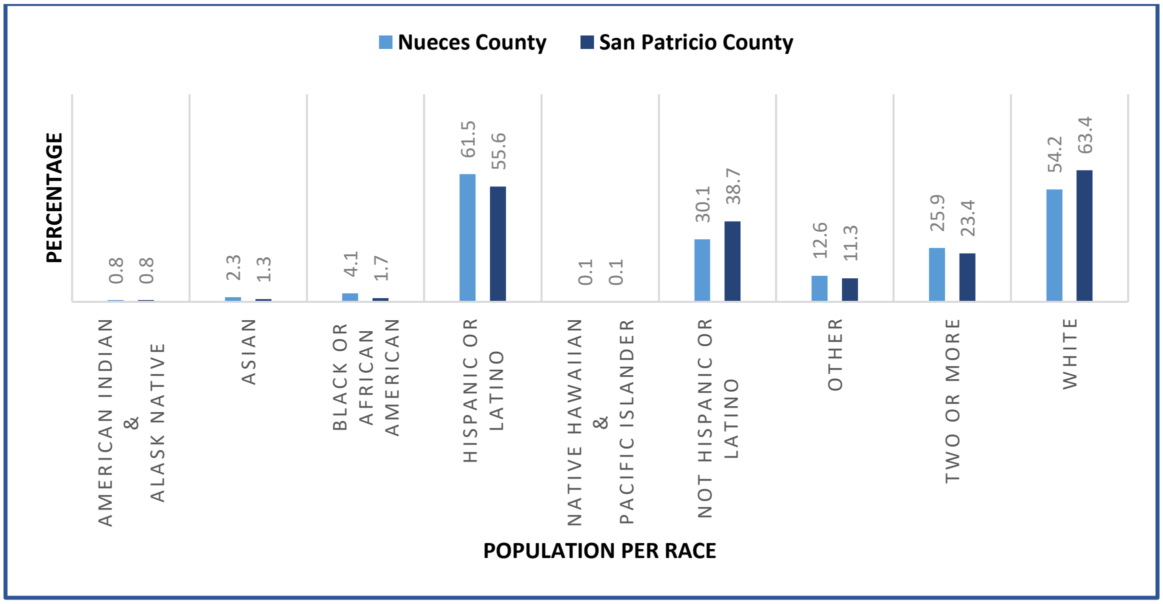

Figure 4-12: County Population per Race

A closer look at the population of the 151,255 housing units in Nueces County and the 29,424 in San Patricio County, linguistic barriers such as households with limited to no English fluency exist for 35% of Nueces and 34.4% of San Patricio residents in those counties. Spanish remains the primary language other than English for the counties. Additionally, the ACS data reported the median household income for both counties falls under $57,000 with a 16.25% poverty rate in Nueces County and 15.2% in San Patricio County.

A further review of each county's demographics via a desktop analysis, using the EPA *Environmental Justice Screening and Mapping Tool* (EJSCREEN), indicated Nueces County's population density per square (sq) mile exceeds that of San Patricio by nearly 23% (EPA 2022). Data from the EJSCREEN Tool outlines the two counties' socioeconomic indicators in comparison with Texas state averages as stated in Table 4-5 below.

Table 4-5: Socioeconomic and Environmental Justice Vulnerability Indicators of Project area

Category	Nueces County (%)	San Patricio County (%)	Texas (%)
People of Color	71	62	58
Low Income	37	39	34
Unemployment Rate	6	5	5
< High School Education	17	20	16

While the demographics among both counties in all but one category exceeds that of the state averages, indicating the proportion of susceptible individuals in the analyzed group is slightly higher, the nearest residential community is a mile south of the project area in the city of Corpus Christi.

Recreational fishing as described in Section 4.10 occurs within the Nueces Bay area, likely by minority populations and potentially as a supplemental food source for low-income populations.

4.11.2. Future Conditions with the Proposed Action

Based on the relationship between the project's nature and location and a review of publicly available data from ACS and EPA, none of the associated project work would create a disproportionately high and adverse effect on the EJ communities, including minority and low-income populations. EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks" (62 FR 19885), specifically addresses children because they may be more vulnerable or disproportionately impacted when compared to an adult exposed to the same event. No children would be adversely impacted by any of the activities that may occur under the proposed activities.

Temporary impacts to fishing areas utilized by EJ communities could occur during the project construction; however, these effects would be minor and short-term. Improvements in marsh habitat could provide benefits to commercial and recreational fishing industries through benefits to fish and wildlife habitat and populations. There would be an overall beneficial, indirect, long-term effect of the project on the communities in the region.

4.12. Air Quality

Effects to air quality as a resource from the dredging and placement of material were addressed in the CSCC Improvement Project FEIS. There would be no changes to air quality from BU placement of material as opposed to the placement of material within confined DMPAs, as proposed in the CCSCIP FEIS. Temporary impacts to air quality would result from emissions from construction equipment and dredging vessels. Air emissions would be generated over the short term as a result of construction activities, but not to levels significantly higher than what presently occur under the No-Action Alternative (as discussed in the FEIS), and emissions would not be outside the normal range of emissions from other activities in and around the project area.

An increase in vegetation could potentially provide a long-term benefit to air quality for the area. As the project area is currently threatened by climate change impacts and gradual sea level rise, the proposed project to nourish wetland habitats and supplement sediment resources along the shoreline would serve to beneficially buffer the effects of climate change for the project area, dampening effects of sea level rise, storm surge flooding events, and providing stabilized vegetated area to protect inland areas.

4.13. Noise

Noise would be generated during restoration activities from sources including vessels and mechanical equipment operation (e.g., pumps, compressors, heavy equipment). The proposed activities are of short duration and the types of noise generated are not unusual to everyday activities and, therefore, not anticipated to impact resources in the watershed. Minor noise impacts to wildlife within the natural areas of the delta marsh, such as colonial waterbirds and aquatic species would be expected. The effects of noise would be short-term, minor to negligible, and adverse impacts to resources from noise would be limited to effects of construction activities. With the proposed BMPs is place including avoiding placement during the breeding season of migratory birds, noise impacts from the project would be considered temporary and minor.

5. CUMULATIVE EFFECTS ASSESSMENT

The CEQ regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time," Per 40 CFR § 1508.7.

This analysis generally follows the methodology set forth in relevant guidance (CEQ, 1997; EPA, 1999). Under these guidelines, inclusion of other projects within the analysis is based on identifying commonalities of impacts from past, present, and potential projects that would result from the proposed project. For an action to be included in the cumulative impact analysis, it must:

- Impact a resource area potentially affected by the project;
- Cause this impact within the proposed project area; or
- Cause this impact within the resource-specific geographic boundary of where the project will also have an impact; and
- Cause this impact within the time span for the potential impact from the proposed project.

Actions in the project area were evaluated for significance if they would generally occur within the same town, county, and/or watershed as the project. Distant projects were eliminated from further evaluation because their impacts would not likely overlap with the project's area of impact. The timeline of selected projects, as the potential for cumulative effects, is dependent on the duration of the impact. Present projects were considered to overlap with the project in time of occurrence. Focus was placed on the resources identified in this EA; including wetlands; vegetation and wildlife; cultural resources; water and sediments; land use, recreation, and visual resources; socioeconomics; and air quality and noise.

The scoping for projects included in the cumulative effects assessment included the spatial and temporal boundaries of the proposed project and resource impacts. For this project, the study area was considered Nueces Bay and the shoreline of Nueces Bay, limited at the confluence to Corpus Christi Bay and not including projects within the Inner Harbor, as these projects would have been included in analysis of the FEIS. For a temporal boundary, projects considered for the cumulative effects analysis included projects that have been completed approximately within the past two years (2020 to 2022) or might be constructed in the foreseeable future based on current records of public notices from the USACE Galveston District, planning documentations from local or state agencies and organizations such as CBBEP or Nature Conservancy, or other public notification of the project from media sources.

Most actions were identified primarily through a comprehensive review of the USACE regulatory permit database for permits within the study area of Nueces or San Patricio Counties and located in waters of Nueces Bay or land adjacent to Nueces Bay or the Nueces River. Figure 5-1 below represents all past, present, and future actions selected for the cumulative effects assessment. Individual project documents, such as public notices, draft and final EA and EISs, Records of Decision, newspaper articles, planning documents, and project websites or fact sheets, were also reviewed for impacts to the resource areas. No attempts were made to verify or update those documents, and no field data were collected to verify the impacts described in the above documents.

In some cases, detailed information regarding past, present, and reasonably foreseeable actions were limited, especially regarding cumulative impacts. In these cases, qualitative assessments were completed when possible. There is also a level of uncertainty involved in assessing impacts of projects that are either proposed or in progress. Most of the reasonably foreseeable projects are planned, but do not have definitive implementation schedules due to a variety of factors including funding constraints and permitting. Furthermore, projects are often delayed or altered between the time they are announced and when they are completed, or sometimes abandoned.

5.1. Projects Assessed for Cumulative Effects

The following projects were considered in the cumulative effects assessment.

1. **SWG-2022-00071 - Union Pacific Railroad - Viola Channel and Nueces River - Corpus Christi, Nueces Co., Texas**
   Proposes the placement of a total of 9,595 cy of fill material (road grade) within 5.92-acres of jurisdictional wetlands during the construction of multiple tracts along an existing rail line and the expansion of a 0.04-acre area rail line tract in Corpus Christi, Nueces Co., Texas. The project is located 1.3 miles from the proposed action, Elbow Marsh placement site.
2. **SWG-2009-00991 - Port of Corpus Christi - Corpus Christi Ship Channel Inner Harbor - Corpus Christi, Nueces County, Texas**
   Proposes to construct a liquid bulk terminal in CCSC Inner Harbor, Nueces County, Texas that would impact 1.91 acres of estuarine emergent wetlands. Mitigation for the estuarine wetland impacts by planting 2.87 acres of estuarine vegetation in an unvegetated portion of the Rincon Bayou within the Nueces River Delta is proposed. PCCA would utilize the existing footprint of South Shore Cell C DMPA to construct the facility. The project is located 0.1 miles from the proposed action, Living Shoreline BU placement site.
3. **SWG-1997-01041 - City of Portland - Indian Point Park - Corpus Christi Bay - San Patricio County, Texas**
   Proposes the placement of fill material into 0.221 acre of wetlands and temporary impacts to an additional 0.009 acre of wetlands for the expansion of a parking lot at Indian Point Pier on Corpus Christi Bay, San Patricio County, Texas. The project is located 6 miles from the proposed action, Industrial BU placement site and approximately 10 miles from the Delta Marsh BU sites.
4. **SWG-2020-00839 - Port of Corpus Christi Authority - Corpus Christi Bay - Indian Point, Portland, San Patricio and Nueces Counties, Texas**
   Proposes living shoreline and breakwater construction to improve protection and habitat condition near the Indian Point Causeway shoreline located adjacent to Corpus Christi Bay in Portland, TX. The applicant proposes the placement of a maximum of 5,000 cy of sand along approximately 3 acres of the Indian Point shoreline to stabilize the soil, help absorb low-energy waves, and increase intertidal habitat conditions by establishing a stable slope for the shoreline. The sand fill would be placed along the shoreline below the HTL within the unvegetated bay bottom. Fill would not be placed within any existing SAV areas. Nearshore segmented breakwaters placed in approximately 2 acres of bay bottom would further absorb wave energy offshore and create a low-energy environment in the lee area; they may be constructed of approx. 10,000 cy of material or units composed of concrete, rock, steel, mesh, geotextile, geogrid, bedding stone, piles, chains, anchors, floating platforms, oyster shell, or similar placed within unvegetated bay bottom below the HTL. Oyster reefs would be constructed to provide new marine habitat; they would be composed of approximately 2,000 cy of shell hash, shell bags, live oysters, or similarly placed material within unvegetated bay bottom below the HTL in an

approximate 1.5-acre area. The project is a cooperative effort between the GLO and POCCA[2]. The project is located 6 miles from the proposed action, Industrial BU placement site and approximately 10 miles from the Delta Marsh BU sites.

5. **SWG-2019-00290 - Corpus Christi Infrastructure LLC/Nueces Bay**
Corpus Christi Infrastructure LLC proposes five aquatic resource crossings using open-cut trenching methods and the horizontal directional drilling (HDD) boring under Nueces Bay utilizing a Nationwide Permit 12. They propose approximately 8.57 acres of temporary impacts to four emergent wetlands and one stream crossing. The project is located approximately 1 mile from the proposed action.

6. **City of Corpus Christi/Inner Harbor Desal Facility**
In July 2020, the City of Corpus received funding from the TWDB to obtain permits for two sites (Inner Harbor and La Quinta Channel) and design and build a seawater desalination plant with a maximum capacity of 30 million gallons per day for municipal use at one of the two sites. The proposed location within the Inner Harbor avoids direct impacts to coastal resources due to the industrial setting. Engineering and design to minimize water quality impacts are underway. The TCEQ issued a draft Water Rights Permit for the Inner Harbor location on March 11, 2021 (City of Corpus Christi, 2022), and Public Notice on the issuance of the permit was published on November 16, 2021. The project is located 0.3 miles from the proposed action, Elbow Marsh placement site.

7. **Texas Coastal Resiliency Master Plan (Texas General Land Office) multiple projects**
The study area lies within Region 3 of the Texas Coastal Resilience Master Plan and this area includes five ecosystem restoration projects (GLO, 2019). Most projects involve habitat protection, shoreline restoration or stabilization, and living shorelines. Also planned are bird island restoration and protections, hydrological improvements, oyster reef restoration, and stormwater improvements. The projects are located between 5 and 10 miles from the proposed BU placement sites.
   a. R3-5 Portland Living Shoreline
   b. R3-9 Indian Point Marsh Area Living Shoreline
   c. R3-14 Causeway Island Rookery Habitat Protection
   d. R3 – Oyster Reef Restoration
   e. R3-16 Nueces County Hydrologic Restoration Study

8. **Coastal Bend Bays and Estuaries Program/ Various Projects**
Projects that have potential to contribute benefits to resources in the study area for the fiscal year 2023 plan include (Coastal Bend Bays and Estuaries Program, 2022): **2320 Black Rail Occupancy in the CBBEP Boundary, 2321 Relative Sea Level Rise and Habitat Assessment in the Nueces Delta, and 2329 Nueces Delta Shoreline Protection and Restoration**
   a. Nueces Delta Shoreline Protection and Restoration (as mentioned as project R3-15 above): In 2020, CBBEP received funding from the National Fish and Wildlife Foundation - Gulf Environmental Benefit Fund to construct 3,900 linear ft of breakwater to protect 650 acres of marsh habitat along the face of the Nueces Delta shoreline. In FY 2021, CBBEP continued working with engineers to develop the final designs for this project and construction will begin soon. This project is jointly considered with the proposed action

[2] https://glo.texas.gov/coastal-grants/projects/1651-indian-point-west-shoreline-protection.html

and the proposed Delta Marsh Breakwater

Figure 5-1: Map of Cumulative Effects Assessment Projects

5.2. Cumulative Effects Assessment

The cumulative impact of the BU placement is expected to result in positive long-term impacts to the project area. Based on information in Section 4.0 (Environmental Assessment), key resources will be evaluated for cumulative effects as discussed above. The following sections discuss each of these key resources.

5.2.1. Wetlands and Special Aquatic Sites

Past, present, and reasonably foreseeable actions with dredging or construction activities, and resultant turbidity, can potentially impact nearby wetlands and SAV. Pipeline installation can also have direct impacts to wetlands and SAV; however, horizontal directional drilling (HDD) can avoid and minimize potential impacts. Increases in ship traffic from other projects also have potential to impact wetlands and SAV through wake energies. Desalination projects could have impacts to wetlands or SAV during extreme drought conditions by contributing to increased salinities of the bay. Last, restoration projects, particularly those targeting wetlands and SAV conservation, would result in overall beneficial cumulative effects to wetland and SAV resources in the region.

5.2.2. Water and Sediment Quality

Temporary and localized impacts to water quality (in the form of increased turbidity) may result during dredging and placement. There would be limited spatial and temporal ranges of turbidity effects and related sediment movement. Past, present, and reasonably foreseeable actions in the area could contribute similar temporary and localized impacts to water quality during construction. Actions that require dredging or marine construction could increase turbidity temporarily and locally. Any increases in boat or ship traffic can also contribute to turbidity levels and increase in risk of accidental spills in the bay. Ecosystem restoration projects could help improve turbidity by establishing vegetation and living shorelines or slowing erosion. Overall, the project, in combination with other future restoration projects would provide beneficial effects to water and sediment quality of the region.

5.2.3. Freshwater Inflows, Salinity, and Sediment Topography/Erosion

The BU activities that have the potential to affect sediment transport and shorelines include the living shoreline creation, construction of breakwaters, and placement of material in open water. Changes to sediment transport and shorelines are possible with a wide range of past, present, and future actions in the area, and impacts can be both adverse and beneficial. Hardening shorelines can prevent erosion, but that can also impact sediment transport. Dredging may alter sedimentation and erosion patterns. Any changes in commercial or recreational boat traffic can result from new infrastructure or dredging actions can alter sedimentation and erosion through wakes and scours. Ecosystem restoration actions would have beneficial impacts on sediment transport and shoreline changes. Transportation and desalination projects are not expected to contribute to cumulative impacts on sediment transport and shoreline changes.

5.2.4. Fish and Wildlife Resources, Protected Species

The project would directly affect the estuarine habitats and fauna in the study area by the conversion of bay bottom habitat and other aquatic resources to intertidal shore, wetlands, and industrial use area due to placement activities. Construction impacts, mainly through turbidity increases, may impact aquatic fauna. Dredging and placement would have direct impacts on benthic communities, although benthic organisms would colonize the new substrates after placement. Past, present, and reasonably foreseeable actions with dredging or construction activities, and resultant turbidity, can potentially impact aquatic fauna. Pipeline installation can also have direct impacts to aquatic fauna, particularly benthic organisms; however, HDD can avoid and minimize potential impacts. Desalination projects could have impacts to aquatic fauna during extreme drought conditions by contributing to increased salinities.

The proposed BU placement actions would temporarily impact foraging grounds and construction activities may disturb shorebirds and other wildlife through lights, turbidity, and noise. Scheduling dredge and BU placement activity outside of the wintering period of listed shorebirds can avoid and minimize these disturbances. The BU placement actions could potentially benefit Federally-listed species such as Piping Plovers and Red Knots by nourishing or restoring tidal flat habitats. Migratory birds would benefit from dredged material placement at the placement actions targeting BU from expanded marsh areas, flats, and living shoreline that could be used as rookery sites. The proposed BU placement areas would increase nesting, foraging and wintering habitat for migratory species such as plovers, sandpipers, and curlews that would utilize nourished tidal flats and shorelines.

5.2.5. Recreation, Aesthetics and Land Use

The project would provide beneficial effect to recreation and aesthetics of the area through the nourishment of the estuarine habitats and fauna in the study area by the conversion of bay bottom habitat and other aquatic resources to intertidal shore and wetlands. Land use in the project area would be beneficially affected in the habitat nourishment areas and insignificantly affected in the industrial BU placement area as the adjacent land use is existing industrial and DMPA areas. Past, present, and reasonably foreseeable actions with construction activities can potentially temporarily impact recreation, aesthetics, and land use by limiting access to the public during construction. Habitat restoration projects would contribute to cumulatively beneficial effects to recreation and aesthetics and the projects considered industrial in nature would not adversely contribute to cumulative effects of land use if they were constructed in areas in line with the proposed industrial or commercial uses.

5.2.6. Air Quality and Noise

Past, present, and reasonably foreseeable actions in the area could contribute similar effects to air quality. For those projects constructed concurrently, there may be a chance of temporary and localized cumulative impacts. If reasonably foreseeable actions are constructed concurrently, there may be a chance of temporary and localized cumulative noise impacts. For past, present, and reasonably foreseeable actions that result in increased operational noise or in an increase in surface or marine traffic, there could be a potential contribution to noise impacts.

5.2.7. Conclusion

The project and other past, present, and reasonably foreseeable actions are expected to have overall beneficial cumulative impacts for the area as most projects include an aspect of mitigation, restoration, or habitat enhancement. Development projects that have adverse impacts to the resources discussed above are localized within the CCSC and provide mitigation for adverse impacts. The adverse impacts of the proposed project, in combination with other potential projects, include temporary and minor impacts to water quality due to turbidity increases during placement and sediment transport of placed material. Therefore, the proposed project's negative contribution to cumulative impacts is anticipated to be minimal or insignificant.

6. MITIGATION

This assessment of the potential environmental impacts to important resources finds that the proposed project would have negligible and insignificant adverse impacts to open-water habitat and fisheries resources. These impacts would be related to the loss of water bottom habitat and any associated loss of slow moving or sessile benthic organisms due to the placement of dredged material. The abundance of similar habitat within the project vicinity would further minimize the loss by providing refuge for displaced organisms. These long-term, positive, indirect impacts outweigh the adverse direct impacts caused by activities associated with the proposed action. Therefore, no impacts have been identified that would require compensatory mitigation.

7. COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Environmental compliance for the proposed action would be achieved upon coordination of this EA and draft FONSI with appropriate agencies, organizations, and individuals for their review and comments. Agency Coordination is shown in Appendix F. The draft FONSI (Appendix H) will not be signed until the proposed action achieves environmental compliance with all applicable laws and regulations, as described above.

This proposed project has been coordinated with the USFWS and other Federal, State, and local agencies. Consultation procedures have been initiated with the USFWS in compliance with the ESA, as amended. Our initial determination is that the proposed action will not have any adverse impacts on threatened or endangered species. The NMFS has issued concurrence that the project would have no effect on listed species under their jurisdiction and that the project is in compliance with the MSA.

Refer to Appendix F for a record of agency and organization coordination. Local cooperating organizations for this project include the CBBEP and POCCA. The following is a list of Federal, State, and local agencies with which these activities are being coordinated:

Federal

- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- U.S. Environmental Protection Agency

State

- Texas Parks and Wildlife Department
- Texas General Land Office, Coastal Coordination Council
- Texas Historical Commission
- Texas Commission on Environmental Quality
- Texas Department of Transportation

7.1. State Water Quality Certification

The proposed project will be evaluated regarding the requirements of Section 404(b)(1) of the CWA. Refer to Appendix G for the 404(b)(1) Evaluation Short Form. The TCEQ is reviewing the proposed project under Section 401 of the CWA and in accordance with Title 30, Texas Administrative Code Section 279.1-13, to determine if the work would comply with State water quality standards. By virtue of an agreement between the USACE and the TCEQ, the public notice is also issued for the purpose of advising all known interested persons that there is pending before the TCEQ a decision on water quality certification under such act.

7.2. Compliance with the Texas Coastal Management Program

The proposed project has been coordinated with the Texas GLOs Coastal Coordination Council. The proposed project would impact wetlands within the Texas Coastal Management Program, and therefore a Coastal Management Program Consistency Determination is required. Refer to Appendix F for a record of coordination.

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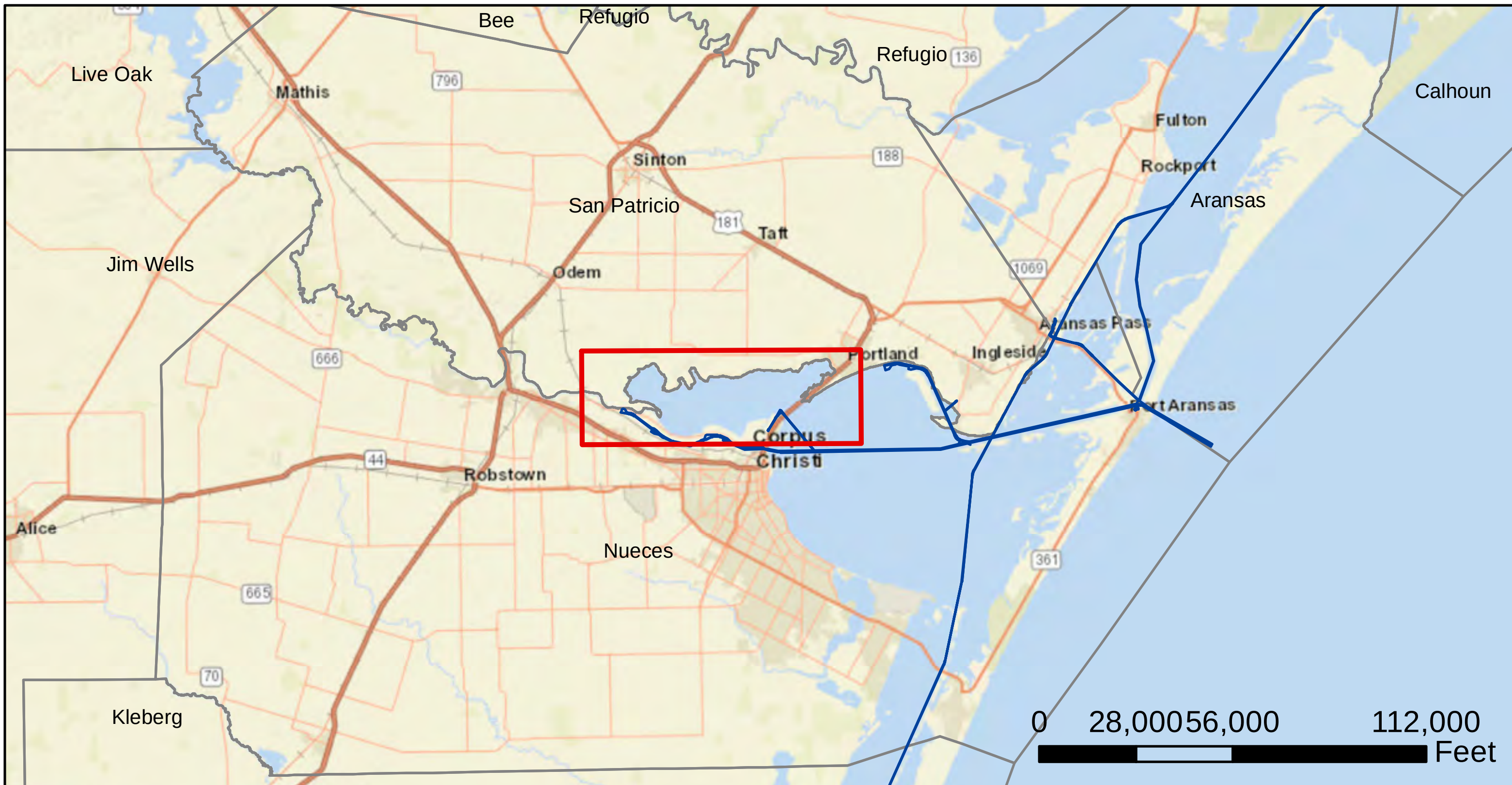
Appendix A

Project Figures



Legend

- Project Area
- Ship Channels
- Counties

N

Figure 1:
Vicinity Map
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Date: Oct 05, 2022	US Army Corps of Engineers
Prepared By: CG	
Project: CCSC BU	

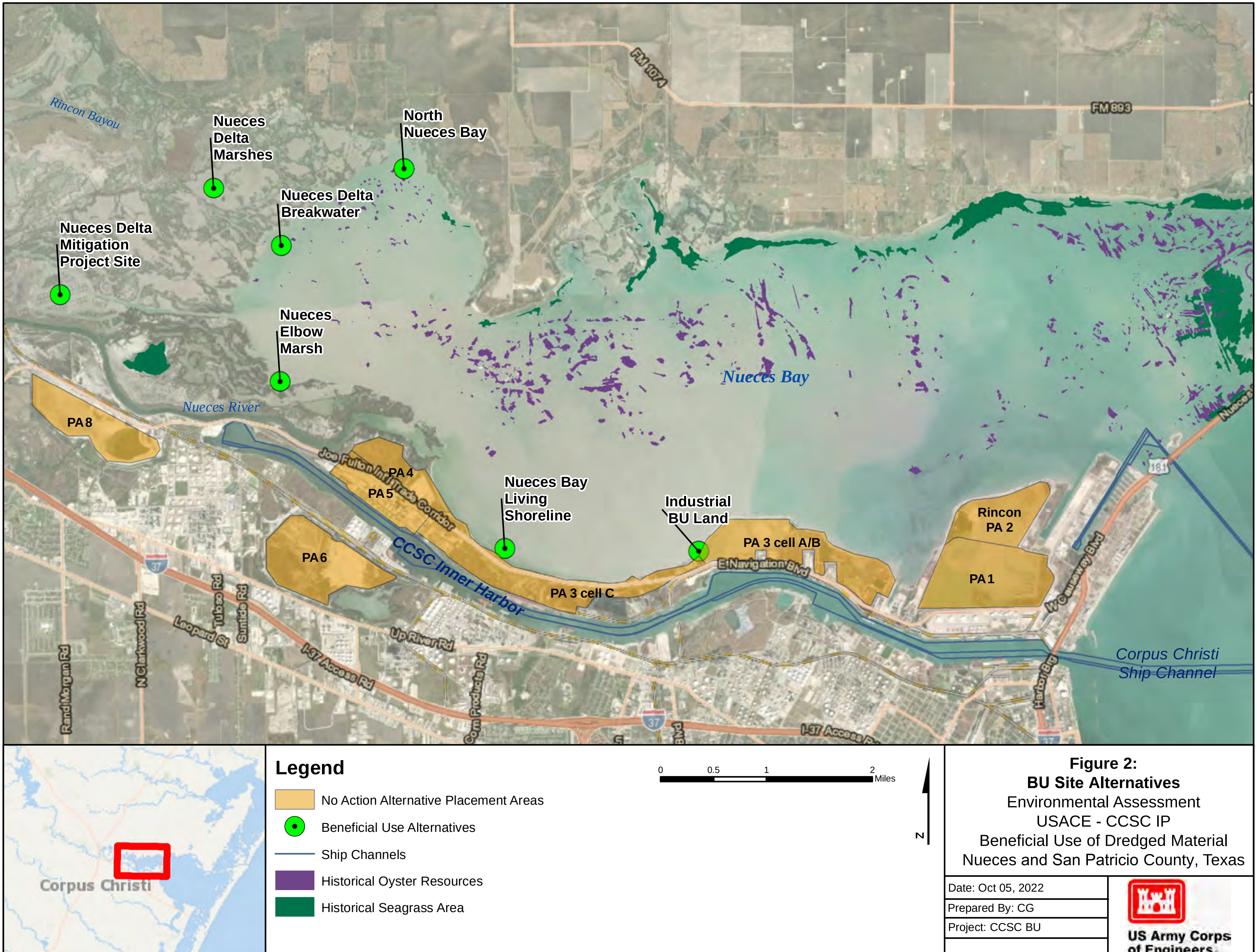


Figure 2:
BU Site Alternatives
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Date: Oct 05, 2022
Prepared By: CG
Project: CCSC BU

US Army Corps of Engineers

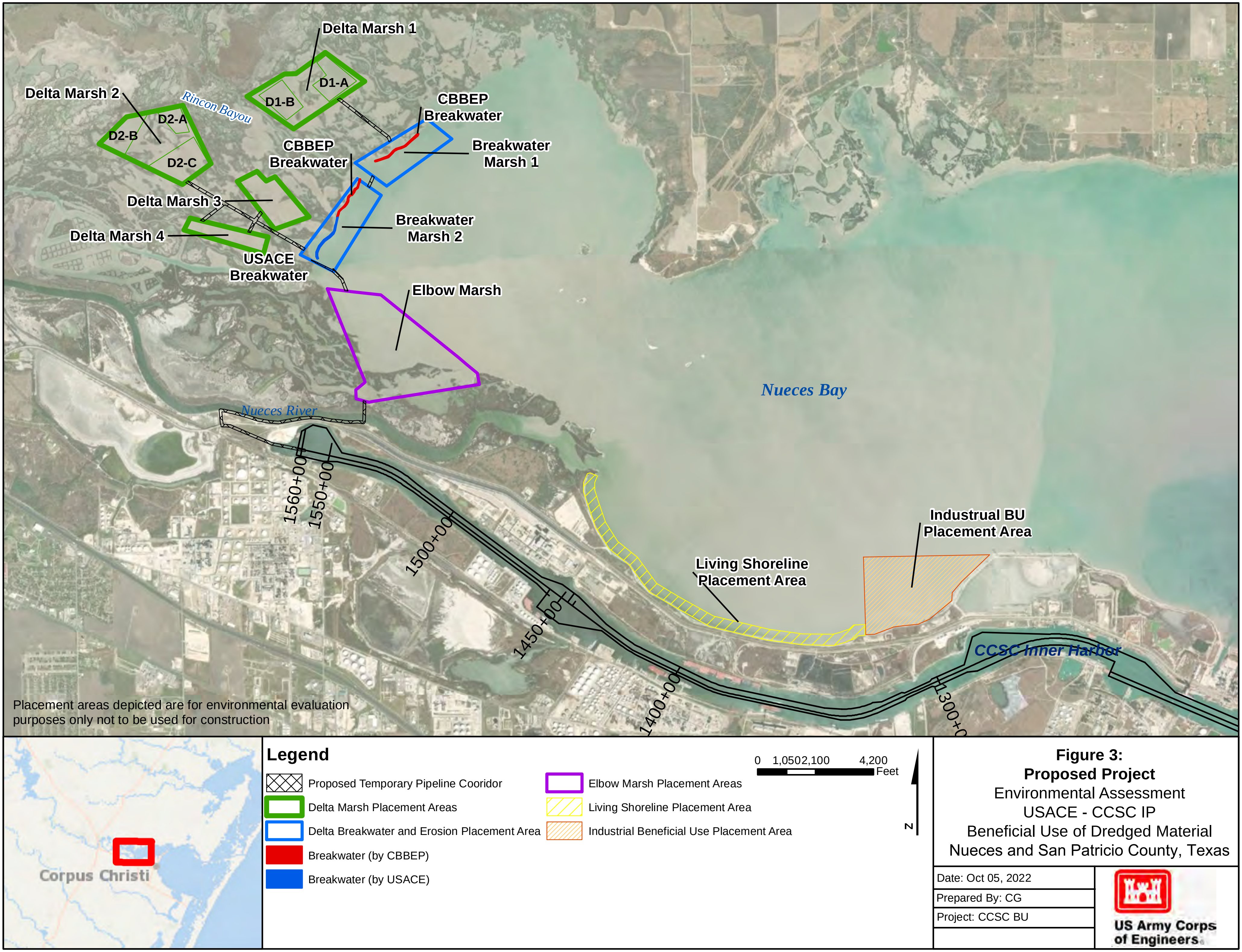
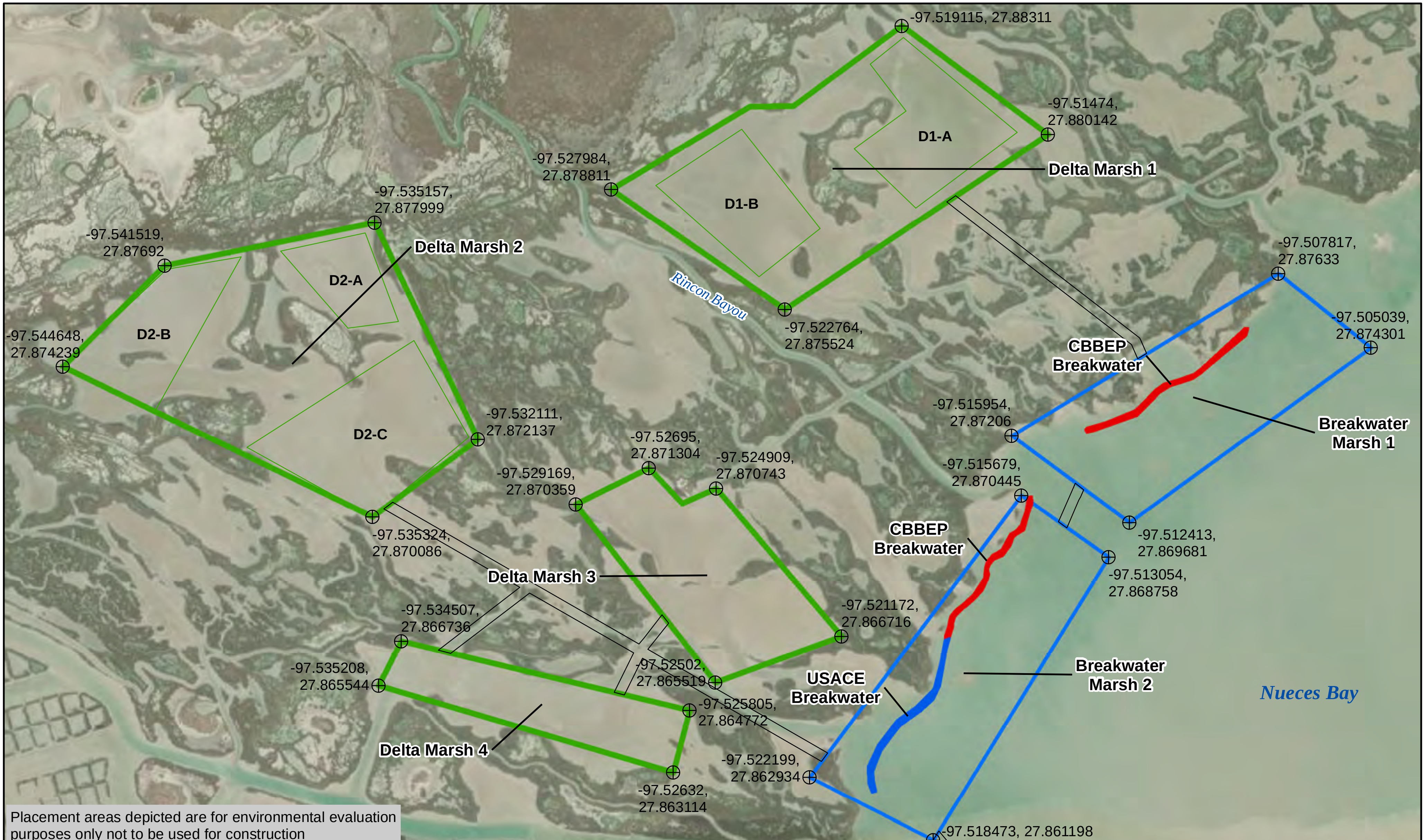


Figure 3:
Proposed Project
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas



Legend

- ⊕ Coordinates
- Proposed Temporary Pipeline Cooridor
- Delta Marsh Placement Areas (with target areas)
- Delta Breakwater and Erosion Placement Area
- Breakwater (by CBBEP)
- Breakwater (by USACE)
- Elbow Marsh Placement Area
- Living Shoreline Placement Area
- Industrial Beneficial Use Placement Area

0 325 650 1,300 Feet

N

Figure 4:
Proposed Nueces Delta Marsh and Breakwater Marsh Placement Plan
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Date: Oct 06, 2022
Prepared By: CG
Project: CCSC BU

US Army Corps of Engineers®

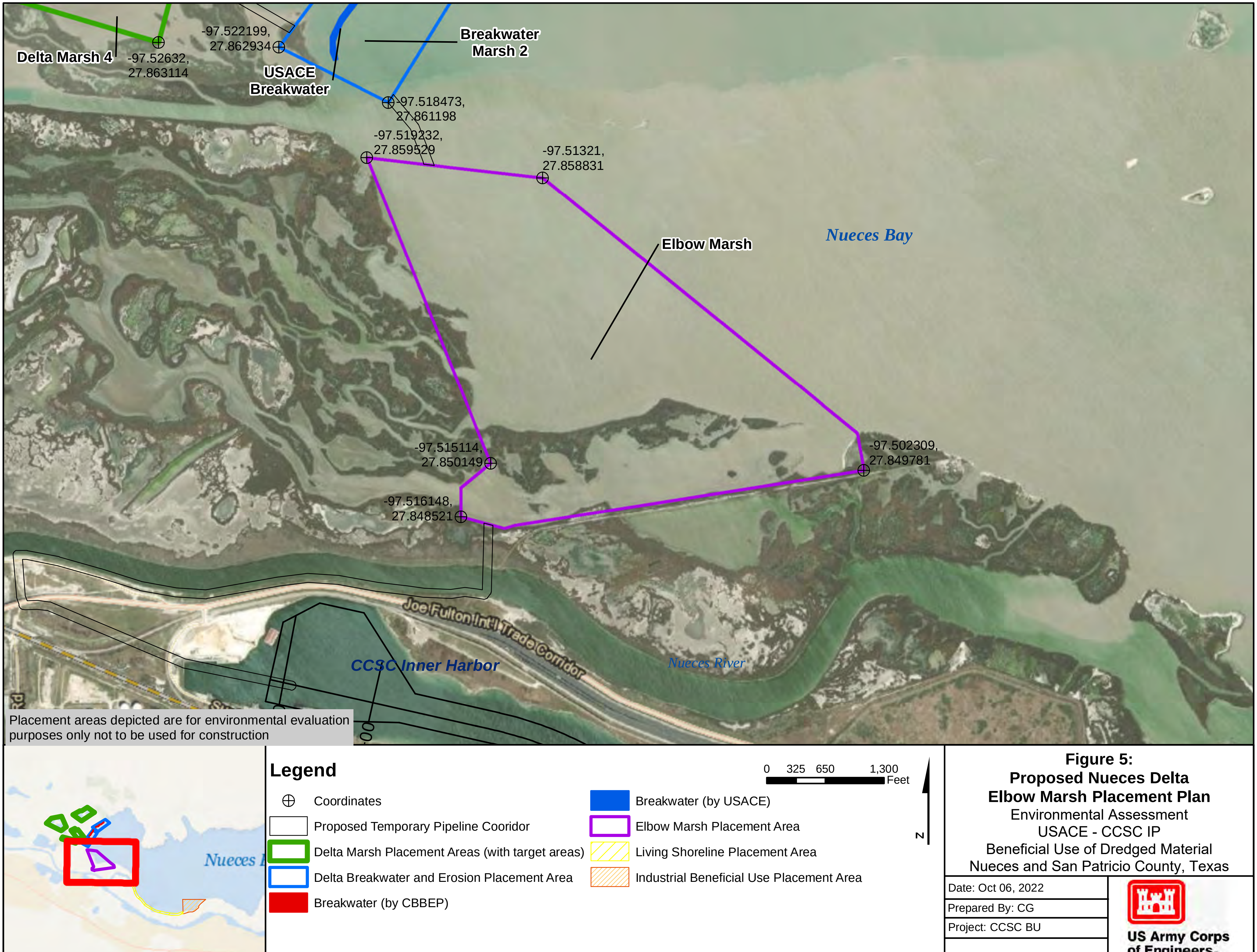
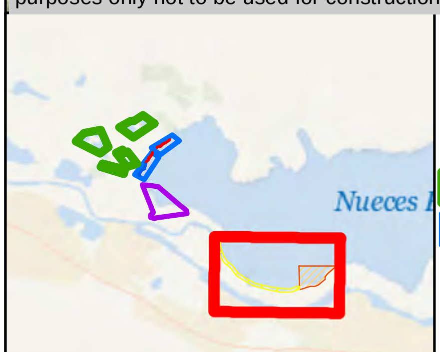


Figure 5:
Proposed Nueces Delta
Elbow Marsh Placement Plan
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Date: Oct 06, 2022	
Prepared By: CG	
Project: CCSC BU	

US Army Corps of Engineers



Legend

⊕	Coordinates		Breakwater (by USACE)
	Proposed Temporary Pipeline Cooridor		Elbow Marsh Placement Area
	Delta Marsh Placement Areas (with target areas)		Living Shoreline Placement Area
	Delta Breakwater and Erosion Placement Area		Industrial Beneficial Use Placement Area
	Breakwater (by CBBEP)		

0 360 720 1,440
Feet

N

Figure 6:
Proposed Nueces Shoreline Placement Plan
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Date: Oct 06, 2022
Prepared By: CG
Project: CCSC BU

US Army Corps of Engineers

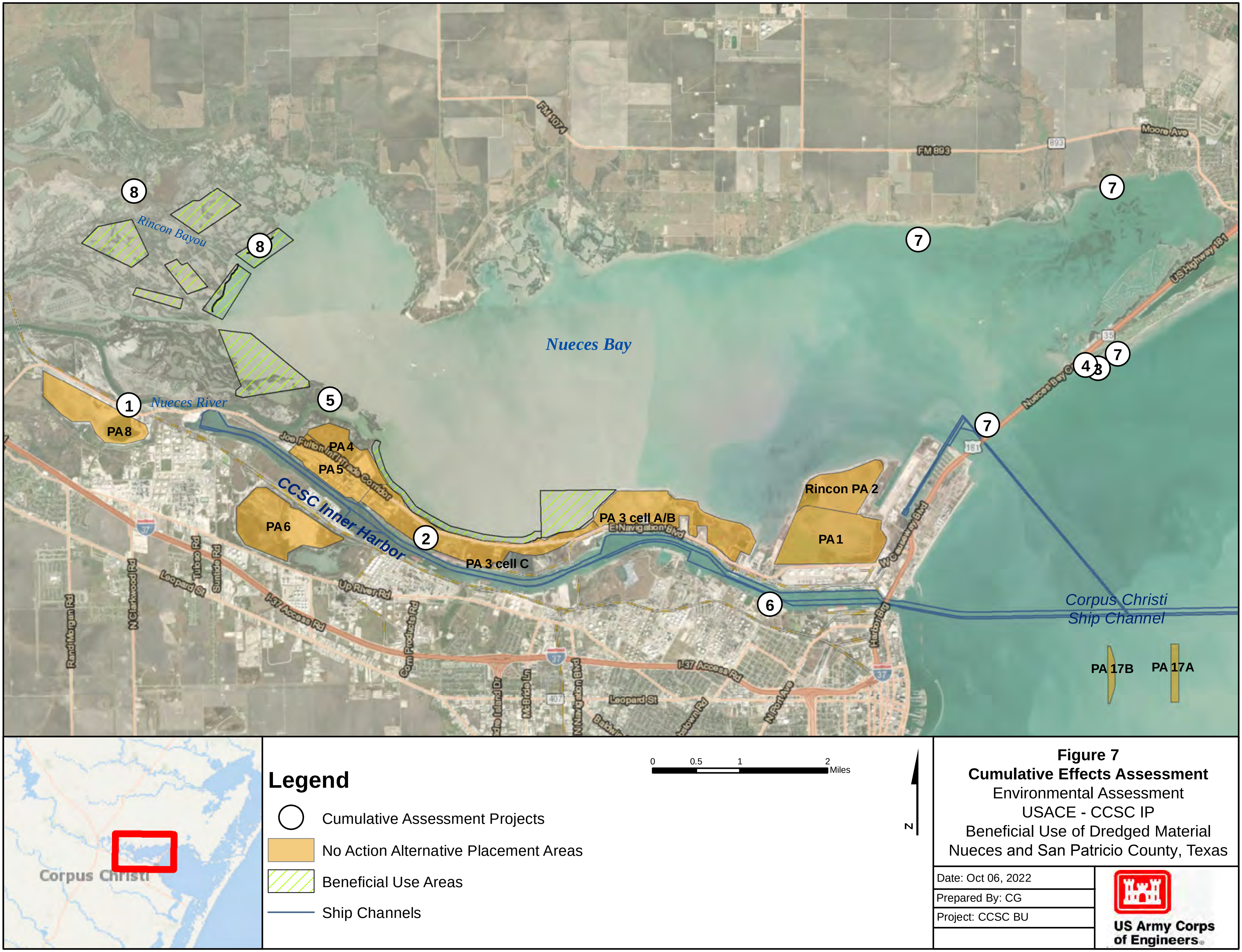


Figure 7
Cumulative Effects Assessment
Environmental Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio County, Texas

Appendix B
Nautical Archaeology Report

BOB Project 2022-03

DESKTOP ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL IN SUPPORT OF A PROPOSED BENEFICIAL USE PROJECT IN NUECES BAY, NUECES COUNTY, TEXAS

Prepared for:

Lloyd Engineering, Inc.
6565 West Loop South, Suite 708
Bellaire, Texas 77401

Prepared by:

BOB Hydrographics, LLC
1315 Fall Creek Loop
Cedar Park, Texas 78613

Principal Investigator:
Robert Gearhart

May 19, 2022

Introduction

BOB Hydrographics, LLC (BOB) conducted this desktop study to summarize the historic potential of four areas proposed for placement of dredged materials in Nueces Bay (Figure 1). Four Beneficial Use (BU) areas, totaling 1,437 acres, are proposed (designated as A-D in Figure 1). Lloyd Engineering, Inc. contracted with BOB to determine whether archaeological assessment surveys would be required for any of the proposed BUs. A review of the cultural background determined that no submerged archaeological investigations have been conducted within 3 miles of this project. No wrecks have been reported within 3 miles of this project. The nearest reported prehistoric site is 0.7 miles northwest of BU A.

Figure 1: Proposed Beneficial Use Areas (aerial base dates from 2016)

Historic Research

The first settlement at what is now Corpus Christi was founded as a trading post in 1839 by Henry Kinney and William Aubrey (Long 2010). The first town to be organized at the site was Grayson, shown on Hunt and Randel's (1839) chart and mentioned by Folsom (1842: 204) as "a town recently laid off on the south side of Corpus Christi Bay." By 1845, when General Zachary Taylor's army landed there during the Mexican American War, the town had become known as Corpus Christi. Aransas Pass and Corpus Christi were used extensively during the war to land troops and supplies bound overland for Mexico.

Federal involvement with navigation improvements in Corpus Christi Bay began with passage of the Rivers and Harbors Act of 1878. The following year, funds were authorized for deepening the outer bar channel at Aransas Pass, which was completed in 1885. The first direct channel between Aransas Pass and Corpus Christi, the Turtle Cove Channel, was dredged to a depth of 8.5 ft by 1909. In 1922 the Turtle Cove Channel was renamed the Corpus Christi Ship Channel. The channel has been deepened and widened multiple times since then to accommodate larger ships.

Thirty-six historic charts, dating from 1845-1973, were examined for evidence of historic navigation, shipwrecks, wharves, or shoreline development in the vicinity of the proposed BUs. A representative sample of those charts are illustrated below. The earliest chart to note water depths or to show any indication of shoreline developments dates from 1882 (Figure 2). The bay above Whites Point was described on that chart as having from 10 inches to 1 ft of depth during average low water and a very soft bottom. A road is shown through the Nueces River Delta, upstream of BUs A and B. The bay below White's Point had a maximum depth of 3 ft (Mean Low Water [MLW]).

Notice that all four BUs appear disconnected from the shoreline in Figure 2. The delta front is not accurately depicted in this chart, appearing to follow the border between Nueces and San Patricio counties, rather than the shoreline of open water. The southern shoreline of Nueces Bay was later shifted northward by landfill, from about 1926 to 1955, as the ship channel was extended from the bay to Tule Lake. Any developments along the south side of Nueces Bay, prior to about 1950, would now be located on the southern side of the Corpus Christi Ship Channel.

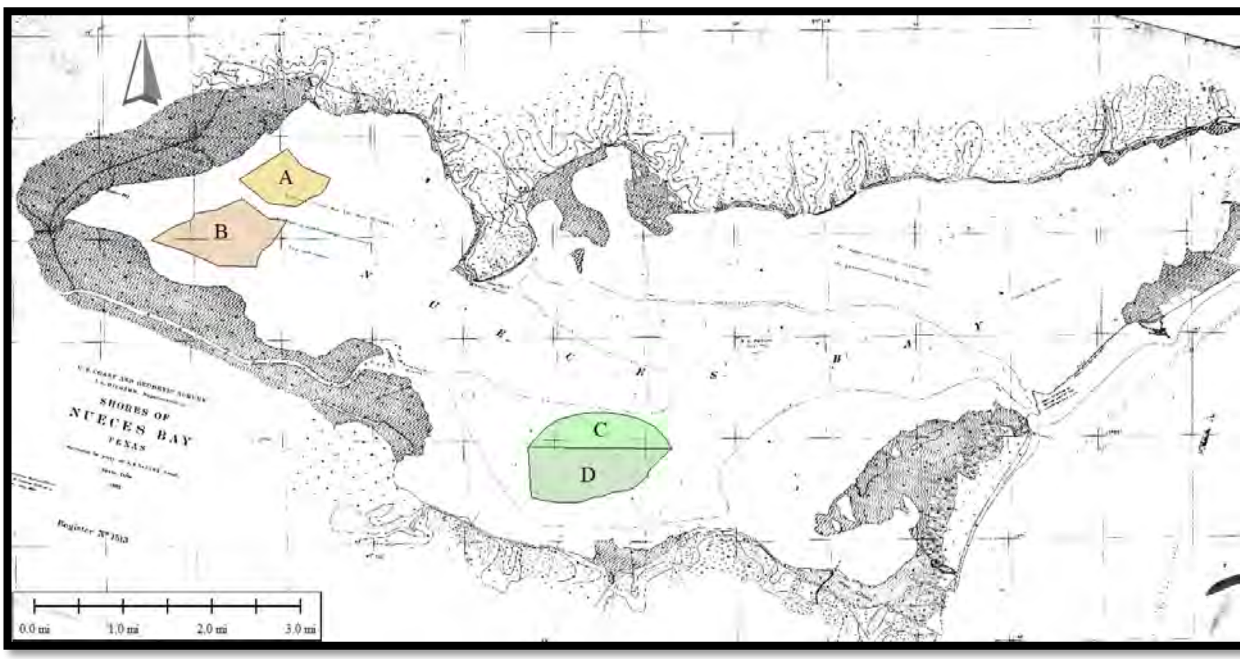


Figure 2: Project Areas in 1882
(United States Coast and Geodetic Survey [USCGS] 1882, from Foster et al. 2006)

A "Bird's Eye View" drawn in 1887 shows Nueces Bay as completely undeveloped (Figure 3, upper right). An exaggerated Bird's Eye View from 1909 (Figure 4, upper right) shows two factory buildings along the southern shore of Nueces Bay and three clusters of buildings on the northern shore, east of White's Point. The factories are drawn with two stories and a tall smokestack between them. The location of this factory would now be on the south side of the Corpus Christi Ship Channel. A half dozen boats, at least three resembling steamers, are shown scattered across the lower half of Nueces Bay. This may be a fanciful depiction, as the bay had only 2-3 feet of water at its deepest point during an average low tide. It is possible that the lower portion of Nueces Bay was fished for oysters during that time period, although no

Figure 3: 1887 Bird’s Eye View of Corpus Christi (Koch 1887, from Foster et al. 2006)

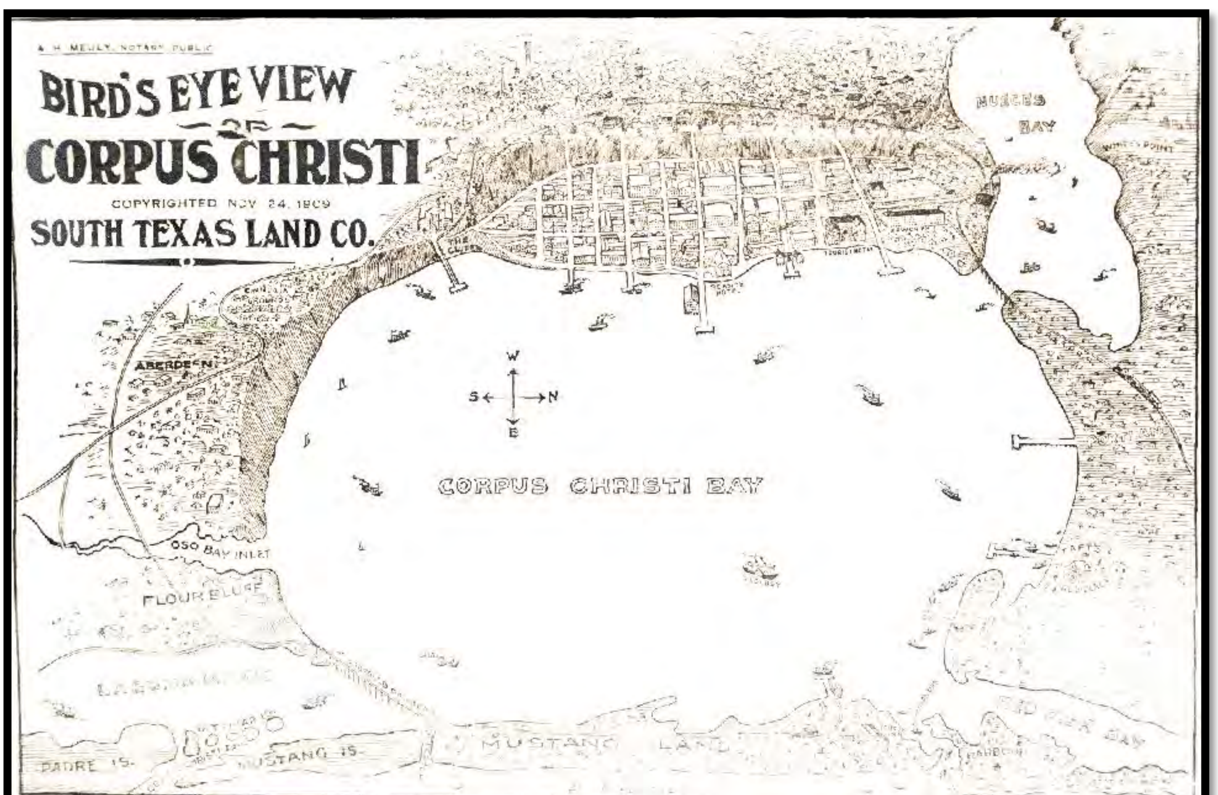


Figure 4: 1909 Bird’s Eye View of Corpus Christi (Meuly 1909, from Foster et al. 2006)

direct evidence has been encountered by this author. Notably not shown on Nueces Bay were any wharves.

A 1934 USCGS chart, created from a composite of aerial photographs (Figure 5), shows BUs A and B overlying the delta marsh, as is the case today (Figure 1). Another USCGS chart published in 1935 at a much smaller scale reverts to showing the upper limit of Nueces Bay as roughly following the county line (Figure 6). Both charts are shown here to illustrate the difference. These charts are the first to show an inland extension of the Corpus Christi Ship Channel, which was created by filling part of Nueces Bay with material dredged from the new channel. The 1935 chart is also the first to show a pipeline area crossing Nueces Bay, reflecting growth in the relatively new, at that time, petroleum industry. Natural gas was discovered in Nueces County in 1922.

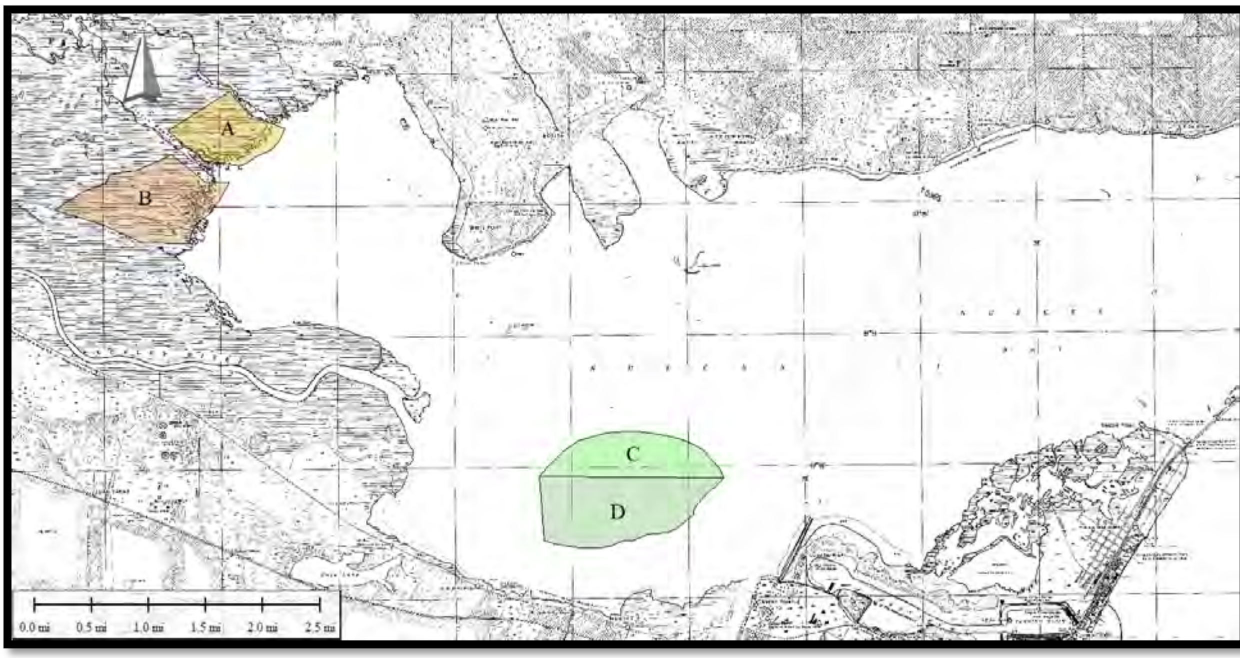


Figure 5: Project Areas in 1934 (USCGS 1934a and 1934b, from Foster et al. 2006)

Depths shown on the USCGS 1935 chart (Figure 6) are the same soundings as were illustrated on the 1882 chart (Figure 2), indicating a low priority for documentation of water depths in the bay during the intervening half century. In fact, the same soundings were used on the 1958 edition of USCGS Chart 1286 (not shown), which was the latest edition found that even bothered charting water depth in Nueces Bay. Although historical water depths were reported, through 1958, as 3 ft or less (MLW), modern depths are somewhat deeper, owing likely to subsidence.

The modern rate of subsidence in Nueces Bay has been documented as 3.53 mm/year, based on data from a 3-year study period between October 2016 and July 2019 (Haley, et al. 2022). The authors attribute subsidence in this area to geologic faults, not to mineral or water extraction, thus subsidence might have been happening at a similar rate for a much longer period. Extrapolating forward 140 years from 1882 at this rate of subsidence, one might expect modern depths in the bay to be about half a meter, or roughly 1.6 ft, deeper today than those shown in Figure 2.

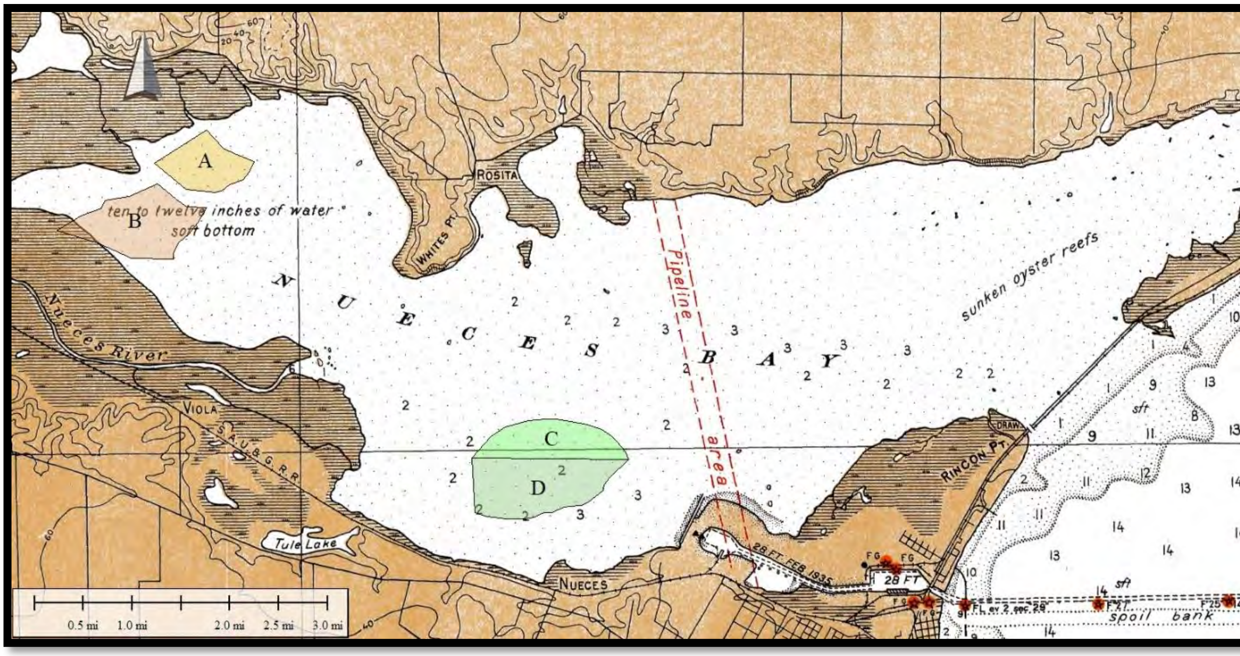


Figure 6: Project Areas in 1935 (USCGS 1935, from Foster et al. 2006)

The United States Geologic Survey (USGS) charts from 1951 and 1954 (Figure 7) show, for the first time, the inland ship channel completed past BUs C and D. By 1958, numerous obstructions, wells, pipelines and overhead power cables were charted in Nueces Bay (USCGS 1958). Today the ship channel has been extended another 3 miles westward and the shoreline of Nueces Bay has been filled all the way northward to the southern margin of BU D (Figure 1).

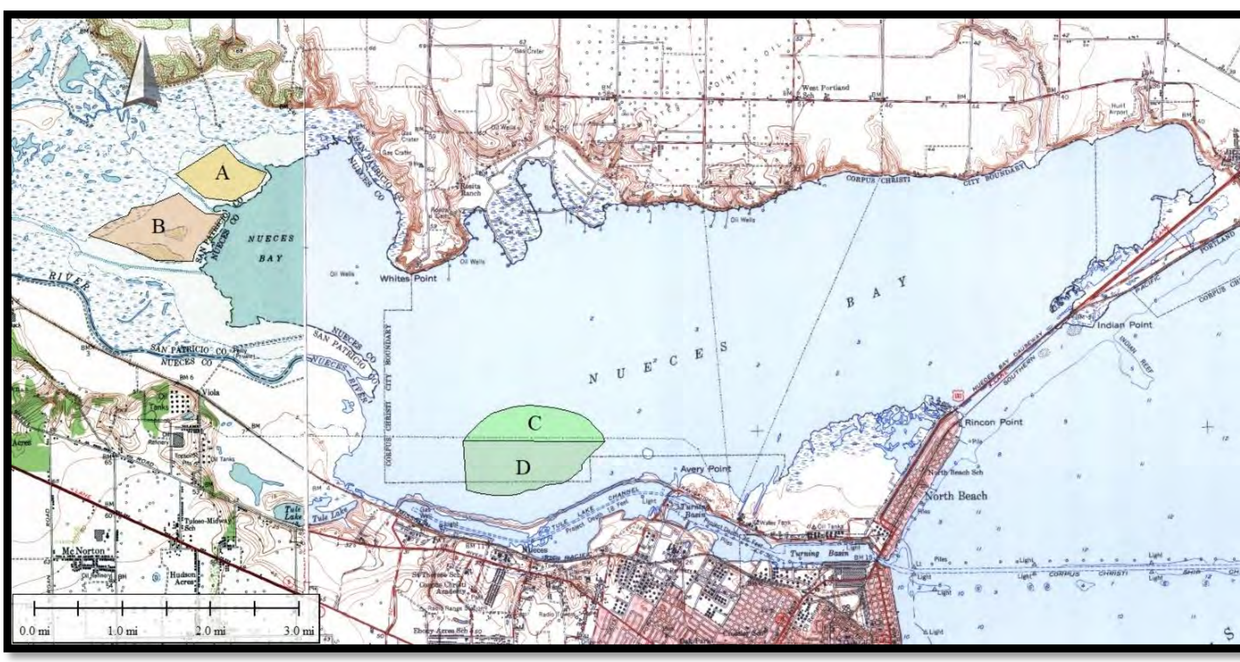


Figure 7: Project Areas in 1951 and 1954
(USGS 1951, 1954, from Foster et al. 2006)

Previous Investigations

There are no submerged archaeological surveys reported within 3 miles of the project. Only 2 surveys are reported in Nueces Bay (Table 1); however, both surveys are located near the bay entrance, at least 3.7 miles east of the nearest proposed BU.

Table 1: Previous Marine Investigations in Nueces Bay

Antiquities Permit	Principal Investigator	Investigating Firm	Reference
4127	Jenna Enright	PBS&J	Enright and Gearhart 2006
4999	Robert d'Aigle	Panamerican Consultants, Inc.	James 2008

Potential for Submerged Archaeological Sites

Sources consulted include the Texas General Land Office's (GLO) Coastal Resources Mapping Viewer (https://cgis.glo.texas.gov/rmc/index.html); the Texas Historical Commission's (THC) Texas Archaeological Sites Atlas (Atlas); the NOAA Automated Wreck and Obstruction Information System (AWOIS) database; historic maps from the Texas Historical Overlay (Foster, et al. 2006); and historic charts from the United States Office of Coast Survey's Historical Map and Chart Collection (https://historicalcharts.noaa.gov).

Figure 8 illustrates the proposed BUs overlaid on the GLO map of submerged mineral lease tracts. BUs A and B are proposed over the front edge of the Nueces River Delta. The delta is eroding along its front, and the marsh has been infiltrated by open waterways. Nevertheless, BUs A and B are not designated as submerged lands by the GLO. The nearest submerged lease tracts are 684 and 785. BUs C and D are located in submerged mineral lease tracts 689, 689A, 706, 746, 746A, 750, and 750A.

The GLO categorizes the sensitivity of state-owned mineral lease tracts using Resource Management Codes. The relevant codes for submerged cultural resources include MJ (indicating that cultural resources may be present) and MK (meaning avoid impacts to cultural resources). An MK code indicates that the THC knows of or suspects cultural resources in a tract. Only two tracts in Nueces Bay are designated by MK codes, 788 and an adjoining unnumbered tract. Both are located more than 3 miles from the project, just inside of the bay (shaded pink in Figure 8). An MJ code indicates that cultural resources could be present but that insufficient data exists to determine their likelihood. The balance of Nueces Bay lease tracts is designated by MJ codes. The GLO recommends consultation with the THC for both MJ and MK codes to determine whether an archaeological remote-sensing survey would be required.

The THC Atlas contains reports of shipwrecks from historic records, as well as verified archaeological sites reported from surveys both on land and in the water. The AWOIS database is maintained by NOAA to support the charting of coastal areas. AWOIS tends to report recent shipwrecks; however, some historic wrecks are included. Positions for wrecks in AWOIS are usually more accurate than those from historic records, although positions pre-dating the era of satellite position systems can vary considerably from actual locations. Historic charts were examined for reports of shipwrecks, including 29 from the Texas Historic Overlay and 7 from the United States Office of Coast Survey's Historical Map and Chart Collection.

There are no shipwrecks reported in Nueces Bay from any of the sources listed above. No prehistoric archaeological sites have been reported near any of the proposed BUs. Three sites are reported in the Nueces Delta, 0.7-1.0 miles northwest of BUs A and B. These are designated 41SP7, 41SP8 and 41SP9. No site forms or descriptions are on file with the THC; however, their location and low site numbers suggest that they might be prehistoric sites, recorded during the early 1960s. They appear to be located on slightly elevated land, possibly natural levees, along abandoned Nueces River bayous, as their locations remain intact, despite subsidence. By contrast, the delta front bordering BUs A and B has eroded substantially in recent times.

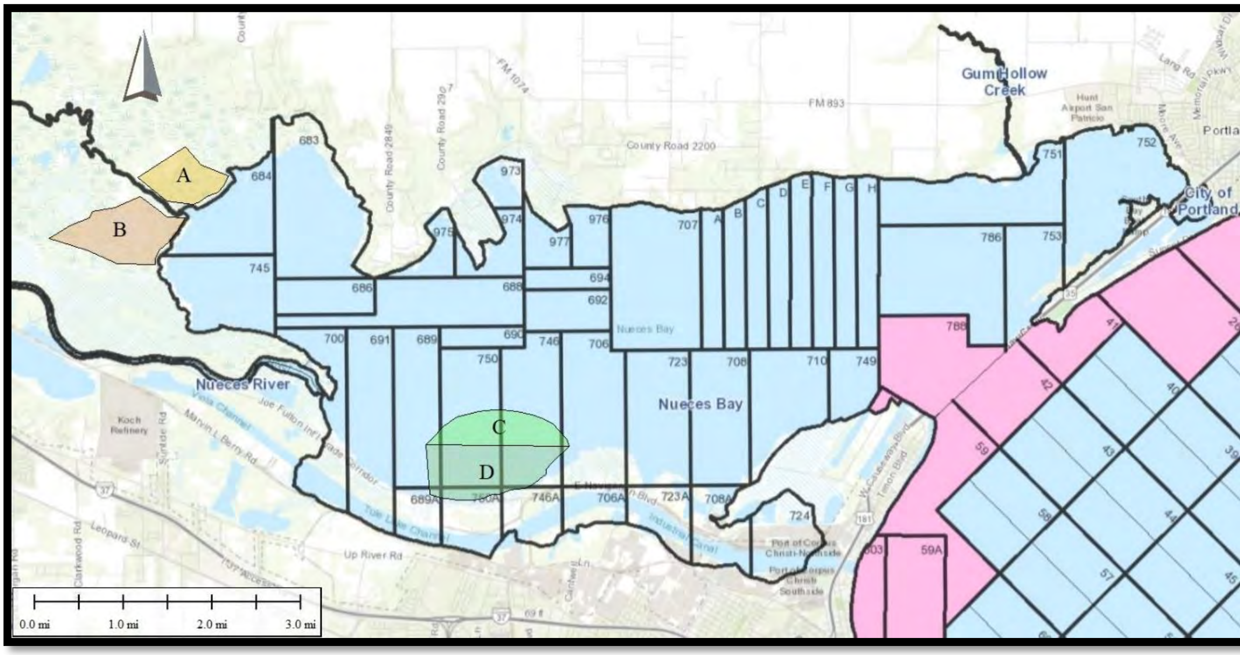


Figure 8: Texas Mineral Lease Tracts
(Texas GLO; pink areas have "MK" resource codes)

Conclusions and Recommendations

The potential for submerged archaeological sites in BUs A and B is considered low, as both areas are located in marshlands, and neither area was historically navigable. Geophysical survey is not feasible in BUs A and B due to the presence of sensitive coastal wetlands.

Survey is feasible in BUs C and D; however, the potential for submerged historic sites in these tracts also is considered low. The waterfront of Nueces Bay has not been commercially developed, owing to the shallow nature of the bay. There is no evidence for commercial navigation in Nueces Bay throughout the historic period, with the exception of vessels used to support the construction and maintenance of petroleum and electrical distribution infrastructure, which has built up in the bay since the 1950s. Oyster fishing might have drawn small fishing vessels to the bay; however, the historic oyster reefs are concentrated near the mouth of Nueces Bay.

BOB recommends that archaeological survey of the proposed BUs should not be required. Consultation with the THC is recommended to determine whether they will concur with BOB's recommendations.

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Folsom, Charles J. 1842. *Mexico in 1842: A Description of the Country, Its Natural and Political Features; with a Sketch of its History, Brought Down to the Present Year.* Wiley and Putnam; Robinson, Pratt and Co. New York.

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Koch, Aug. 1887. *Bird's Eye View of Corpus Christi, Nueces County, Texas, 1887*. Image provided courtesy of Corpus Christi Public Library.

Long, Christopher. 2010. *Corpus Christi, TX*, Handbook of Texas Online, accessed April 21, 2019, http://www.tshaonline.org/handbook/online/articles/hdc03. Uploaded on June 12, 2010. Published by the Texas State Historical Association.

Meuly, A.H. 1909. *Bird's Eye View of Corpus Christi, Copyrighted Nov. 24, 1909, South Texas Land Co. Gulf View of the Pre-Destined Atlantic City of the South.* Image provided courtesy of Corpus Christi Public Library.

United States Coast and Geodetic Survey. 1934a. Corpus Christi to Laguna Madre, Air Photo Compilation No. T-5365. March, 1934. Image courtesy of Texas General Land Office.

United States Coast and Geodetic Survey. 1934b. Nueces Bay, Air Photo Compilation No. T-5366. March, 1934. Image courtesy of Texas General Land Office.

United States Coast and Geodetic Survey. 1935. *Chart 1286, Aransas Pass to Baffin Bay*. Washington, D.C. Image courtesy of Texas State Library and Archives Commission, Austin.

United States Geological Survey. 1951. Corpus Christi 7.5-minute Topographic Quadrangle. Washington, D.C.

United States Geological Survey. 1954. Robstown 7.5-minute Topographic Quadrangle. Washington, D.C.

From:	Marisa Weber
To:	Courtney Gerken; Justin Wiedeman
Subject:	Fwd: Section 106 Submission
Date:	Thursday, September 1, 2022 4:44:59 PM

Marisa Weber

713.419.3479

Begin forwarded message:

From: Robert Gearhart <bob.hydrographics@gmail.com>
Date: June 16, 2022 at 15:21:02 CDT
Subject: Fwd: Section 106 Submission

Marisa,
The THC has concurred with my recommendations for Nueces Bay (see following email).
Bob

---------- Forwarded message ---------
From: <noreply@thc.state.tx.us>
Date: Thu, Jun 16, 2022 at 3:04 PM
Subject: Section 106 Submission
To: <bob.hydrographics@gmail.com>, <reviews@thc.state.tx.us>

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202210485
Date: 06/16/2022
Beneficial Use Areas in Nueces Bay
Nueces Bay
Corpus Christi,TX

Description: Requesting consultation to determine whether a remote-sensing survey will be required. Desktop study of historic potential is attached for your review.

Dear Robert L Gearhart:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff, led by Amy Borgens and Jeff Durst, has completed its review and has made the following determinations based on the information submitted for review:

Archeology Comments

- No identified underwater archeological sites, historic shipwrecks, and/or significant remote-sensing targets present or affected. However, if buried cultural materials are encountered during project activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided for the underwater project area.
- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: amy.borgens@thc.texas.gov, Jeff.Durst@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

Appendix C

Habitat Assessment

Habitat Assessment

Beneficial Use of Dredged Material - Corpus Christi Ship Channel Improvement Project

INTRODUCTION

A detailed habitat assessment was conducted within five beneficial use (BU) sites selected for the placement of material dredged within the Inner Harbor segment of the Corpus Christi Ship Channel (CCSC) for the Corpus Christi Ship Channel Improvement Project (CCSCIP).

An alternatives analysis was conducted as part of an Environmental Assessment to identify BU sites that would best fulfill the project purpose and need while minimizing environmental impacts. Based on the results of the analysis conducted, the Proposed Project is a combination of BU placement sites, including the Nueces Delta Marsh, Delta Marsh Breakwaters, Elbow Marsh, Living Shoreline, and Industrial BU areas. These areas will collectively take approximately five-million cubic yards of dredge material generated as part of the CCSCIP. The proposed BU sites are situated within and adjacent to Nueces Bay, in Nueces and San Patricio Counties, Texas. Refer to Attachment A for figures depicting the location of the proposed BU sites and the extent of the habitat assessment detailed herein.

The objective of the habitat assessment is to characterize and quantify habitats located within and adjacent to the proposed BU sites and the required temporary dredge pipeline corridors and construction workspaces. The following sections detail the methods and results of the habitat assessment conducted. This information was obtained though both desktop review and field reconnaissance.

METHODOLOGY

Multiple publicly available data sources, agency maintained spatial data, and literature was utilized during desktop assessments to accurately characterize and quantify potential habitats located within and adjacent to the proposed BU sites. In combination with these data sources, biologists utilized qualitative judgment based on their understanding of the local and regional setting. Additionally, photographic documentation collected during previously conducted field reconnaissance efforts was utilized where available to verify the results of the desktop habitat assessment.

A total of five habitat types were identified has having the potential to occur including wetland low marsh, tidal mud flats, historical oyster habitat, open water habitat (subtidal), and submerged aquatic vegetation were identified. Provided in the following sections are the detailed justifications and the data utilized to characterize each of the identified habitat types.

Wetland Low Marsh

Areas characterized as Wetland Low Marshes are areas which exist at elevations of approximately 2-4 feet (ft) mean lower low water (MLLW) and comprised of species such cordgrass (*Spartina* spp.), saltgrass/shoregrass (*Distichlis* spp.), and sedges (*Cyperaceae* spp.). Aerial imagery, Light Detection and Ranging (LiDAR) data, and the Continually Update Shoreline Product (CUSP) lines were used to delineate the low marsh areas within the proposed Beneficial Use Placement Sites. Aerial imagery collected in 2020 was provided by the National Agriculture Imagery Program (NAIP) through the Texas Natural Resources Information System (TNRIS) DataHub. LiDAR data collected in 2018 by United States Geological Survey (USGS) was also accessed through the TNRIS DataHub. The habitat within this category includes areas which are densely vegetated and exist at elevations where they are not likely to be completely flooded during tidal exchange.

Tidal Mud Flats

Tidal Mud Flats are habitat areas which exist at elevations of approximately 0-2 ft MLLW where they are regularly subjected to flooding during higher tides but are temporarily exposed during lower tides, especially during the fall/winter months when northern winds push the water out of the bays and marshes. These areas are very sparsely vegetated, if at all, due to the ebb and flow of water during tidal events. Aerial imagery and LiDAR data were used to delineate and map potential tidal mud flat habitat areas. Aerial imagery that was collected in 2016, which shows lower tide levels, was provided by NAIP and accessed through the TNRIS DataHub. Areas with high elevation intertidal islands and marshes were excluded from being classified as tidal mud flat habitat. Areas with lower elevations which hold water year-round were also excluded from being classified as tidal mud flat habitat.

Historical Oyster Habitat

Habitats that are marked as Historical Oyster Habitat are habitats which were known to contain oyster reefs or dense scattered shell as of the year 2011. Data from the National Oceanic and Atmospheric Administration’s Gulf of Mexico Data Atlas was utilized, and then filtered to only show potential oyster habitats which exist within and adjacent to the proposed BU sites.

Open Water Habitat (Subtidal)

Any area that was not classified as a wetland low marsh, tidal mud flats, or historical oyster habitat was considered to be subtidal open water habitat. Open water habitats were characterized as areas continuously submerged regardless of the tide levels. These habitats were mapped by creating a polygon shapefile which covered the entire extent of the proposed Action areas, then clipping or removing those areas which were already defined as either wetland low marsh, tidal mud flats, or historical oyster habitat.

Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) areas are characterized as habitats within open water areas that contain vegetation which remains completely submerged. These habitats are extremely sensitive to environmental factors such as water depth, water clarity, salinity, and currents. Texas Parks and Wildlife (TPWD) conducted a survey of the Nueces River delta for SAVs in 2019 and recorded GPS locations where SAV were observed. However, no delineations were conducted and there is no aerial imagery available which displays the current extent of any SAVs within the Project action area.

RESULTS

A total of four habitat types were identified within the proposed BU sites and temporary dredge pipeline corridors/workspaces. Table 1 itemizes the habitat type and area within each proposed BU site and the temporary dredge pipeline corridors/workspaces. Refer to Figure 3 of Attachment A for a depiction of the habitat types identified within each BU site.

Table 1
Habitat Assessment Results
Beneficial Use of Dredge Material for the CCSCIP

BU Placement Site ID	Potential Habitat Type (Acres)			
	Wetland Low Marsh	Tidal Mud Flat	Historical Oyster Habitat	Open Water (Subtidal)
Delta Marsh 1-A	0.005	0.228	0.000	28.937
Delta Marsh 1-B	0.000	0.260	0.000	25.620
Delta Marsh 2-A	0.000	5.240	0.000	8.390
Delta Marsh 2-B	1.234	5.169	0.000	20.127
Delta Marsh 2-C	2.682	5.881	0.000	34.017
Delta Marsh 3	3.629	2.612	0.000	53.032
Delta Marsh 4	0.989	0.256	0.000	36.143
Breakwater Marsh 1	7.397	2.108	1.044	73.560
Breakwater Marsh 2	7.855	1.814	0.637	82.388
Elbow Marsh	31.502	4.854	0.000	239.664
Living Shoreline Placement Area	2.17	0.000	0.000	117.666
Industrial BU Placement Area	0.000	0.000	0.000	200.00
Temporary Dredge Pipeline Corridors	8.743	3.596	0.000	15.586
TOTALS	**66.746**	**29.018**	**1.681**	**932.700**

CONCLUSION

This habitat assessment was prepared using available information and data sources and understanding of the local and regional setting. The acreages represented in Table 1 do not represent proposed impacts as a result of the proposed dredge material placement activities. Potential impacts to these habitats and other environmental resources are discussed in detail within the Environmental Evaluation prepared for the proposed Project.

REFERENCES

National Oceanic and Atmospheric Administration (NOAA). Gulf of Mexico Data Atlas. Texas_Oysters_2011. Web. 2022-09-16. https://www.ncei.noaa.gov/maps/gulf-data-atlas//Metadata/ISO/Oysters_TX_2011.html.

United States Department of Agriculture (USDA). Texas NAIP Imagery, 2020-04-01. Web. 2022-09-16. https://data.tnris.org/collection?c=aa5183ca-a1bd-4b5f-9b63-4ba48d01b83d#5.25/31.407/-100.125

United States Department of Agriculture (USDA). Texas NAIP Imagery, 2016-12-15. Web. 2022-09-16. https://data.tnris.org/collection?c=a40c2ff9-ccac-4c76-99a1-2382c09cf716#5.27/31.341/-100.094

United States Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS). Continually Updates Shoreline Product (CUSP). 2012-04-18. Web. 2022-09-16. http://www.ngs.noaa.gov/NSDE/

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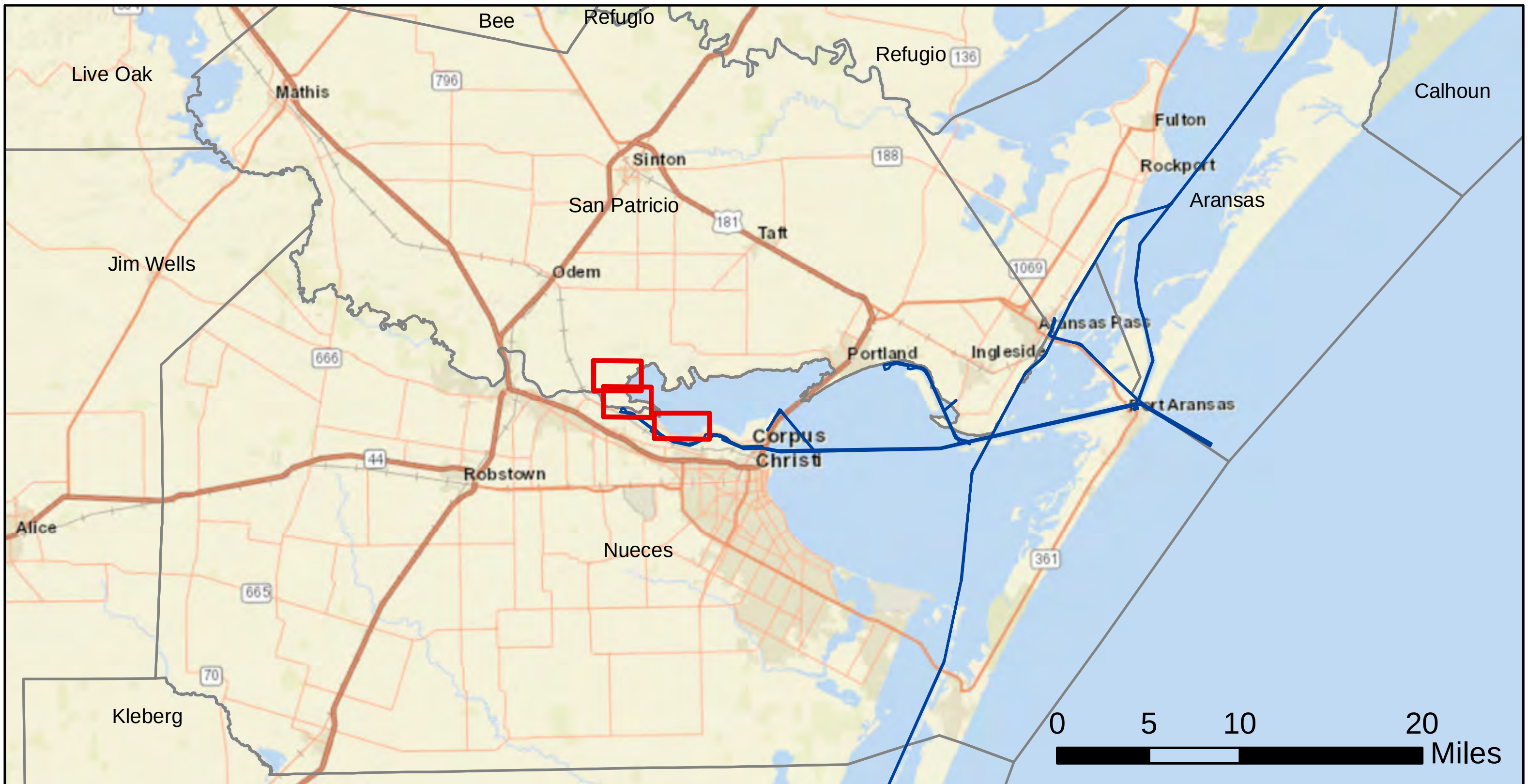
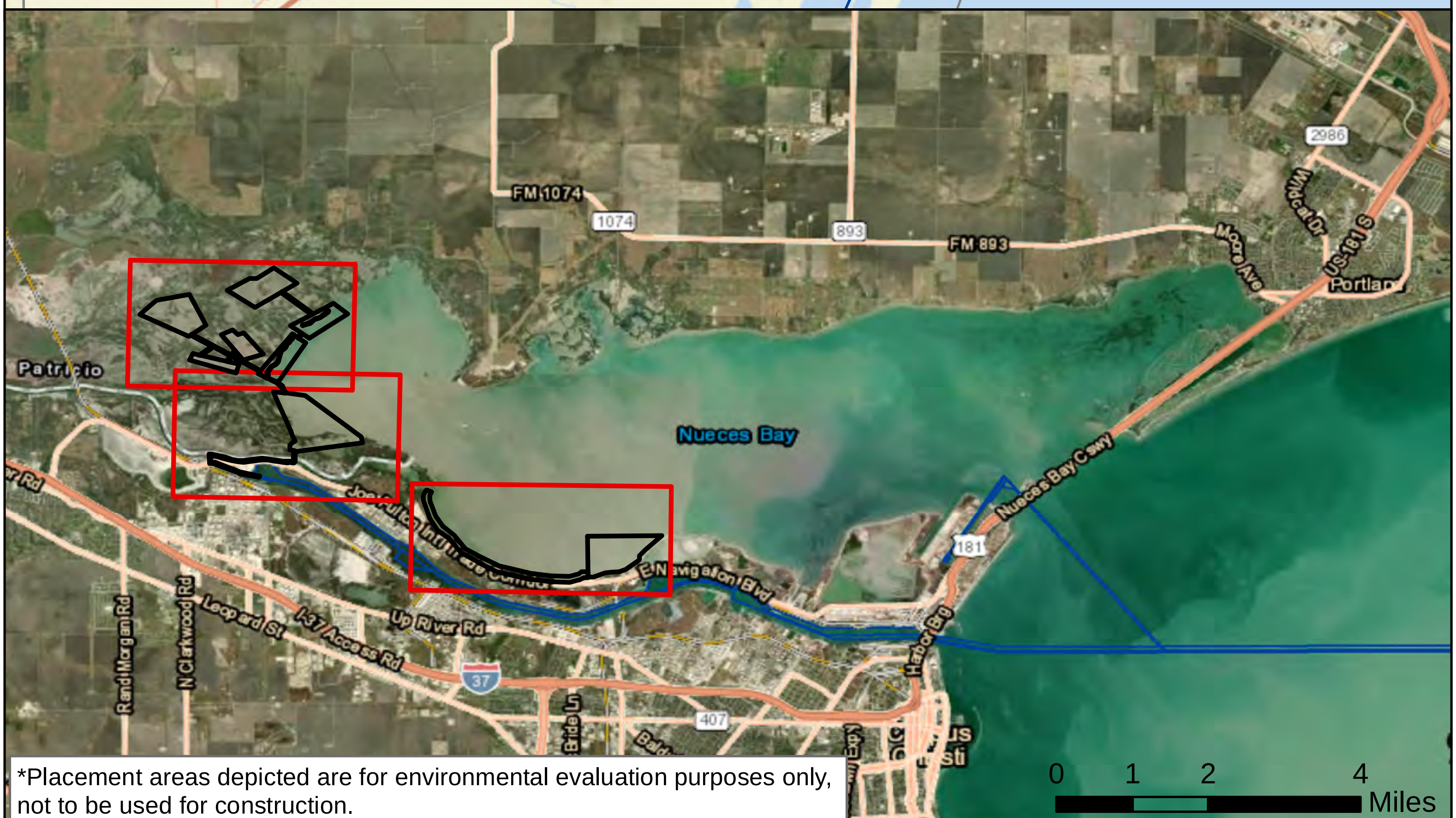
Attachment A
Habitat Assessment Figures





*Placement areas depicted are for environmental evaluation purposes only, not to be used for construction.

Legend

Habitat Assessment Extent

Ship Channels

Counties

Beneficial Use Placement Areas and Pipeline Corridors

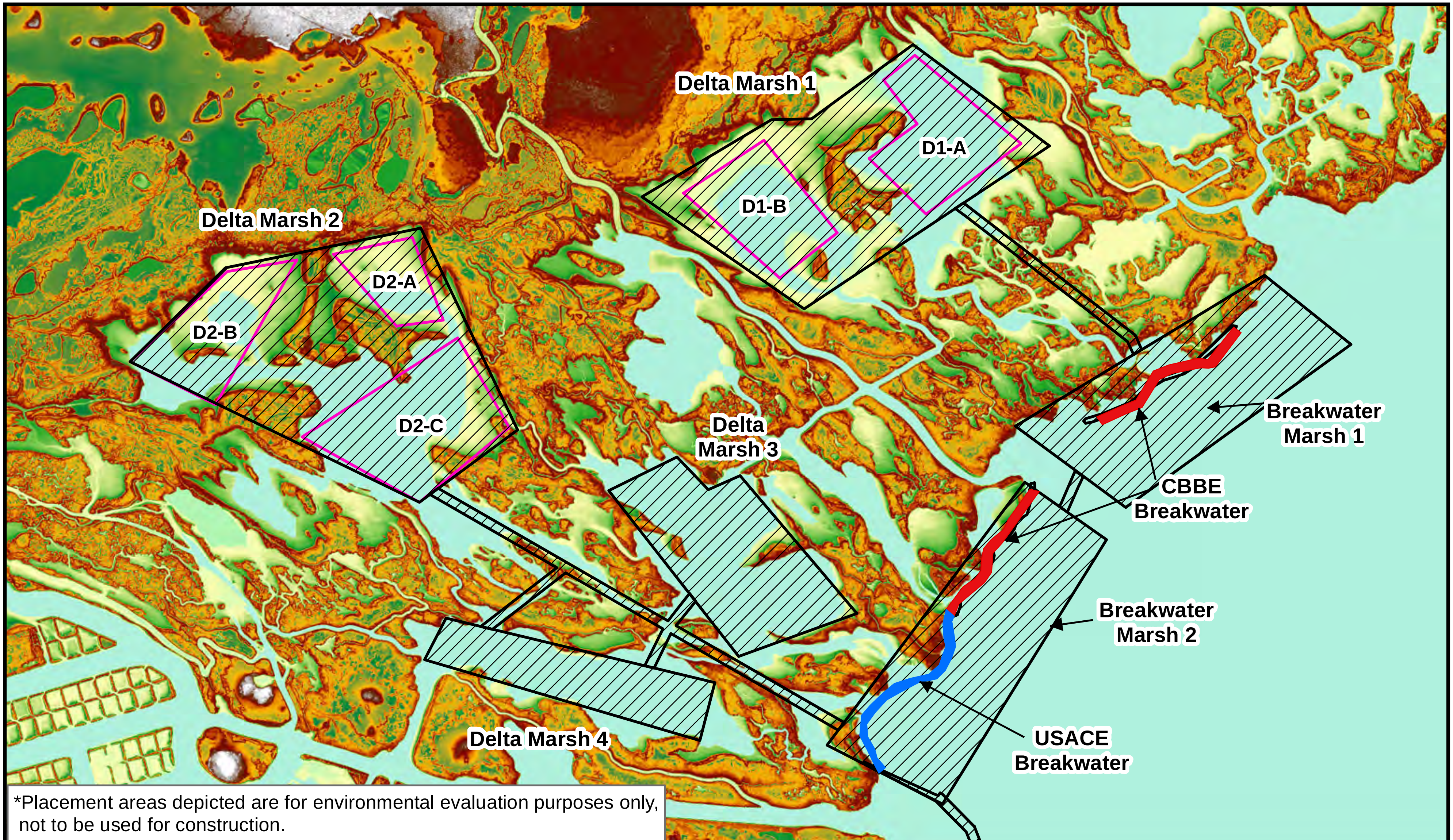
N

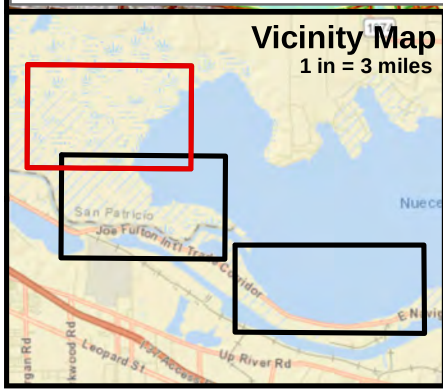
Figure 1:
Vicintiy Map

Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio Counties, Texas

Date: Oct 05, 2022
Prepared By: BS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers





Legend

- CBBE Breakwater
- USACE Breakwater
- Beneficial Use Placement Sites & Pipeline Corridors
- Target Placement Zones

USGS 2018 Lidar Data (NAVD88)

Value

High : 5 ft

Low : <0.0 ft

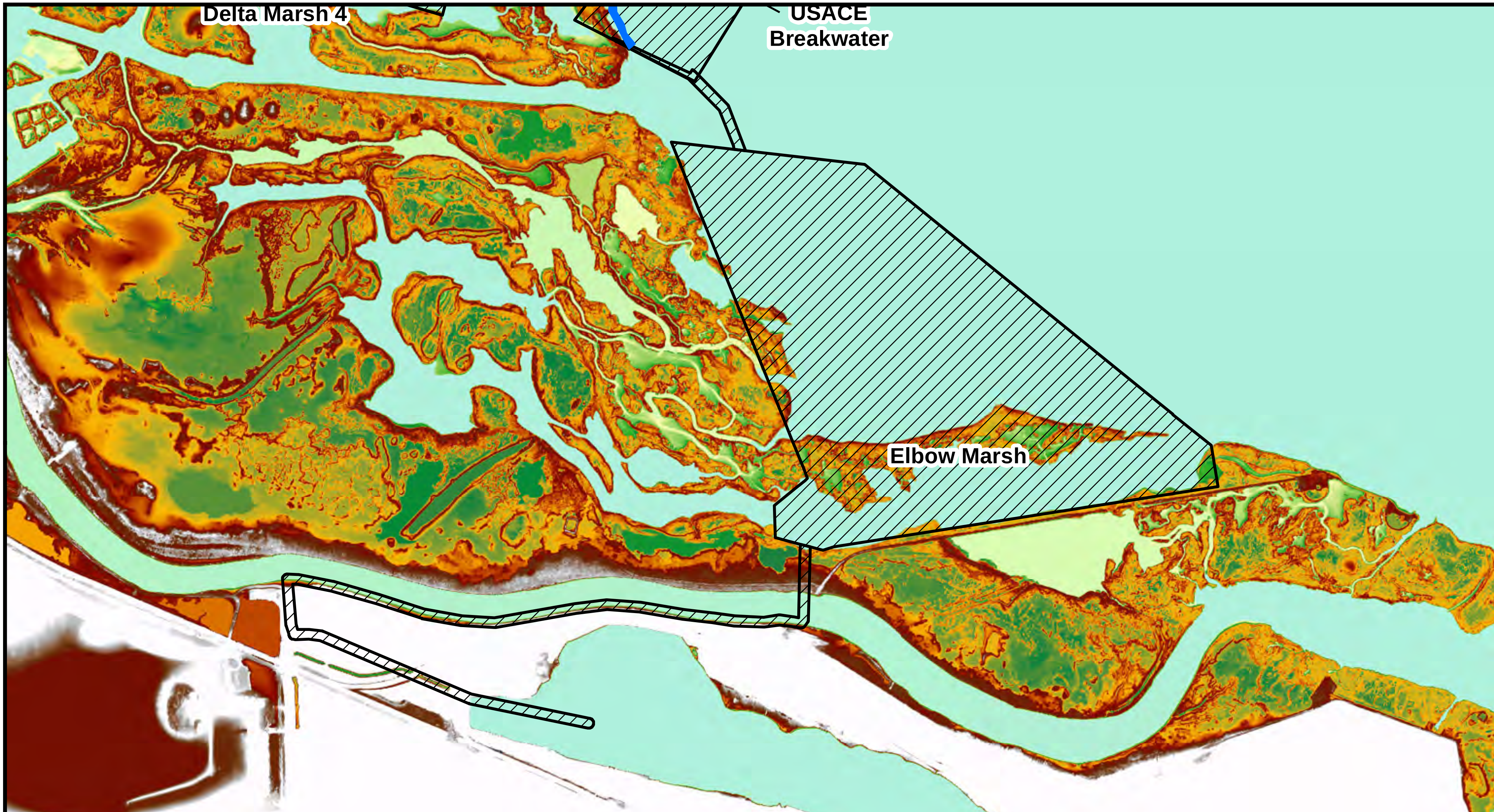
0 0.15 0.3 0.6 Miles

N

Figure 2
Site Plan Over USGS Lidar Data
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio Counties, Texas
Page 1 of 3

Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers



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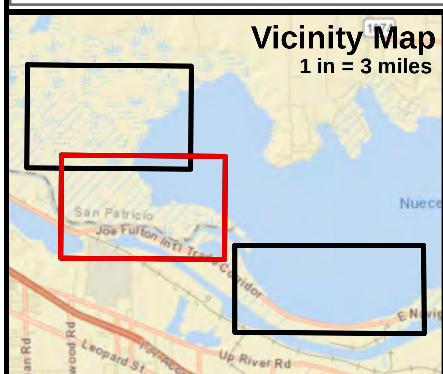

Legend

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- USACE Breakwater
- Beneficial Use Placement Sites & Pipeline Corridors
- Target Placement Zones

USGS 2018 Lidar Data (NAVD88)

Value

High : 5 ft

Low : <0.0 ft

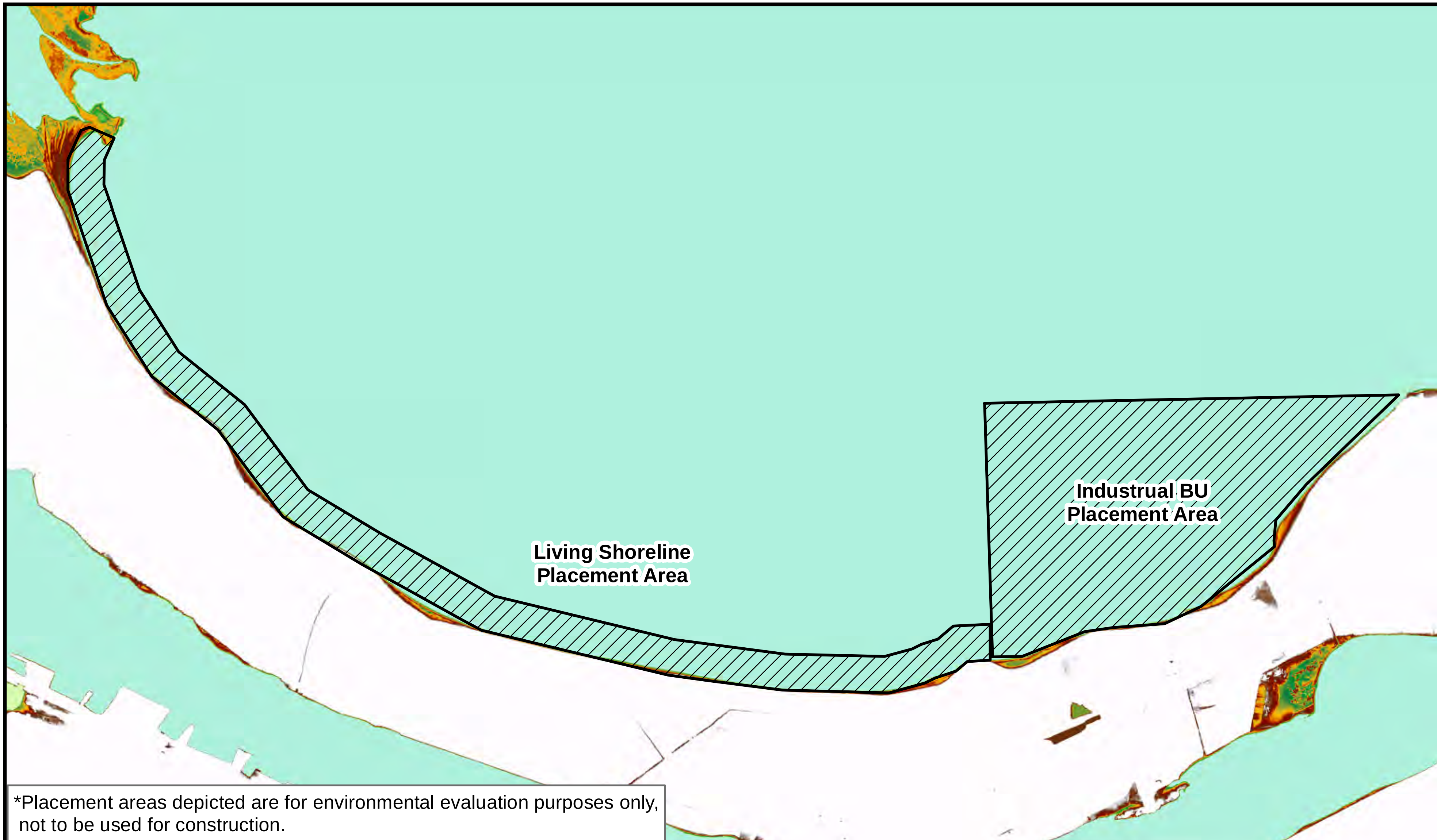
N

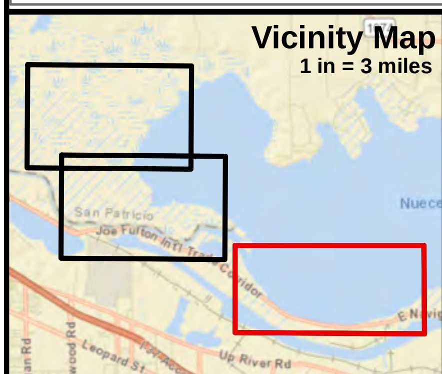
0 0.15 0.3 0.6 Miles

Figure 2
Site Plan Over USGS Lidar Data
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio Counties, Texas
Page 2 of 3

Date: Oct 05, 2022	
Prepared By: BCS	
Prepared For: USACE	
Project: CCSC BU	

US Army Corps of Engineers





Legend

- CBBE Breakwater
- USACE Breakwater
- Beneficial Use Placement Sites & Pipeline Corridors
- Target Placement Zones

USGS 2018 Lidar Data (NAVD88)

Value

High : 5 ft

Low : <0.0 ft

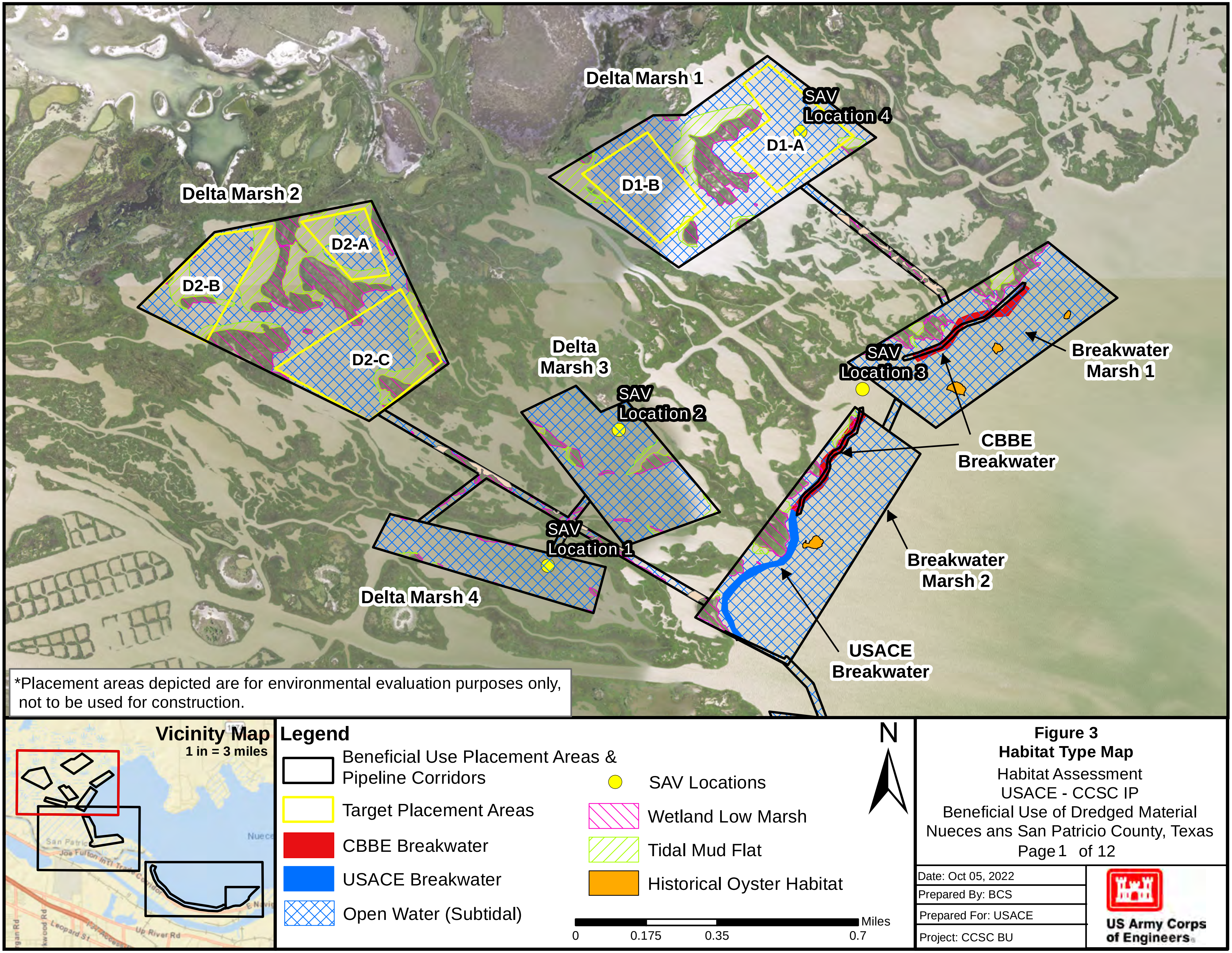
N

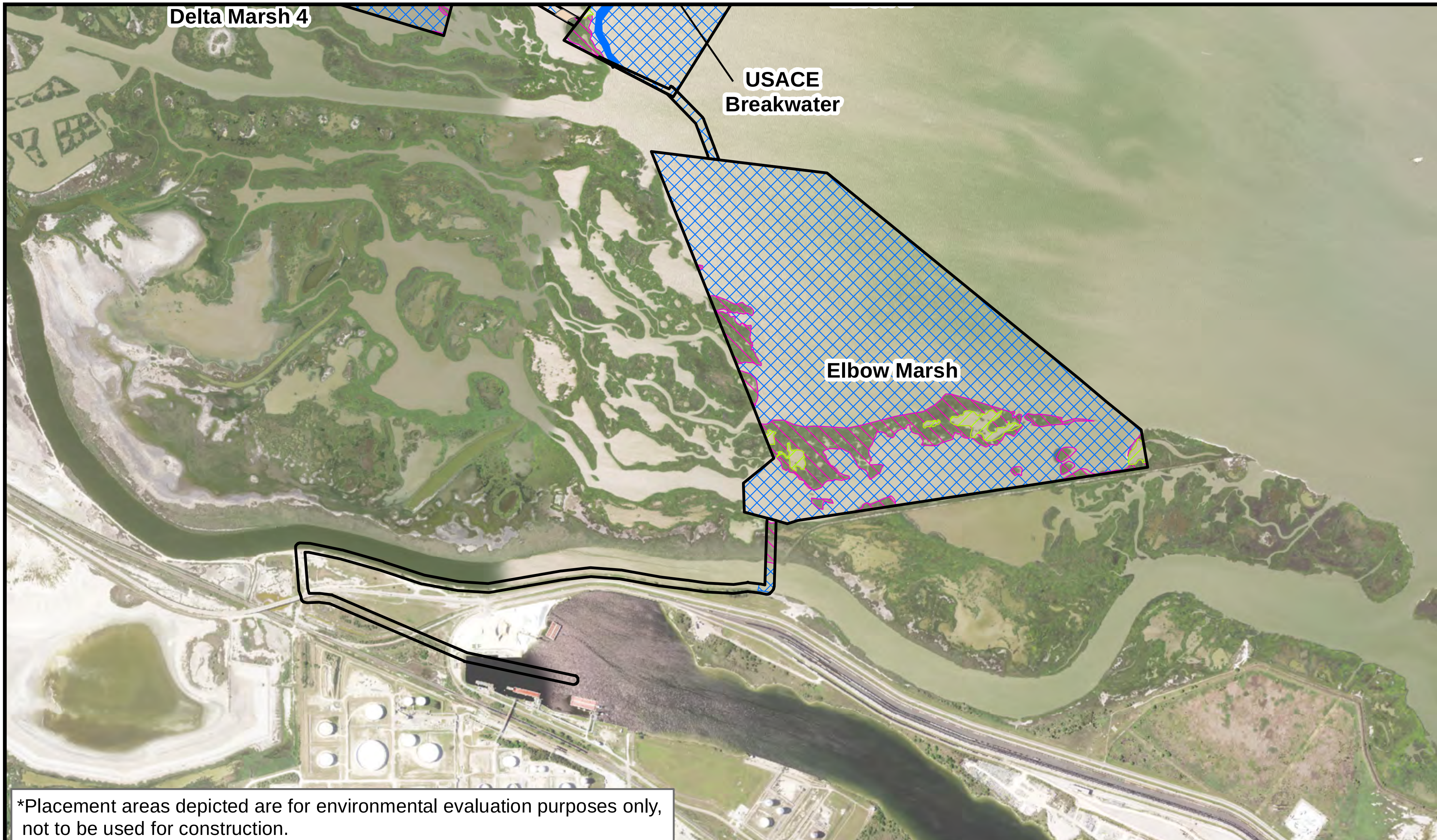
0 0.175 0.35 0.7 Miles

Figure 2
Site Plan Over USGS Lidar Data
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces and San Patricio Counties, Texas
Page 3 of 3

Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers


Delta Marsh 1
SAV Location 4
D1-A
D1-B
Delta Marsh 2
D2-A
D2-B
D2-C
Delta Marsh 3
SAV Location 2
SAV Location 3
Breakwater Marsh 1
CBBE Breakwater
SAV Location 1
Delta Marsh 4
Breakwater Marsh 2
USACE Breakwater
*Placement areas depicted are for environmental evaluation purposes only, not to be used for construction.
Vicinity Map
1 in = 3 miles
Legend
Beneficial Use Placement Areas & Pipeline Corridors
Target Placement Areas
CBBE Breakwater
USACE Breakwater
Open Water (Subtidal)
SAV Locations
Wetland Low Marsh
Tidal Mud Flat
Historical Oyster Habitat
N
0
0.175
0.35
0.7
Miles
Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 1 of 12
Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU
US Army Corps of Engineers



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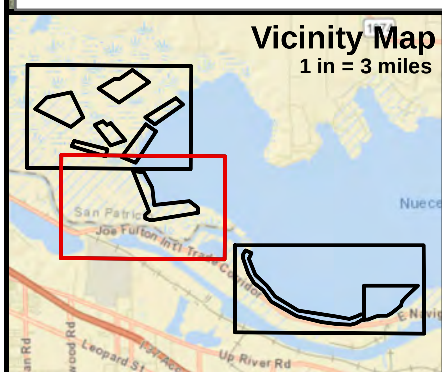

Legend

- Beneficial Use Placement Areas & Pipeline Corridors
- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

0 0.175 0.35 0.7 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 2 of 12

Date: Oct 05, 2022
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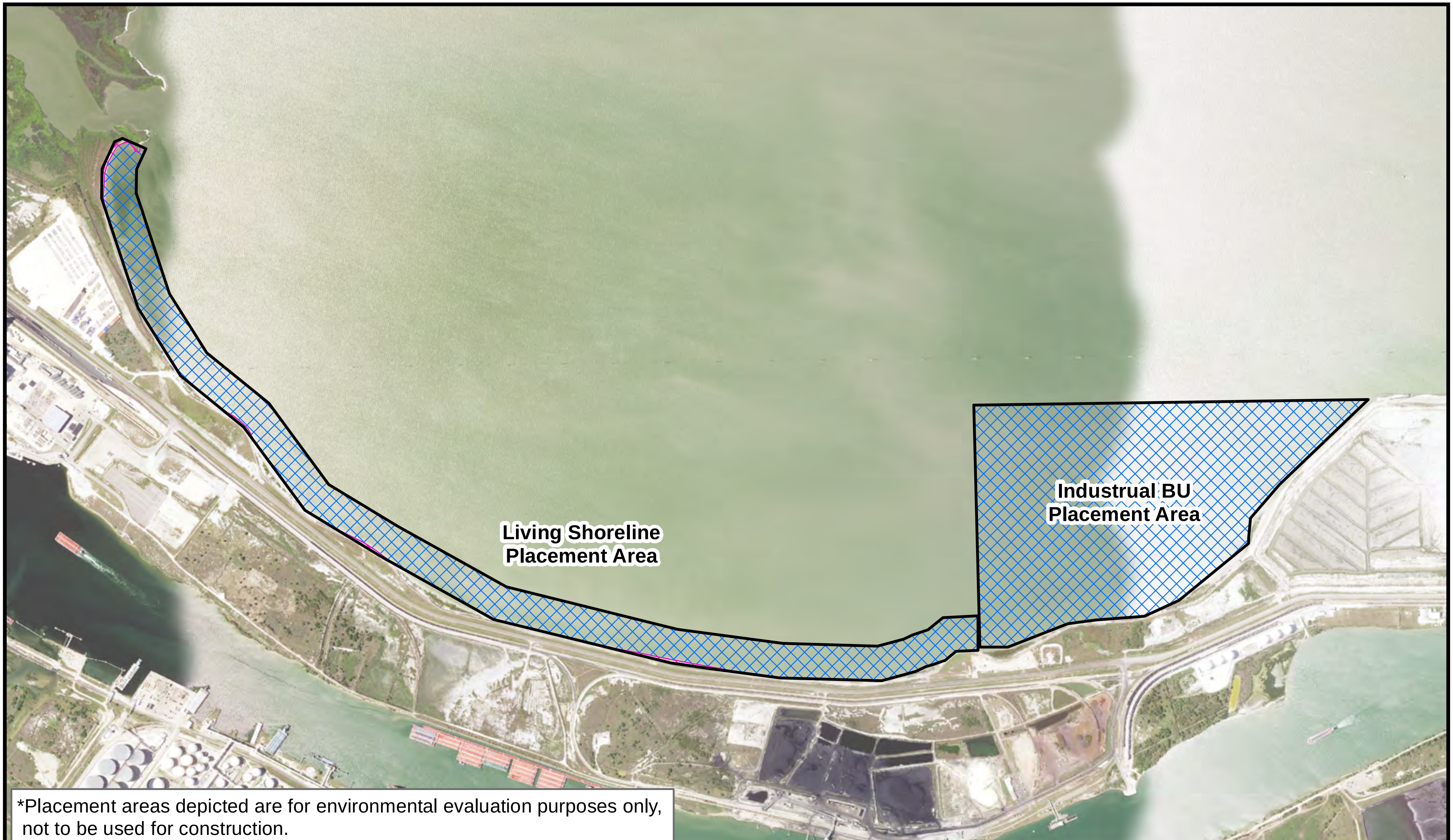

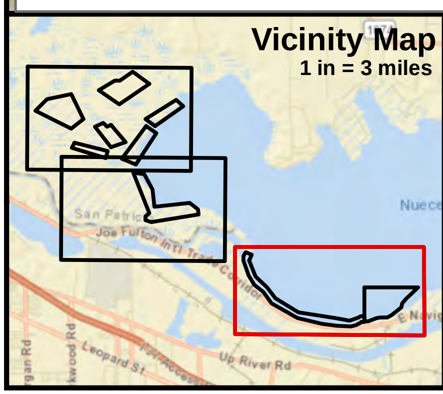

Legend

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- CBBE Breakwater
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N

0 0.175 0.35 0.7 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
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Nueces ans San Patricio County, Texas
Page 3 of 12

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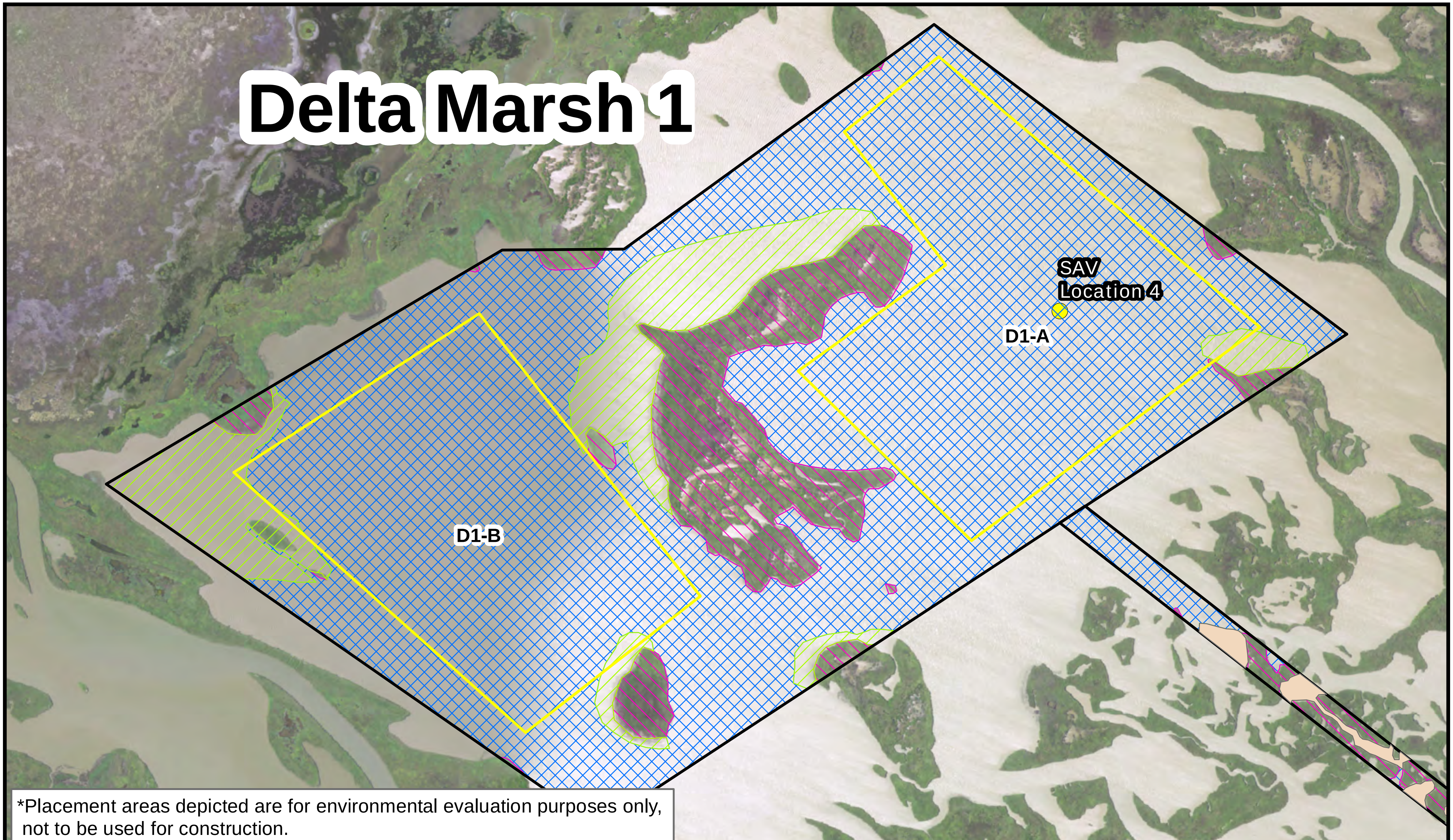

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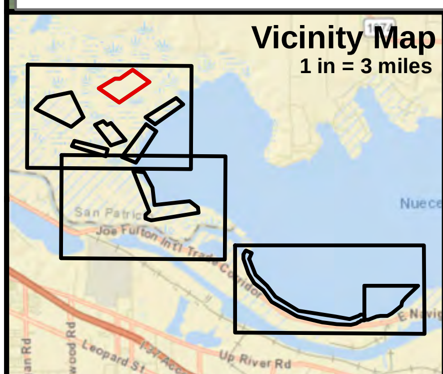

Legend

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- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

0 0.05 0.1 0.2 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 4 of 12

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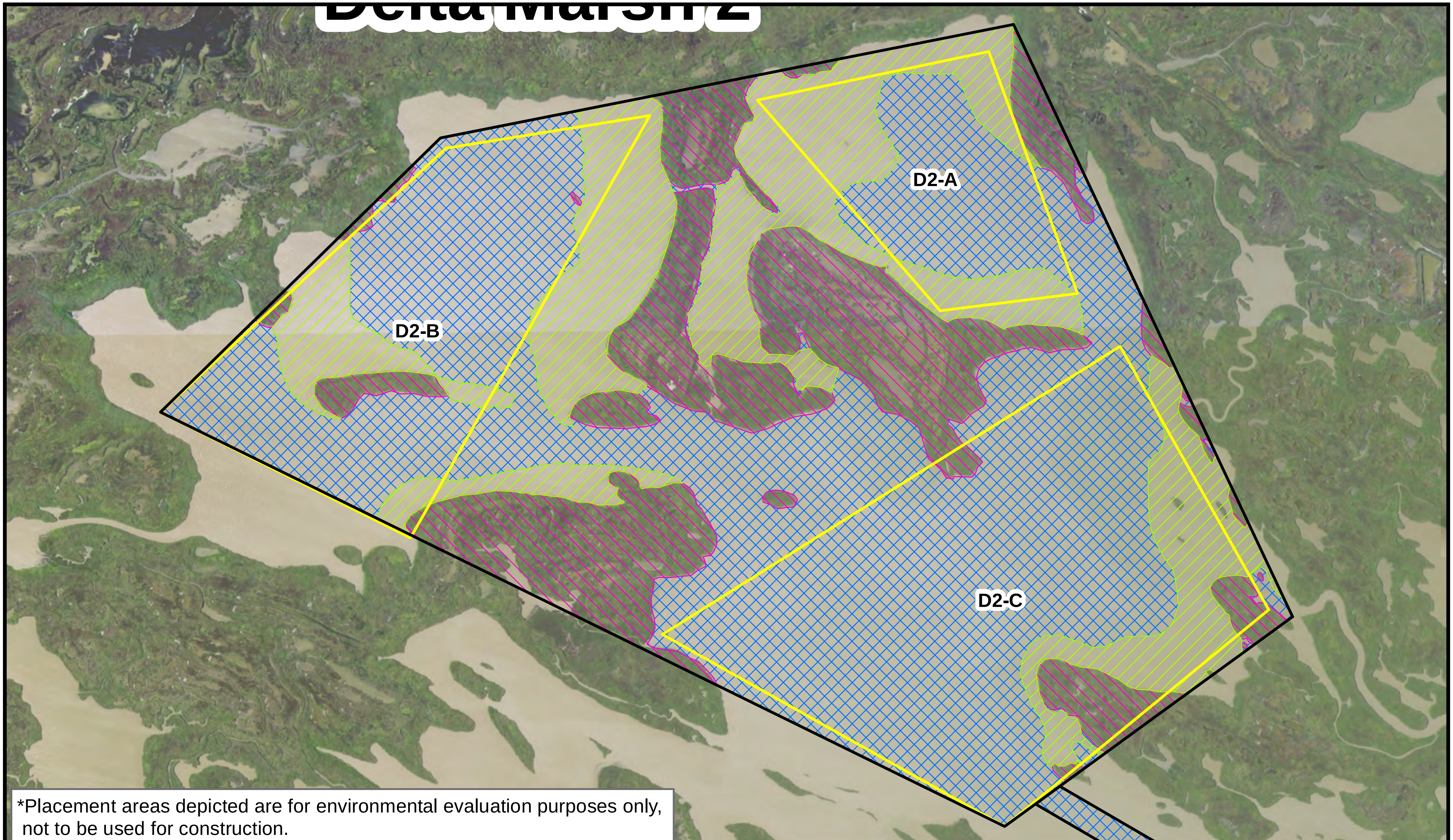
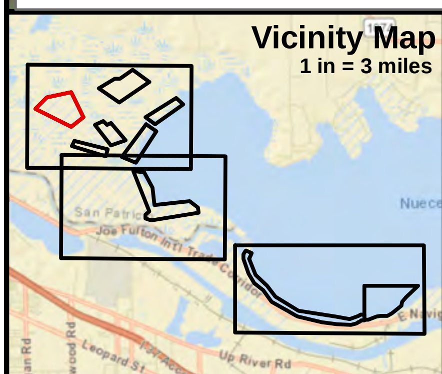
US Army Corps of Engineers





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- Target Placement Areas
- CBBE Breakwater
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N

0 0.05 0.1 0.2 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 5 of 12

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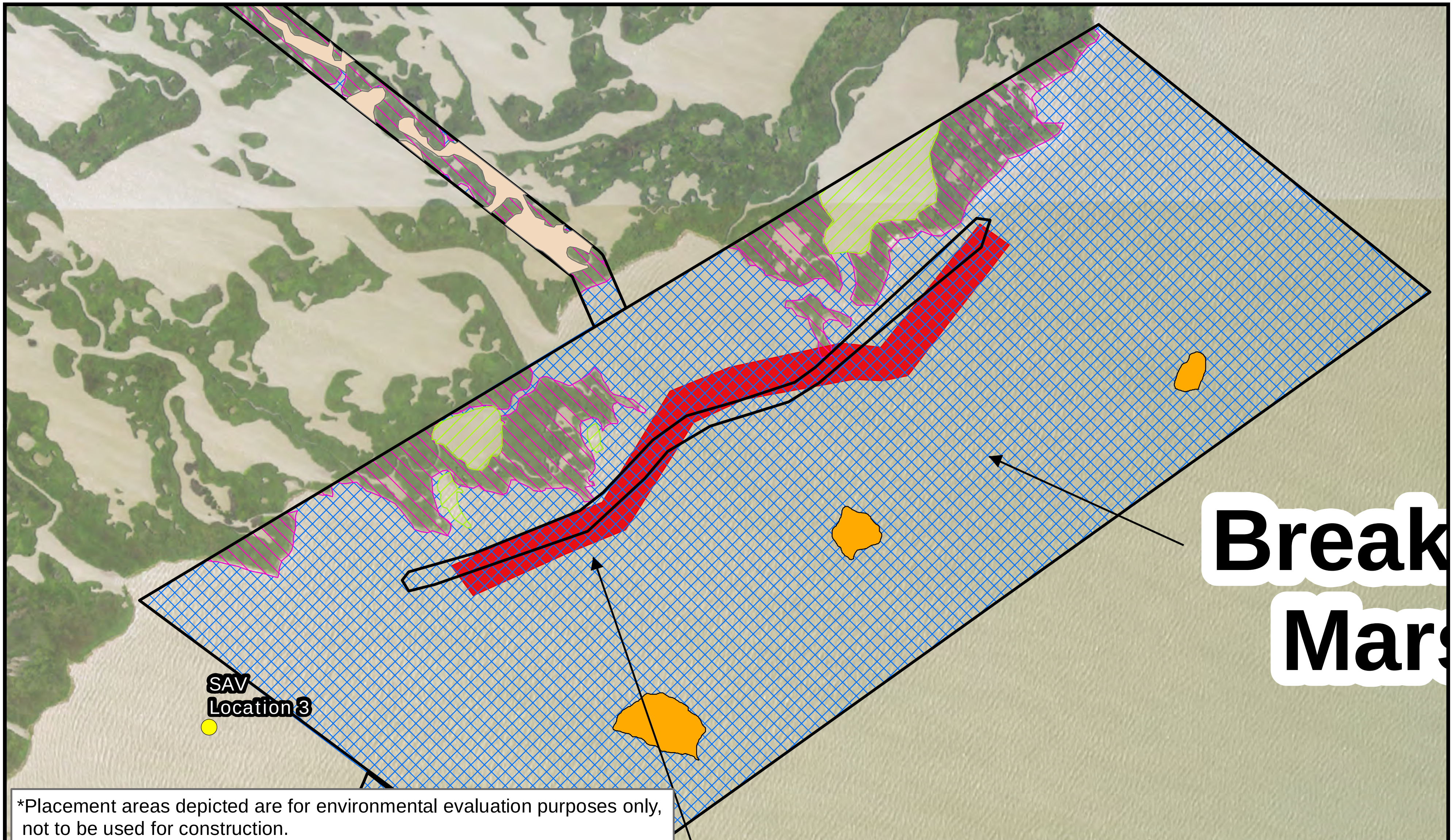

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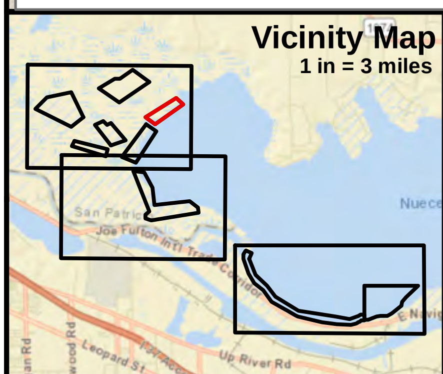

Legend

- Beneficial Use Placement Areas & Pipeline Corridors
- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

Miles
0 0.0425 0.085 0.17

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 6 of 12

Date: Oct 05, 2022
Prepared By: BCS
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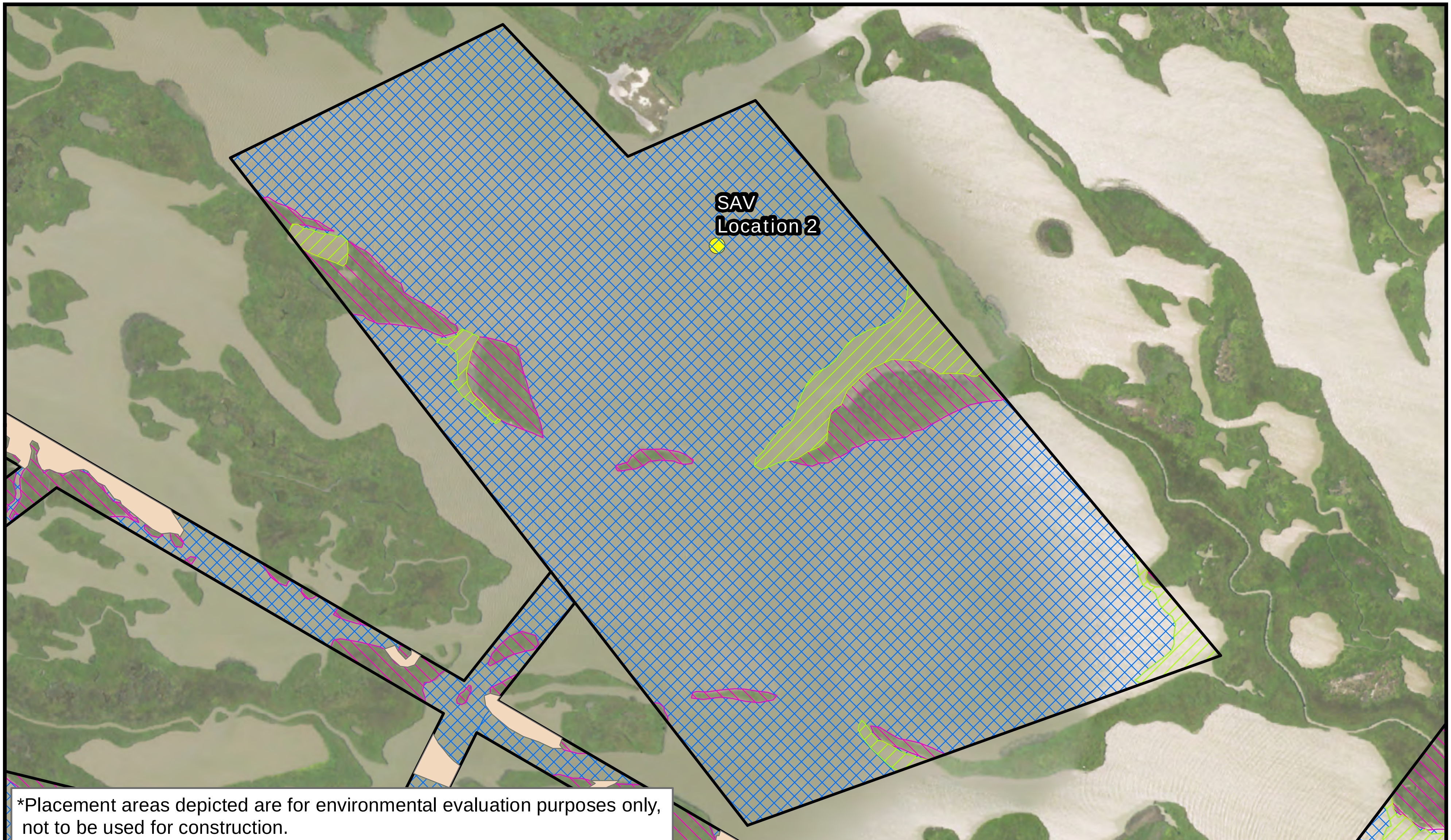

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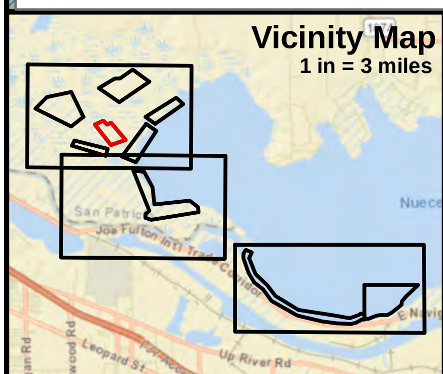

Legend

- Beneficial Use Placement Areas & Pipeline Corridors
- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

0 0.0425 0.085 0.17 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 7 of 12

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Prepared By: BCS
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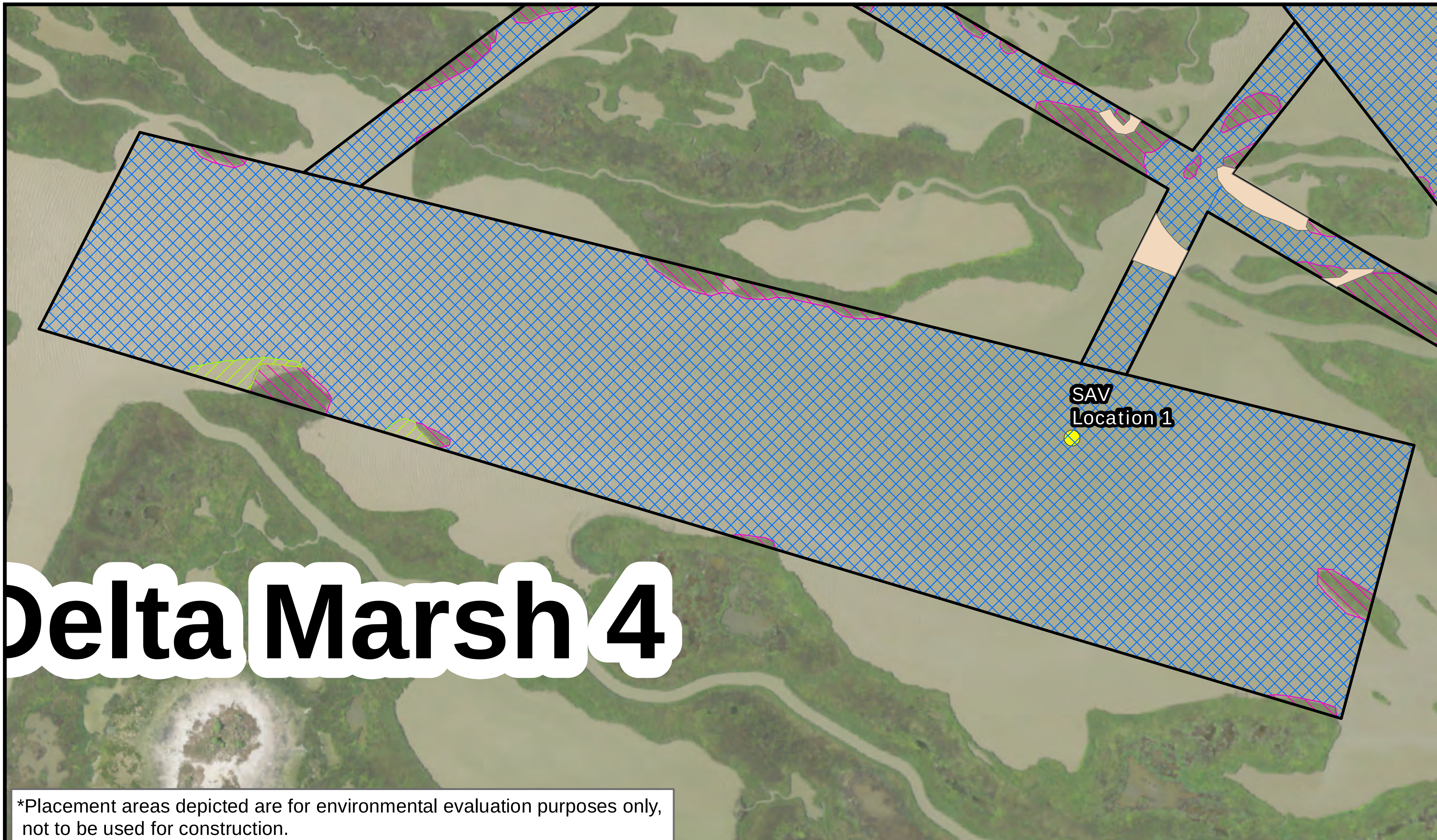

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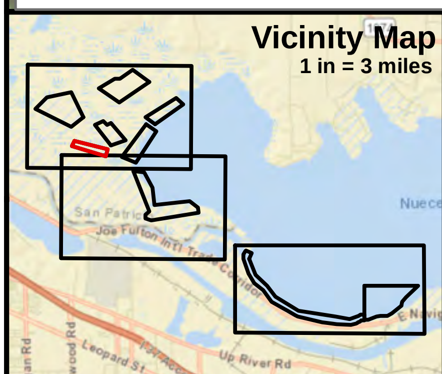

Legend

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- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

0 0.035 0.07 0.14 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 8 of 12

Date: Oct 05, 2022
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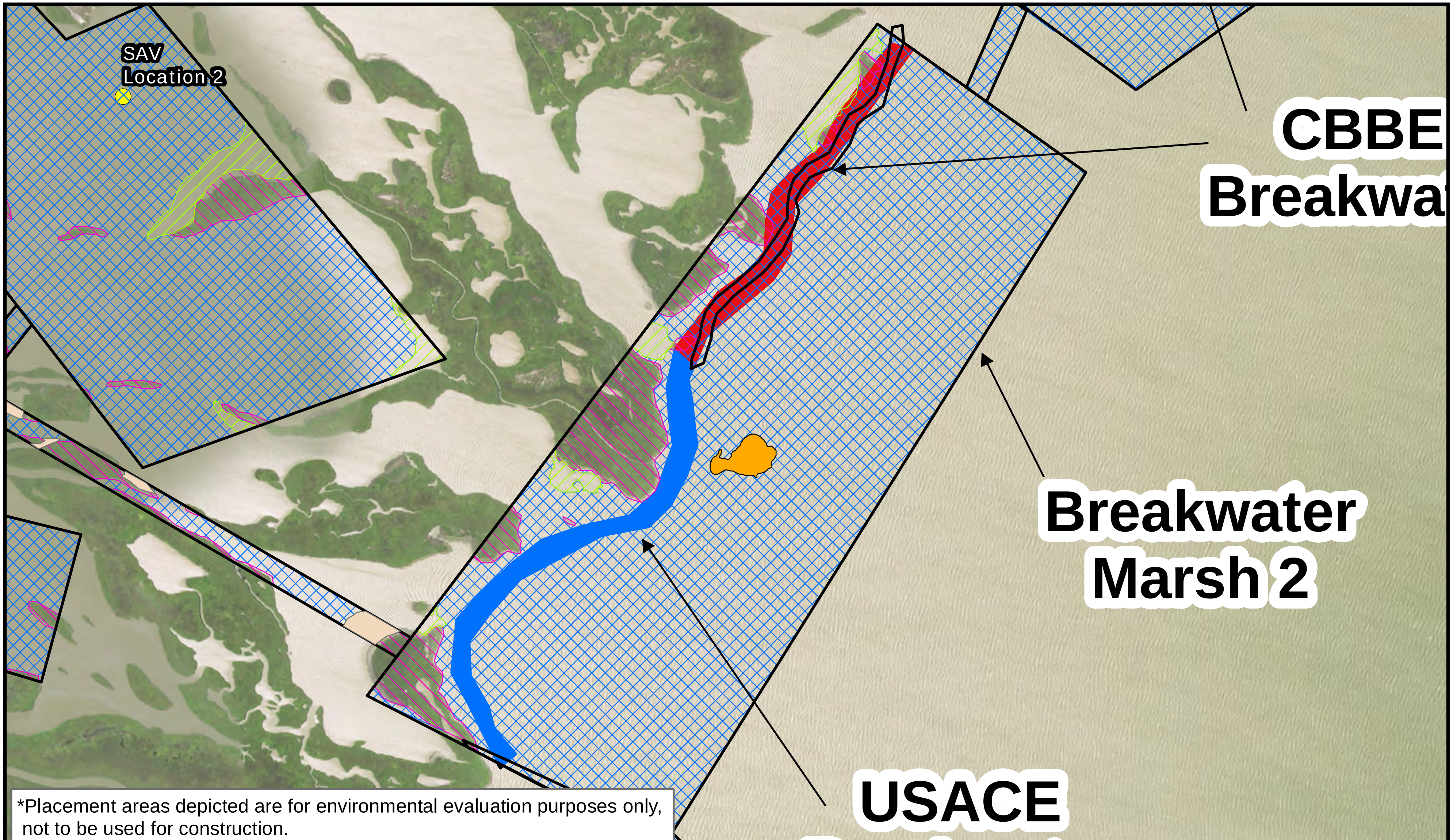

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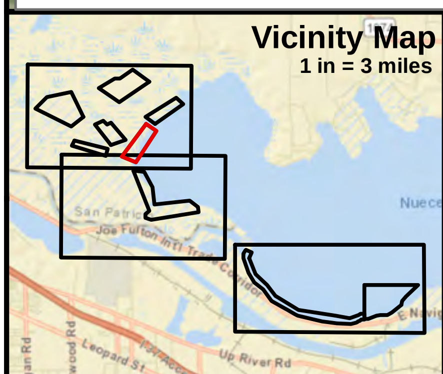
Vicinity Map
1 in = 3 miles



Legend

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- Historical Oyster Habitat

N

0 0.05 0.1 0.2 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 9 of 12

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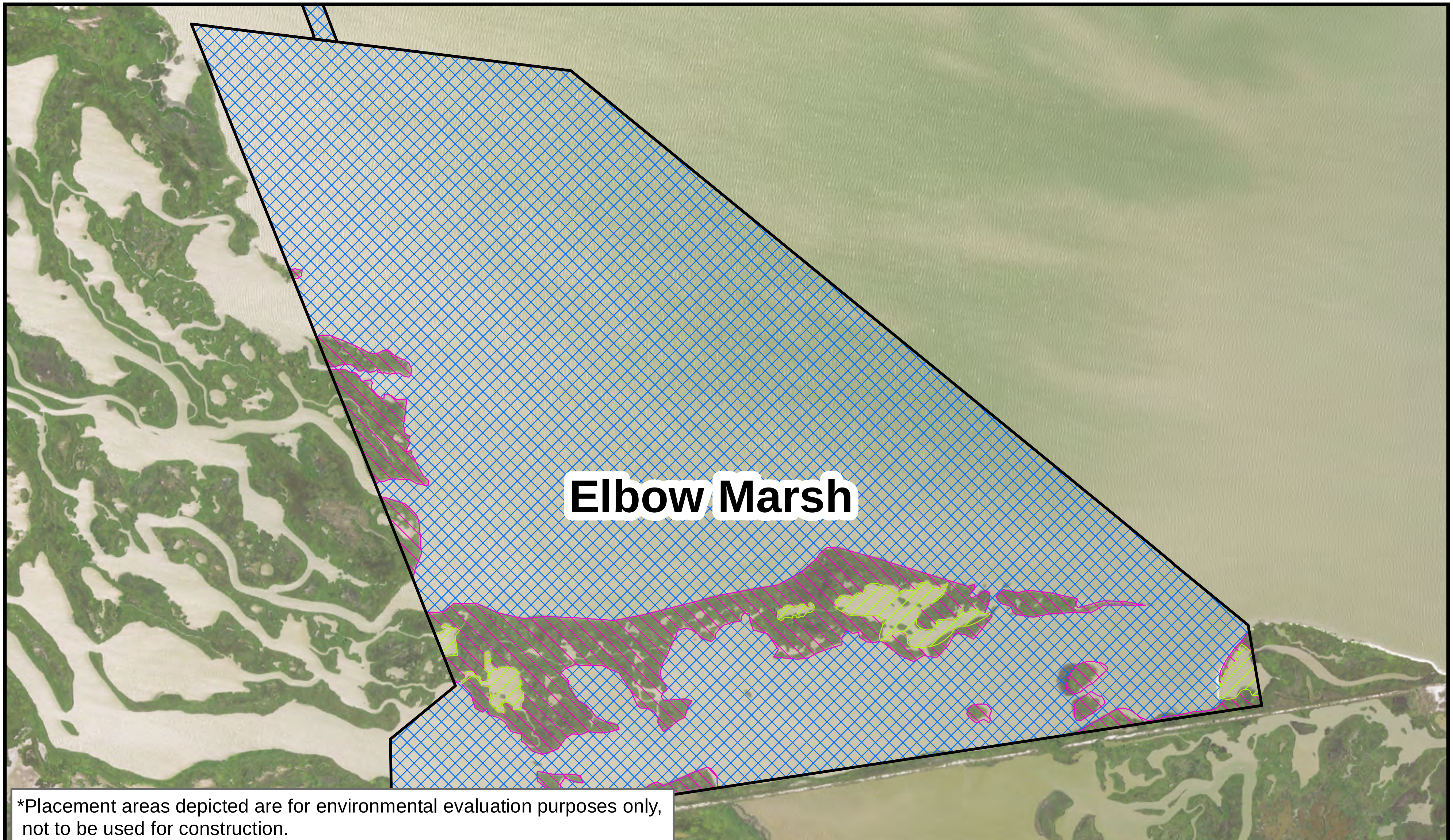

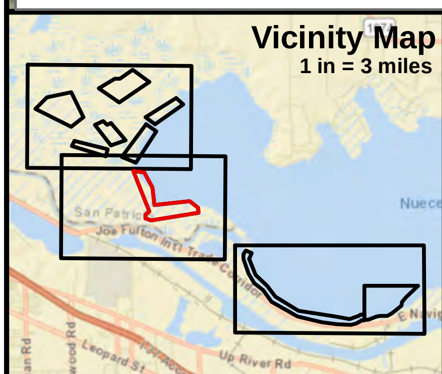

Legend

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- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

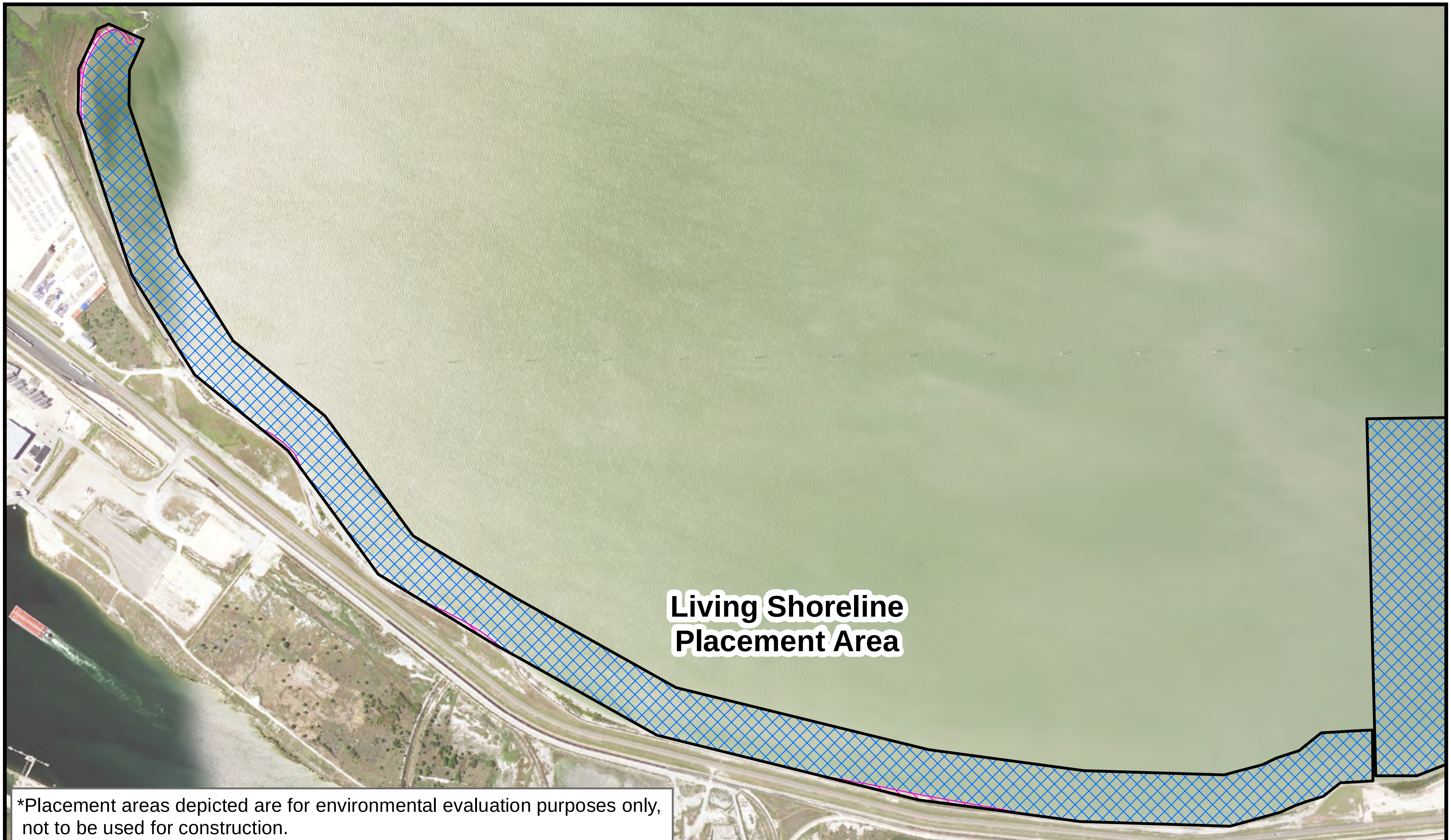
N

0 0.075 0.15 0.3 Miles

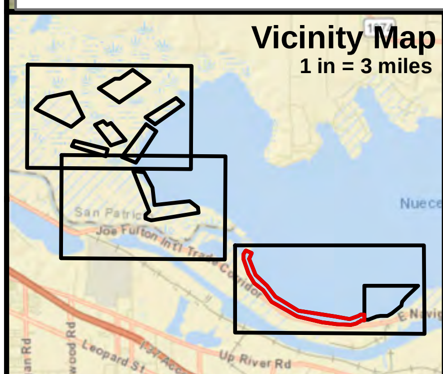
Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 10 of 12

Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers



*Placement areas depicted are for environmental evaluation purposes only, not to be used for construction.



Legend

- Beneficial Use Placement Areas & Pipeline Corridors
- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

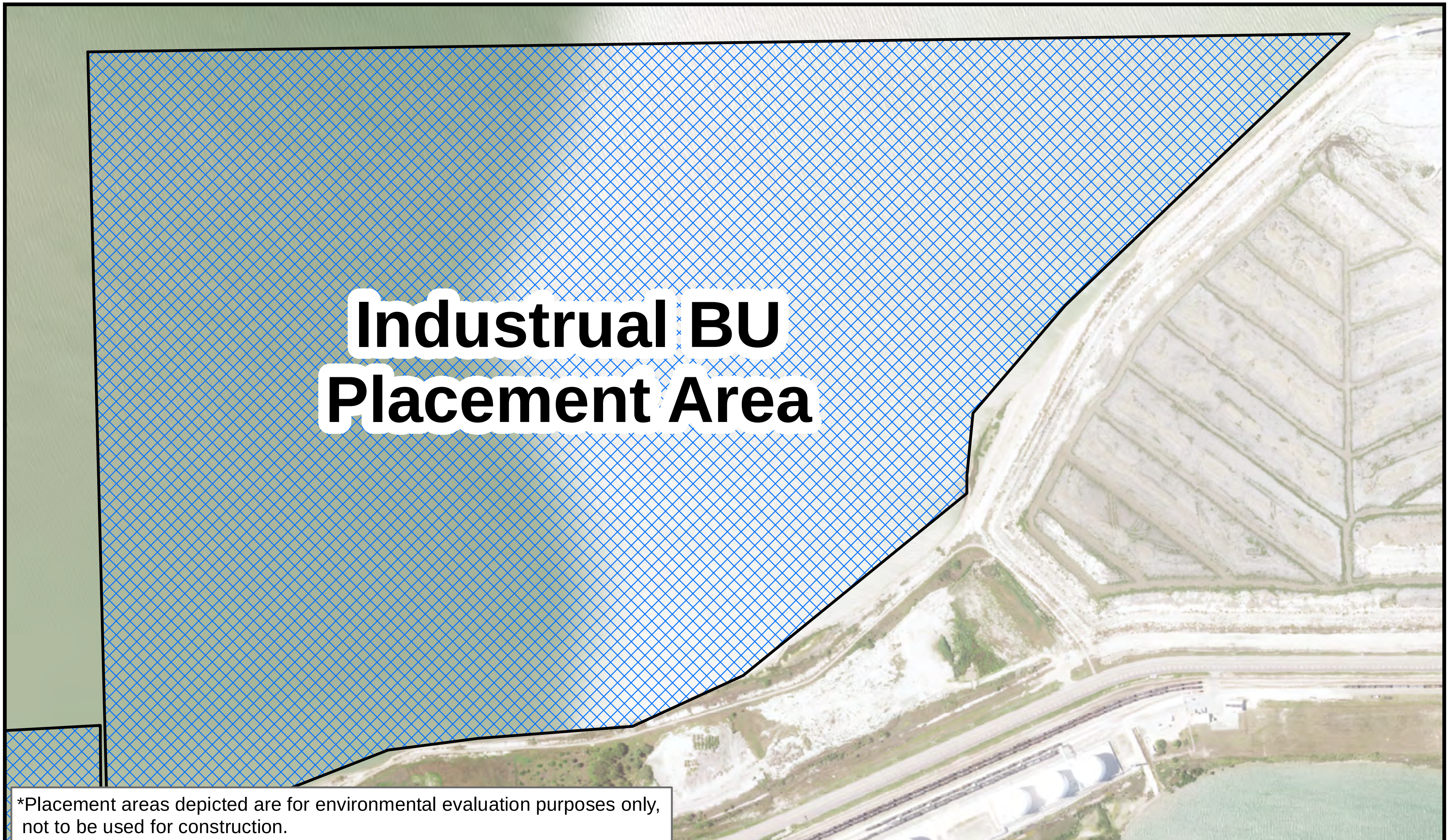
N

0 | 0.125 | 0.25 | 0.5 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 11 of 12

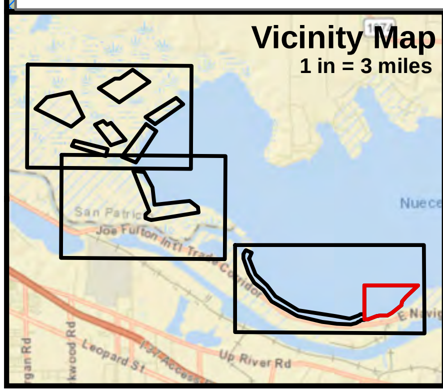
Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers



*Placement areas depicted are for environmental evaluation purposes only, not to be used for construction.

Vicinity Map
1 in = 3 miles



Legend

- Beneficial Use Placement Areas & Pipeline Corridors
- Target Placement Areas
- CBBE Breakwater
- USACE Breakwater
- Open Water (Subtidal)
- SAV Locations
- Wetland Low Marsh
- Tidal Mud Flat
- Historical Oyster Habitat

N

0 0.05 0.1 0.2 Miles

Figure 3
Habitat Type Map
Habitat Assessment
USACE - CCSC IP
Beneficial Use of Dredged Material
Nueces ans San Patricio County, Texas
Page 12 of 12

Date: Oct 05, 2022
Prepared By: BCS
Prepared For: USACE
Project: CCSC BU

US Army Corps of Engineers

Appendix D

Sedimentandt and Water Quality Sampling

Section 404 Analysis Report

August 3, 2022

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

Dear Mrs. Finn:

Re: Dredge Material Sampling and Analysis Report
Corpus Christ Ship Channel Beneficial Use – Dredge Material Sampling and Analysis
Corpus Christi Ship Channel – Inner Harbor, Nueces County, Texas

Lloyd Engineering, Inc. (LEI) was contracted by the U.S. Army Corps of Engineers (USACE) to conduct sampling and analysis of material associated with the deepening and widening of the Inner Harbor section of the Corpus Christi Ship Channel from station 1300+00 to 1560+00, ending in the Viola Turning Basin. The objective of this sampling and analysis is to determine whether unacceptable adverse impacts would result from dredging and/or dredge material placement for beneficial use. Refer to Attachment A, Figure 1 – *Site Vicinity Map* for a map depicting the location of the project.

METHODS

Sample collection took place from April 21, 2022, through April 27, 2022 and consisted of collecting sediment, water, and elutriate samples for physical and chemical analysis. Sediment samples were collected from 28 sample locations, which were composited into 11 sample stations and split between the top and bottom horizons to create a total of 22 sediment and elutriate samples. Site water for water chemistry and elutriate samples were collected from two sample locations, CC-TB-05A and CC-TB-10A. Refer to Attachment B – Table 4 for water quality data collected in the field at the time of sampling. Refer to Attachment B – Table 1 for sample IDs, compositing scheme, and GPS coordinates for each sample location. Refer to Attachment A, Figure 2 – *Sample Location Map* for a depiction of the sampling locations.

According to the Sampling and Analysis Plan (SAP) for this Project, samples were to be collected with a Vibracore to the project depth of approximately -52 feet MLLW (approximately 7 ft of penetration into the sediment). However, achieving the proposed project depths was not possible with a Vibracore given the geotechnical characteristics of the material at the proposed locations, see Attachment E - *Geotechnical Report* for data showing the physical characteristics of the sample material. The Vibracore sampling device is designed to take core samples from finely graded and saturated material, such as silts and fine sands. The geotechnical report of the Corpus Christi Ship Channel suggests that there is approximately 1-5 feet of material fitting this description in areas of similar water depth to the sample locations. As a result, the target penetration was only achieved at sample location CC-TB-22-08AC. Penetration depths achieved can be found for each sample location in Attachment B – Table 2 – *Core Penetration Depths.* The SAP was still followed with all samples with regards to splitting the cores between the upper and lower horizons. However, at some locations, additional sampling methods such as the use of a Van Veen was used in conjugation with the Vibracore to collect the volume needed for laboratory analysis.

All sample collections were conducted in accordance with standard operating procedures (SOPs) and care was taken to avoid contamination from multiple sources throughout field efforts. Sediment, water, and elutriate samples were placed in pre-labeled containers, immediately placed in coolers, and delivered to the NELAP accredited chemistry lab for analysis to determine the presence of contaminants of concern (COC). See Attachment B – Table 3 for a list of all COCs for this Project. All chemical analyses were conducted in accordance with the methods and requirements approved by the U.S. Army Corps of Engineers (USACE) Sampling and Analysis Plan (SAP).

RESULTS

Sediment, water, and elutriate samples were collected from April 21, 2022 through April 27, 2022 within the proposed dredge footprint. Table 1, provided in Attachment B, provides the global positioning system (GPS) coordinates from which samples were collected, the matrix of material collected, as well as the analyses conducted at each of the sampling locations. The methods of analysis, minimum detection levels (i.e., Target Detection Limits [TDLs]), and Chain of Custody forms are provided in Attachment C. The Electronic Data Deliverable (EDD) raw laboratory results are included in Attachment D, and Grain Size Analysis results are included in Attachment E.

Sediment Chemistry

TDLs are defined in the Regional Implementation Agreement (RIA) as “A performance goal set between the lowest, technically feasible detection limit for routine analytical methods and available regulatory criteria or guidelines for evaluating dredged material.” There are no enforceable sediment quality criteria or standards with which to compare concentrations of compounds in sediment. However, there are several different guidelines that are used to look for a cause for concern in sediment samples, one of which is the Effects Range Low, or ERL (Buchman, 2008). When an exceedance of the ERL occurs, the effects range medium (ERM) benchmark value is then evaluated. However, since these sediments are proposed to be used for beneficial use, it is customary (Hauch, 2012) to also compare to the Human Health Protective Concentration Levels (PCL), provided by the Texas Commission on Environmental Quality (TCEQ) as part of the Texas Risk Reduction Program (TRRP, 30 TAC §350). Sediment concentrations of detected compounds are presented in Tables 6 through 9 of Attachment B.

Metals and Others

An examination of Table 6 provided in Attachment B revealed exceedances of the ERL benchmark. The metals which exceeded the ERL benchmarks include Cadmium, Copper, Mercury, and Zinc.

All of these results were below the respective ERM and PCL thresholds.

Pesticides and Total PCBs

An examination of Table 7 provided in Attachment B revealed that six compounds, including Total PCBs were detected above the MDL. However, none of the compounds were detected at concentrations which exceeded any of the respective selected screening benchmarks. The MDL for Dieldrin was reported above the ERL value in each sample, however each result was reported as undetected (U-flagged). The MDL for Chlordane was also reported above the MDL in several samples; however these results also were all reported as undetected (U-flagged).

PAHs

An examination of Table 8 provided in Attachment B revealed 11 of 15 PAH compounds analyzed were detected at concentrations above the LRL in numerous samples, however none of which exceeded any of the respective selected screening benchmarks.

SVOCs

An examination of Table 9 provided in Attachment B revealed five SVOC compounds were detected above the MDL, including Bis(2-ethyhexyl) phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Nitrobenzene, and Total Phenol. However, none of the compounds were detected at concentrations which exceeded any of the respective selected screening benchmarks.

Water and Elutriate Chemistry

The results of chemical analyses for analytes detected in water and elutriate samples are presented in Tables 10 through 13 provided in Attachment B. Also included in Tables 10 through 13 are the Texas Acute Surface Water Quality Standards (WQS), provided by the TCEQ and the United States Environmental Protection Agency (EPA) acute aquatic life metals criteria (CMC) for the protection of aquatic life criteria based on standard laboratory toxicology tests (EPA/USACE, 2003).

Elutriates were prepared by North Water District Laboratory Services, Inc. (NWDLS) from site sediment and corresponding site water. For trace metals analysis, with the exception of mercury and selenium, the elutriate samples were filtered or centrifuged to remove suspended material. As such, these samples provide information on those constituents that move into the water column during dredging operations.

Metals and Others

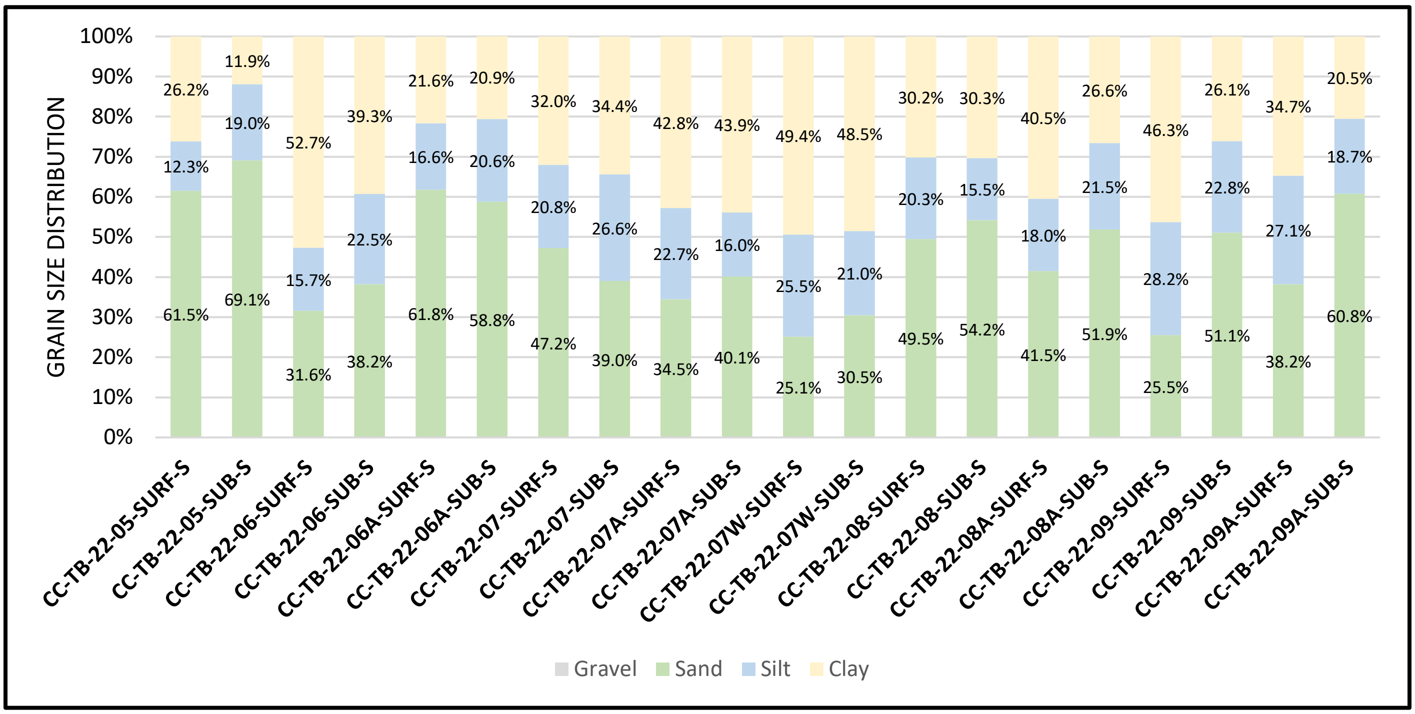
An examination of Table 10 reveals that Cyanide exceeded the CMC benchmark in 5 samples, with 2 of the samples also exceeding the WQS benchmark of 0.0056 µg/L.

Pesticides, PAHs, and SVOCs

An examination of Tables 11 through 13 provided in Attachment B, revealed that no Region 6, CMC or WQS benchmarks were exceeded for any of the compounds detected in any of the site water or elutriate samples.

Sediment Grain Size

Table 5 provided in Attachment B presents the grain size summary. Overall, the average sample was comprised of 45.4% sand, 20.8% silt, and 33.8% clay. See Figure 1 for a graph showing percentage of silt, sand, and clay in each sample.



Refer to Attachment C for Grain Size Analysis Results.

SUMMARY

A review of the sediment chemistry results revealed exceedances of the ERL benchmarks for several different metals. The metals: Zinc, Copper, Cadmium, and Mercury exceeded the ERL benchmarks, but are not above NOAA's ERM or PCL benchmarks. No other ERL, ERM, or PCL benchmarks were exceeded in the concentrations of any of the other analytes detected in any of the sediment samples.

A review of the site water and elutriate chemistry results revealed that Cyanide exceeded the CMC and TWQS benchmarks in multiple samples. No other corresponding screening benchmarks were exceeded in any other compounds detected in any of the site water or elutriate samples.

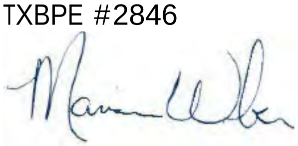
CONCLUSION

These sediments are proposed for placement for the purpose of beneficial use. Based on the results of this assessment, it is LEI's professional opinion that there is nothing in the chemical analysis that would indicate a cause for concern with the dredging and/or placement of new work material from the Inner Harbor of the Corpus Christi Ship Channel for beneficial use.

Please contact me at (832) 426-4656 or by email at Marisa@lloydeng.com if you have any questions or need additional information.

Sincerely,

Lloyd Engineering, Inc.
TXBPE #2846

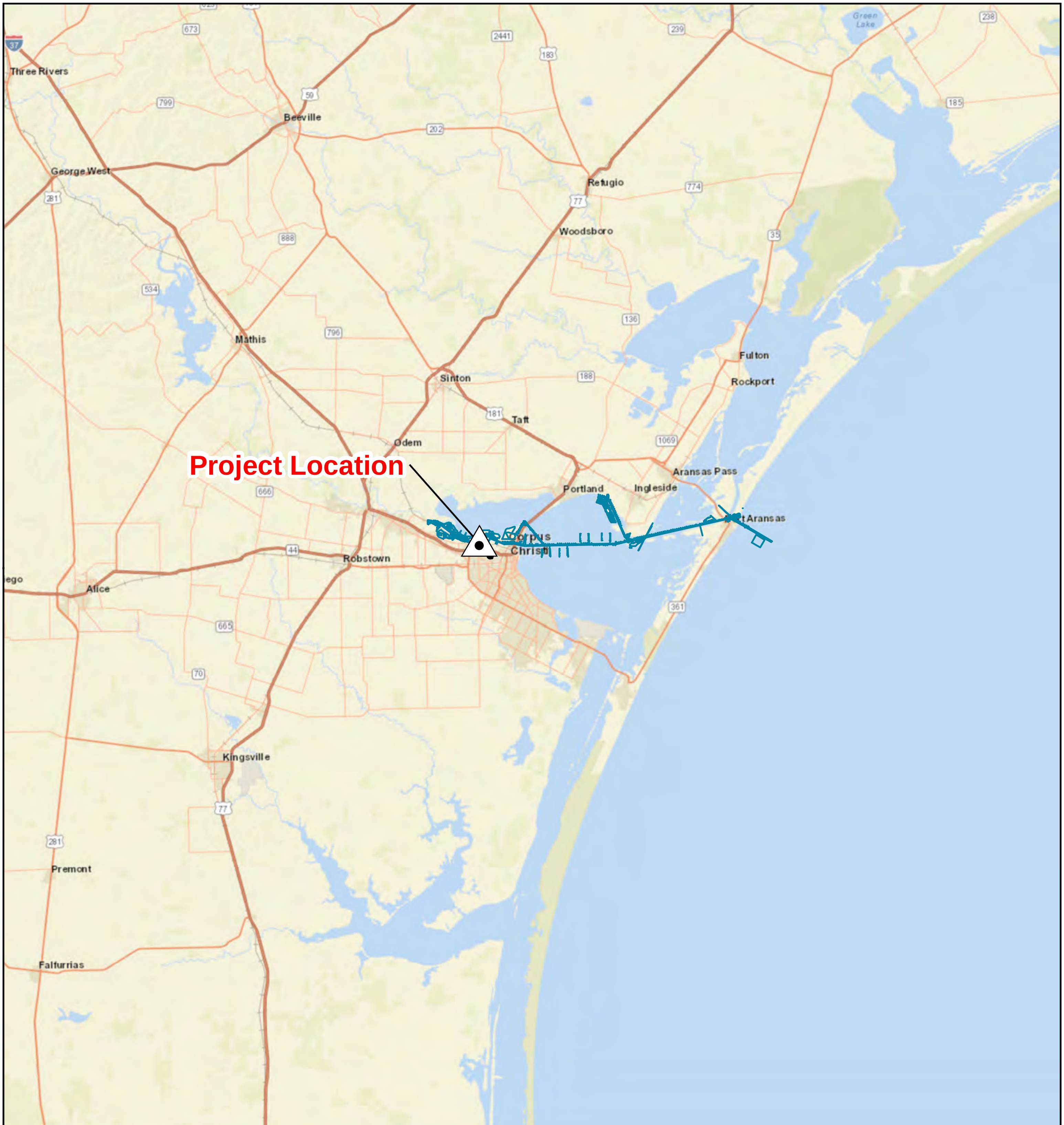


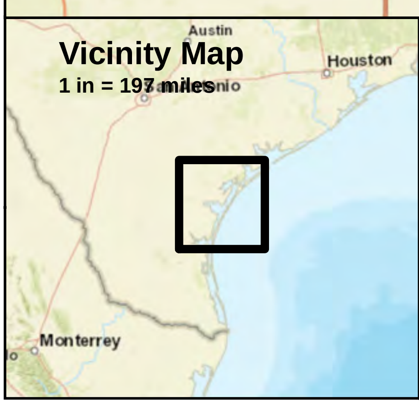
Marisa Weber
Director of Environmental Services

Attachments

Attachment A – Project Vicinity and Sampling Location Maps
Attachment B – Sampling and Analysis Results Tables
Attachment C – Laboratory Analyses, QA/QC Reports and Chain of Custody Forms
Attachment D – Electronic Data Deliverable (EDD) Raw Laboratory Results
Attachment E – Geotechnical Data Report

Attachment A
Project Vicinity and Sampling Location Maps





Legend

- Sample Locations
- Corpus Christi Ship Channel

0 5 10 20 Miles

N

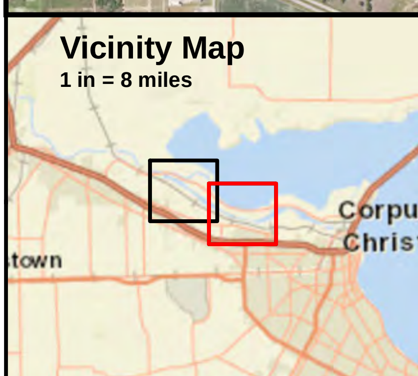
Figure 1:
Site Vicinity Map

Corpus Christi Ship Channel
Environmental Assessment
Sediment Sampling Report
USACE
Nueces County, Texas

Date: Jun 09, 2022

Prepared By: BCS

LLOYD ENGINEERING, INC.



Legend

- Sample Locations
- Corpus Christi Ship Channel

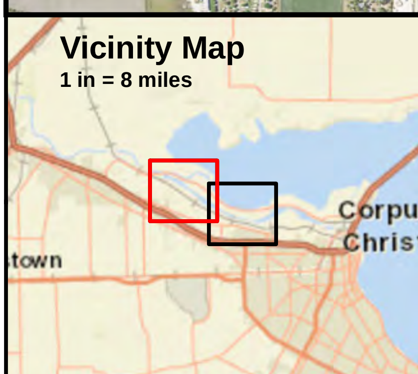
N

0 5 10 20 Miles

Figure 2
Sample Location Map
Corpus Christi Ship Channel
Environmental Assessment
Sediment Sampling Report
USACE
Nueces County, Texas

Date: Jul 21, 2022
Prepared By: B. Selensky
Page #: 1

LLOYD ENGINEERING, INC.



Legend

- Sample Locations
- Corpus Christi Ship Channel

N

0 5 10 20 Miles

Figure 2
Sample Location Map
Corpus Christi Ship Channel
Environmental Assessment
Sediment Sampling Report
USACE
Nueces County, Texas

Date: Jul 21, 2022
Prepared By: B. Selensky
Page #: 2

LLOYD ENGINEERING, INC.

Attachment B
Sampling and Analysis Results Tables

Table 1
Sampling Station GPS Locations and Analyses Performed
Corpus Christi Ship Channel - Beneficial Use - Environmental Assessment
April 2022

Sample ID	Station ID	Substation ID	Latitude	Longitude	Channel Station	Sample Matrix	Analyses**
CC-TB-05-W	CC-TB-05	CC-TB-05A	27.8196183	-97.4512092	1300+00	Sediment, Water	W, S, E, GS
CC-TB-05-SURF-S		CC-TB-05B	27.8183509	-97.4539976	1310+00	Sediment	
CC-TB-05-SUB-S		CC-TB-05C	27.8175912	-97.4568957	1320+00		
CC-TB-06-SURF-S	CC-TB-06	CC-TB-06A	27.8161913	-97.4596879	1330+00	Sediment	S, E, GS
		CC-TB-06B	27.8160346	-97.4628090	1340+00		
CC-TB-06-SUB-S		CC-TB-06C	27.8169820	-97.4657723	1350+00		
CC-TB-06A-SURF-S	CC-TB-06A	CC-TB-06AA	27.8175085	-97.4688513	1360+00	Sediment	S, E, GS
		CC-TB-06AB	27.8177613	-97.4718815	1370+00		
CC-TB-06A-SUB-S		CC-TB-06AC	27.8196977	-97.4755453	1380+00		
CC-TB-07-SURF-S	CC-TB-07	CC-TB-07A	27.8214039	-97.4804113	1400+00	Sediment	S, E, GS
		CC-TB-07B	27.8224163	-97.4831087	1410+00		
CC-TB-07-SUB-S		CC-TB-07C	27.8238559	-97.4858941	1420+00		
CC-TB-07A-SURF-S	CC-TB-07A	CC-TB-07AA	27.8251027	-97.4884240	1430+00	Sediment	S, E, GS
		CC-TB-07AB	27.8267810	-97.4907821	1440+00		
CC-TB-07A-SUB-S		CC-TB-07AC	27.8283487	-97.4935002	1450+00		
CC-TB-07W-SURF-S	CC-TB-07W	CC-TB-07WN	27.8276294	-97.4909206	1440+00	Sediment	S, E, GS
CC-TB-07W-SUB-S		CC-TB-07WS	27.8268752	-97.4948013	1450+00		
CC-TB-08-SURF-S	CC-TB-08	CC-TB-08A	27.8301208	-97.4958031	1460+00	Sediment	S, E, GS
CC-TB-08-SUB-S		CC-TB-08B	27.8315440	-97.4985010	1470+00		
CC-TB-08A-SURF-S	CC-TB-08A	CC-TB-08AA	27.8334469	-97.5007202	1480+00	Sediment	S, E, GS
		CC-TB-08AB	27.8349705	-97.50325908	1490+00		
CC-TB-08A-SUB-S		CC-TB-08AC	27.83690917	-97.50555885	1500+00		
CC-TB-09-SURF-S	CC-TB-09	CC-TB-09A	27.84010197	-97.51075645	1520+00	Sediment	S, E, GS
CC-TB-09-SUB-S		CC-TB-09B	27.8418595	-97.5133954	1530+00		
CC-TB-09A-SURF-S	CC-TB-09A	CC-TB-09AA	27.8422284	-97.5161915	1540+00	Sediment	S, E, GS
CC-TB-09A-SUB-S		CC-TB-09AB	27.8427446	-97.5184025	1550+00		
CC-TB-10-SURF-S	CC-TB-10	CC-TB-10A	27.8453248	-97.5214933	1560+00	Sediment, Water	W, S, E, GS
CC-TB-10-SUB-S		CC-TB-10B	27.8453248	-97.5217777	1560+00	Sediment	

*State Plane South Central NAD 83
**W = Analysis of water sample
**S = Analysis of sediment sample
**E = Analysis of elutriate sample
**GS = Grain-size analysis

Table 2	
Corpus Christ Ship Channel - Inner Harbor Beneficial Use Environmental Assessment Vibracore Sample Penetration Depths	
Station ID	**Sample Depth Achieved (Feet)**
CC-TB-22-05A	1.25
CC-TB-22-05B	1.75
CC-TB-22-05C	2.50
CC-TB-22-06A	3.00
CC-TB-22-06B	3.50
CC-TB-22-06C	1.00
CC-TB-22-06AA	1.20
CC-TB-22-06AB	3.00
CC-TB-22-06AC	3.50
CC-TB-22-07A	5.50
CC-TB-22-07B	5.00
CC-TB-22-07C	4.50
CC-TB-22-07AA	3.00
CC-TB-22-07AB	1.50
CC-TB-22-07AC	2.75
CC-TB-22-07WN	3.75
CC-TB-22-07WS	4.00
CC-TB-22-08A	1.50
CC-TB-22-08B	4.00
CC-TB-22-08AA	2.50
CC-TB-22-08AB	6.50
CC-TB-22-08AC	8.00
CC-TB-22-09A	2.50
CC-TB-22-09B	5.00
CC-TB-22-09AA	2.00
CC-TB-22-09AB	3.25
CC-TB-22-10A	3.00
CC-TB-22-10B	2.80

Table 3

Parameters Determined by Chemical Analysis

Corpus Christi Ship Channel - Beneficial Use - Environmental Assessment

May 2022

Semivolatiles		
1,2,4-Trichlorobenzene	4-Chloro-3-methylphenol	Di-n-butyl phthalate
1,2-Dichlorobenzene	4-Nitrophenol	Di-n-octyl Phthalate
1,2-Diphenylhydrazine as Azobenzene	Acenaphthene	Fluoranthene
1,3-Dichlorobenzene	Acenaphthylene	Fluorene
1,4-Dichlorobenzene	Anthracene	Hexachlorobenzene
2,2'-Oxybis	Benzidine	Hexachlorobutadiene
2,4,6-Trichlorophenol	Benzo(a)anthracene	Hexachlorocyclopentadiene
2,4-Dichlorophenol	Benzo(a)pyrene	Hexachloroethane
2,4-Dimethylphenol	Benzo(b)fluoranthene	Indeno(1,2,3-cd)pyrene
2,4-Dinitrophenol	Benzo(g,h,i)perylene	Isophorone
2,4-Dinitrotoluene	Benzo(k)fluoranthene	Naphthalene
2,6-Dinitrotoluene	Bis(2-chloroethoxy) methane	Nitrobenzene
2-Chloronaphthalene	Bis(2-chloroethyl) ether	n-Nitrosodimethylamine
2-Chlorophenol	Bis(2-ethylhexyl)phthalate	n-nitrosodi-n-propylamine
2-Methyl-4,6-dinitrophenol	Butyl benzyl phthalate	n-Nitrosodiphenylamine
2-Nitrophenol	Chrysene	Pentachlorophenol
3,3-Dichlorobenzidine	Dibenzo(a,h)anthracene	Phenanthrene
4-Chlorophenyl phenyl ether	Diethyl phthalate	Phenol
4-Bromophenyl phenyl ether	Dimethyl phthalate	Pyrene
Organochlorine Pesticides		
4,4'-DDD	Chlordane	Endrin Aldehyde
4,4'-DDE	Delta-BHC (d-BHC)	Endrin Ketone
4,4'-DDT	Dieldrin	Gamma-BHC (g-BHC or y-BHC)
Alpha-BHC (a-BHC)	Endosulfan I	Heptachlor
Alpha-Chlordane (a-Chlordane)	Endosulfan II	Heptachlor Epoxide
Aldrin	Endosulfan Sulfate	Toxaphene
Beta-BHC (b-BHC)	Endrin	Gamma-Chlordane (g-Chlordane or y-Chlordane)
Metals		
Antimony	Chromium (III)	Nickel
Arsenic	Chromium (VI)	Selenium
Beryllium	Copper	Silver
Cadmium	Lead	Thallium
Chromium	Mercury	Zinc
Polychlorinated Biphenyls		
Total PCB		
Miscellaneous Parameters		
Ammonia	Grain Size (sand)	Total Petroleum Hydrocarbons
Cyanides	Grain Size (silt)	Total Solids/ Dry Weight
Total Organic Carbon	Grain Size (clay)	Percent (%) Solids

WATER QUALITY DATA

Project: Corpus Christi Beneficial Use Environmental Assessment
Location: Corpus Christi Ship Channel - Inner Harbor, Nueces County, Texas
Date(s) Collected: April 21, 2022

Station	CC-TB-22-5-W	CC-TB-22-10-W
Date	4/21/2022	4/21/2022
Latitude	27.8196183	27.8453248
Longitude	-97.4512092	-97.5217777
Water Depth (ft.)	54.3	51.8
Reading Taken at (ft):	Surface	Surface
	2	2
DO (mg/L)	6.76	6.75
pH (s.u.)	7.59	7.71
Salinity ($^{0}/_{00}$)	27.9	27.00
Specific Cond. (mS/cm)	43.3	42.00
Water Temp (ºC)	24.56	24.48
Turbidity (NTU)	4.3	0.00
Time	13:00	13:45

Remarks:
Present During Sampling- Brett Selensky, Robert Moleski, Kevin Kichline
Weather- 01:00 PM: 80ºF, sunny, 11 MPH winds from SW

TABLE 5
Results of Physical Analyses for Sediment Samples

Sample ID		CC-TB-22-05-SUB	CC-TB-22-05-SURF	CC-TB-22-06-SUB	CC-TB-22-06-SURF	CC-TB-22-06A-SUB	CC-TB-22-06A-SURF	CC-TB-22-07-SUB	CC-TB-22-07-SURF
Sediment Description		Silty sand, mostly fine-grained quartz sand, little silt, few clay, gray	Clayey sand, mostly fine-grained quartz sand, little clay, few silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Clayey sand, mostly fine-grained quartz sand, little clay, little silt, gray	Clayey sand, mostly fine-grained quartz sand, little clay, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray
% Gravel (Particles ≥4.750 mm)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Coarse Sand		1.9	0.2	0.1	0.3	0.0	0.1	0.1	0.9
% Medium Sand		8.2	3.1	1.3	1.6	0.8	1.3	0.3	2.4
% Fine Sand		59.0	58.2	36.8	29.7	57.7	60.4	38.6	43.9
% Sand (total) (Particles 0.075-4.749 mm)		69.1	61.5	38.2	31.6	58.5	61.8	39.0	47.2
% Silt (Particles 0.005-0.074 mm)		19.0	12.3	22.5	15.7	20.6	16.6	26.6	20.8
% Clay (Particles <0.005 mm)		11.9	26.2	39.3	52.7	20.9	21.6	34.4	32.0
% Silt & Clay (combined)		30.9	38.5	61.8	68.4	41.5	38.2	61.0	52.8
USCS Classification		SM	SC	CL	CL	SC	SC	CL	CL
% Passing Sieve Size	**Metric Equivalent (mm)**								
#4	**4.75**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
#10	**2.00**	98.1	99.8	99.9	99.7	100.0	99.9	99.9	99.1
#20	**0.85**	94.1	99.3	99.7	99.3	99.8	99.8	99.8	97.7
#40	**0.425**	89.9	96.7	98.6	98.1	99.2	98.6	99.6	96.7
#50	**0.297**	85.0	90.9	96.0	95.1	96.1	93.1	98.8	94.9
#70	**0.210**	78.2	82.1	90.7	90.2	88.1	83.2	95.4	88.2
#100	**0.149**	64.1	66.1	81.4	83.2	71.8	66.3	86.1	74.1
#140	**0.105**	46.3	50.5	71.7	75.0	53.8	48.8	75.4	62.9
#200	**0.075**	30.9	38.5	61.8	68.4	41.5	38.2	61.0	52.8
Hydrometer Readings (% less than the following sizes)		21.7 @ 0.0468 mm	35.0 @ 0.0433 mm	49.7 @ 0.0412 mm	66.5 @ 0.0370 mm	31.4 @ 0.0439 mm	29.4 @ 0.0453 mm	48.1 @ 0.0403 mm	42.5 @ 0.0420 mm
		19.5 @ 0.0334 mm	32.9 @ 0.0310 mm	48.2 @ 0.0294 mm	62.7 @ 0.0269 mm	28.7 @ 0.0315 mm	28.0 @ 0.0322 mm	44.7 @ 0.0291 mm	40.4 @ 0.0301 mm
		18.1 @ 0.0238 mm	30.8 @ 0.0221 mm	45.9 @ 0.0210 mm	60.5 @ 0.0193 mm	26.7 @ 0.0225 mm	26.5 @ 0.0230 mm	42.7 @ 0.0209 mm	38.3 @ 0.0215 mm
		15.3 @ 0.0124 mm	28.7 @ 0.0116 mm	43.7 @ 0.0110 mm	57.5 @ 0.0101 mm	23.4 @ 0.0118 mm	25.1 @ 0.0119 mm	39.3 @ 0.0110 mm	35.5 @ 0.0113 mm
		13.9 @ 0.0088 mm	27.3 @ 0.0082 mm	41.4 @ 0.0079 mm	55.2 @ 0.0073 mm	22.0 @ 0.0084 mm	23.6 @ 0.0085 mm	37.2 @ 0.0079 mm	34.1 @ 0.0080 mm
		12.5 @ 0.0063 mm	26.6 @ 0.0058 mm	39.9 @ 0.0056 mm	53.0 @ 0.0052 mm	21.4 @ 0.0060 mm	22.2 @ 0.0060 mm	35.2 @ 0.0056 mm	32.7 @ 0.0057 mm
		11.2 @ 0.0031 mm	24.5 @ 0.0029 mm	35.5 @ 0.0028 mm	48.7 @ 0.0026 mm	19.4 @ 0.0030 mm	20.2 @ 0.0030 mm	30.6 @ 0.0029 mm	28.7 @ 0.0029 mm
		9.8 @ 0.0013 mm	22.8 @ 0.0012 mm	28.6 @ 0.0012 mm	41.1 @ 0.0011 mm	17.8 @ 0.0013 mm	16.5 @ 0.0013 mm	25.8 @ 0.0012 mm	23.0 @ 0.0012 mm

TABLE 5 (*continued*)
Results of Physical Analyses for Sediment Samples

Sample ID		CC-TB-22-07A-SUB	CC-TB-22-07A-SURF	CC-TB-22-07W-SUB	CC-TB-22-07W-SURF	CC-TB-22-08-SUB	CC-TB-22-08-SURF	CC-TB-22-08A-SUB	CC-TB-22-08A-SURF
Sediment Description		Lean clay, some fine-grained quartz sand, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Fat clay, some fine-grained quartz sand, little silt, gray	Fat clay, little fine-grained quartz sand, little silt, gray	Clayey sand, mostly fine-grained quartz sand, some clay, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Clayey sand, mostly fine-grained quartz sand, little clay, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray
% Gravel (Particles ≥4.750 mm)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Coarse Sand		0.2	0.3	0.0	0.0	0.5	0.1	0.1	0.2
% Medium Sand		1.2	1.8	0.3	0.4	3.4	1.0	1.4	1.0
% Fine Sand		38.7	32.4	30.2	24.7	50.3	48.4	50.4	40.3
% Sand (total) (Particles 0.075-4.749 mm)		40.1	34.5	30.5	25.1	54.2	49.5	51.9	41.5
% Silt (Particles 0.005-0.074 mm)		16.0	22.7	21.0	25.5	15.5	20.3	21.5	18.0
% Clay (Particles <0.005 mm)		43.9	42.8	48.5	49.4	30.3	30.2	26.6	40.5
% Silt & Clay (combined)		59.9	65.5	69.5	74.9	45.8	50.5	48.1	58.5
USCS Classification		CL	CL	CH	CH	SC	CL	SC	CL
% Passing Sieve Size	**Metric Equivalent (mm)**								
#4	**4.75**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
#10	**2.00**	99.8	99.7	100.0	100.0	99.5	99.9	99.9	99.8
#20	**0.85**	99.6	98.9	100.0	99.9	98.3	99.6	99.7	99.6
#40	**0.425**	98.6	97.9	99.7	99.6	96.1	98.9	98.5	98.8
#50	**0.297**	94.9	96.0	98.4	98.4	92.7	96.5	94.3	96.3
#70	**0.210**	88.8	92.0	95.2	95.6	86.8	90.4	86.2	90.6
#100	**0.149**	79.4	84.4	87.6	89.7	73.5	77.4	72.6	78.9
#140	**0.105**	68.8	75.7	79.0	81.7	58.6	62.4	57.8	68.0
#200	**0.075**	59.9	65.5	69.5	74.9	45.8	50.5	48.1	58.5
Hydrometer Readings (% less than the following sizes)		56.6 @ 0.0389 mm	60.0 @ 0.0385 mm	60.8 @ 0.0379 mm	64.3 @ 0.0365 mm	41.9 @ 0.0426 mm	43.2 @ 0.0417 mm	37.1 @ 0.0435 mm	54.2 @ 0.0399 mm
		53.7 @ 0.0280 mm	56.3 @ 0.0279 mm	58.2 @ 0.0273 mm	61.5 @ 0.0264 mm	39.0 @ 0.0306 mm	40.3 @ 0.0300 mm	34.3 @ 0.0312 mm	52.0 @ 0.0286 mm
		52.3 @ 0.0200 mm	54.0 @ 0.0200 mm	57.1 @ 0.0194 mm	60.0 @ 0.0188 mm	36.8 @ 0.0219 mm	38.2 @ 0.0214 mm	32.1 @ 0.0223 mm	49.7 @ 0.0205 mm
		48.7 @ 0.0105 mm	49.6 @ 0.0106 mm	53.4 @ 0.0103 mm	55.8 @ 0.0100 mm	33.9 @ 0.0114 mm	34.6 @ 0.0113 mm	29.2 @ 0.0117 mm	46.7 @ 0.0108 mm
		46.5 @ 0.0076 mm	46.6 @ 0.0076 mm	50.9 @ 0.0074 mm	52.9 @ 0.0072 mm	32.4 @ 0.0082 mm	33.1 @ 0.0080 mm	27.8 @ 0.0083 mm	45.2 @ 0.0077 mm
		44.4 @ 0.0054 mm	43.6 @ 0.0055 mm	48.8 @ 0.0053 mm	49.8 @ 0.0052 mm	31.0 @ 0.0058 mm	31.0 @ 0.0057 mm	27.1 @ 0.0059 mm	41.6 @ 0.0055 mm
		40.2 @ 0.0027 mm	38.6 @ 0.0028 mm	43.0 @ 0.0027 mm	40.0 @ 0.0027 mm	27.6 @ 0.0029 mm	28.1 @ 0.0029 mm	24.4 @ 0.0030 mm	36.5 @ 0.0028 mm
		32.2 @ 0.0012 mm	33.3 @ 0.0012 mm	33.4 @ 0.0012 mm	3.7 @ 0.0013 mm	23.1 @ 0.0012 mm	25.6 @ 0.0012 mm	19.3 @ 0.0012 mm	30.4 @ 0.0012 mm

TABLE 5 (*continued*)
Results of Physical Analyses for Sediment Samples

	Sample ID	CC-TB-22-09-SUB	CC-TB-22-09-SURF	CC-TB-22-09A-SUB	CC-TB-22-09A-SURF	CC-TB-22-10-SUB	CC-TB-22-10-SURF	CC-TB-22-DUP	CC-TB-22-DUP2
Sediment Description		Clayey sand, mostly fine-grained quartz sand, little clay, little silt, gray	Fat clay, some silt, little fine-grained quartz sand, gray	Clayey sand, mostly fine-grained quartz sand, little clay, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Silty sand, mostly fine-grained quartz sand, little silt, little clay, gray	Fat clay, little fine-grained quartz sand, little silt, gray	Lean clay, some fine-grained quartz sand, little silt, gray	Clayey sand, mostly fine-grained quartz sand, some clay, little silt, gray
% Gravel (Particles ≥4.750 mm)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Coarse Sand		0.0	0.0	0.7	0.4	0.2	0.1	0.0	0.1
% Medium Sand		1.7	0.2	11.4	4.8	3.5	1.7	0.9	1.4
% Fine Sand		49.4	25.3	48.7	33.0	53.0	27.9	38.3	52.1
% Sand (total) (Particles 0.075-4.749 mm)		51.1	25.5	60.8	38.2	56.7	29.7	39.2	53.6
% Silt (Particles 0.005-0.074 mm)		22.8	28.2	18.7	27.1	21.8	25.9	24.4	16.1
% Clay (Particles <0.005 mm)		26.1	46.3	20.5	34.7	21.5	44.4	36.4	30.3
% Silt & Clay (combined)		48.9	74.5	39.2	61.8	43.3	70.3	60.8	46.4
USCS Classification		SC	CH	SC	CL	SM	CH	CL	SC
% Passing Sieve Size	**Metric Equivalent (mm)**								
#4	**4.75**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
#10	**2.00**	100.0	100.0	99.3	99.6	99.8	99.9	100.0	99.9
#20	**0.85**	99.8	100.0	95.9	97.9	99.1	99.4	99.8	99.8
#40	**0.425**	98.3	99.8	87.9	94.8	96.3	98.2	99.1	98.5
#50	**0.297**	93.8	99.0	77.9	90.7	92.0	96.3	96.7	94.2
#70	**0.210**	85.6	97.0	68.6	86.3	86.0	93.7	91.4	85.7
#100	**0.149**	74.1	91.3	57.4	78.7	73.7	87.6	80.8	71.6
#140	**0.105**	61.4	83.1	47.8	70.4	55.8	78.0	68.6	56.4
#200	**0.075**	48.9	74.5	39.2	61.8	43.3	70.3	60.8	46.4
Hydrometer Readings (% less than the following sizes)		39.6 @ 0.0430 mm	63.1 @ 0.0382 mm	31.1 @ 0.0444 mm	50.1 @ 0.0407 mm	33.0 @ 0.0440 mm	58.3 @ 0.0389 mm	51.5 @ 0.0397 mm	39.9 @ 0.0426 mm
		36.0 @ 0.0310 mm	60.1 @ 0.0275 mm	28.2 @ 0.0319 mm	46.4 @ 0.0294 mm	30.1 @ 0.0315 mm	56.1 @ 0.0279 mm	49.4 @ 0.0284 mm	36.7 @ 0.0307 mm
		33.8 @ 0.0221 mm	57.8 @ 0.0197 mm	26.0 @ 0.0228 mm	44.2 @ 0.0210 mm	27.9 @ 0.0225 mm	53.9 @ 0.0200 mm	47.3 @ 0.0204 mm	35.3 @ 0.0219 mm
		30.9 @ 0.0116 mm	53.2 @ 0.0105 mm	23.1 @ 0.0119 mm	40.6 @ 0.0111 mm	24.4 @ 0.0118 mm	50.2 @ 0.0105 mm	43.8 @ 0.0107 mm	32.5 @ 0.0114 mm
		29.5 @ 0.0083 mm	50.9 @ 0.0075 mm	21.7 @ 0.0085 mm	39.1 @ 0.0079 mm	23.6 @ 0.0084 mm	48.7 @ 0.0075 mm	41.3 @ 0.0077 mm	31.8 @ 0.0081 mm
		27.0 @ 0.0059 mm	47.2 @ 0.0054 mm	21.0 @ 0.0060 mm	35.6 @ 0.0057 mm	22.2 @ 0.0060 mm	45.1 @ 0.0054 mm	38.2 @ 0.0055 mm	30.7 @ 0.0058 mm
		24.2 @ 0.0030 mm	36.2 @ 0.0028 mm	18.8 @ 0.0030 mm	32.0 @ 0.0029 mm	20.1 @ 0.0030 mm	37.4 @ 0.0028 mm	21.9 @ 0.0030 mm	28.4 @ 0.0029 mm
		20.8 @ 0.0012 mm	5.1 @ 0.0013 mm	17.8 @ 0.0013 mm	15.8 @ 0.0013 mm	17.6 @ 0.0013 mm	4.2 @ 0.0013 mm	4.0 @ 0.0013 mm	23.2 @ 0.0012 mm

Note: Total distribution does not necessarily add up to 100% for each sample due to rounding. Some sieve openings differ slightly from phi mm scale. See Appendix C for grain size distribution graphs and laboratory triplicate results.
Unified Soil Classification System (USCS) classes: CH = Clay of high plasticity, elastic silt. CL = Clay. SC = Clayey sand. SM = Silty sand. SP = Poorly graded sand. ML = Silt of low plasticity.

Source: Results from Taylor Engineering, Inc.
Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 6
Analytical Results for Dry Weight Metals in Sediment Samples

Analyte	Maximum Conc. mg/kg	TEL mg/kg	NOAA ERL mg/kg	NOAA ERM mg/kg	TCEQ PCL mg/kg	CC-TB-22-05-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-05-SURF Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-06-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-06-SURF Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-06A-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-06A-SURF Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-07-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-07-SURF Result mg/kg	Qualifier	MDL	LRL
Metals																																					
Antimony	0.306	x	x	x	15.0	0.174	J	0.121	0.242	<0.0971	U	0.0971	0.195	0.306	J	0.161	0.322	0.144	J	0.134	0.269	<0.106	U	0.106	0.213	<0.128	U	0.128	0.258	<0.141	U	0.141	0.282	<0.142	U	0.142	0.286
Arsenic	3.66	7.24	8.2	70	24.0	1.85	--	0.0121	0.121	1.94	--	0.00971	0.0971	2.56	--	0.0161	0.161	2.48	--	0.0134	0.134	1.98	--	0.0106	0.106	1.74	--	0.0128	0.128	3.66	--	0.0141	0.141	2.35	--	0.0142	0.142
Beryllium	0.746	x	x	x	38.0	0.205	--	0.00242	0.0483	0.378	--	0.00195	0.0388	0.519	--	0.00322	0.0642	0.552	--	0.00269	0.0537	0.288	--	0.00213	0.0424	0.315	--	0.00258	0.0514	0.569	--	0.00282	0.0562	0.522	--	0.00286	0.0569
Cadmium	**7.44**	0.676	1.2	9.6	51.0	**1.69**	--	0.0121	0.242	0.777	--	0.00971	0.195	**1.91**	--	0.0161	0.322	**1.75**	--	0.0134	0.269	0.874	--	0.0106	0.213	0.563	--	0.0128	0.258	**7.44**	--	0.0141	0.282	0.805	--	0.0142	0.286
Chromium	14.4	52.3	81	370	27000	5.69	--	0.0363	0.725	7.25	--	0.0291	0.583	11.4	--	0.0482	0.965	11.5	--	0.0403	0.807	5.85	--	0.0318	0.637	6.13	--	0.0386	0.771	9.11	--	0.0422	0.843	9.85	--	0.0427	0.855
Chromium (III)	14.4	x	81	370	27000	5.69	J	2.37	7.33	7.25	--	2.39	7.24	11.4	--	2.85	8.87	11.5	--	2.95	9.03	5.85	J	2.17	6.69	6.13	J	2.80	8.56	9.11	--	2.92	8.97	9.85	--	3.00	9.22
Chromium (VI)	<4.04	x	x	x	120	<2.34	U	2.34	6.60	<2.36	U	2.36	6.66	<2.80	U	2.80	7.90	<2.91	U	2.91	8.22	<2.14	U	2.14	6.05	<2.76	U	2.76	7.79	<2.88	U	2.88	8.13	<2.96	U	2.96	8.36
Copper	**49.8**	18.7	34	270	1300	9.73	--	0.0483	0.242	18.9	--	0.0388	0.195	**49.8**	--	0.0642	0.322	**38.1**	--	0.0537	0.269	19.7	--	0.0424	0.213	14.7	--	0.0514	0.258	19.5	--	0.0562	0.282	23.0	--	0.0569	0.286
Lead	**36.4**	30.24	46.7	218	500.0	24.1	V	0.0121	0.121	12.9	V	0.00971	0.0971	36.4	V	0.0321	0.321	32.5	V	0.0269	0.269	12.5	V	0.0106	0.106	11.7	V	0.0128	0.128	26.2	V	0.0141	0.141	17.4	V	0.0142	0.142
Mercury	**0.508**	0.13	0.15	0.71	2.10	**0.157**	--	0.00417	0.00834	**0.182**	--	0.00439	0.00878	**0.508**	--	0.0101	0.0202	**0.409**	--	0.0102	0.0204	**0.232**	--	0.00953	0.0191	**0.231**	--	0.00663	0.0133	**0.445**	--	0.0103	0.0207	**0.297**	--	0.00673	0.0135
Nickel	9.39	15.9	20.9	51.6	840.0	2.17	--	0.242	0.242	3.89	--	0.195	0.195	5.99	--	0.322	0.322	6.08	--	0.269	0.269	3.48	--	0.213	0.213	3.67	--	0.258	0.258	6.12	--	0.282	0.282	6.01	--	0.286	0.286
Selenium	2.56	x	x	x	310.0	0.642	J	0.242	1.21	1.09	--	0.195	0.971	1.60	J	0.322	1.61	2.56	--	0.269	1.34	1.27	--	0.213	1.06	1.08	J	0.258	1.28	1.77	--	0.282	1.41	2.50	--	0.286	1.42
Silver	0.219	0.73	1	3.7	97	0.139	--	0.00605	0.121	0.0743	J	0.00486	0.0971	0.219	--	0.00804	0.161	0.188	--	0.00673	0.134	0.0793	J	0.00531	0.106	0.0608	J	0.00643	0.128	0.161	--	0.00703	0.141	0.0878	J	0.00713	0.142
Thallium	0.207	x	x	x	5	0.0790	J	0.00605	0.121	0.101	--	0.00486	0.0971	0.154	J	0.00804	0.161	0.148	--	0.00673	0.134	0.118	--	0.00531	0.106	0.119	J	0.00643	0.128	0.176	--	0.00703	0.141	0.150	--	0.00713	0.142
Zinc	**381**	124	150	410	9900	**188**	--	0.484	0.966	106	--	0.389	0.776	**381**	--	0.967	1.93	**316**	--	0.808	1.61	105	--	0.425	0.848	89.2	--	0.258	0.514	**380**	--	1.13	2.25	**151**	--	0.571	1.14

Others

Analyte	Maximum Conc.	TEL	NOAA ERL	NOAA ERM	TCEQ PCL	CC-TB-22-05-SUB Result %	Qualifier	MDL	LRL	CC-TB-22-05-SURF Result %	Qualifier	MDL	LRL	CC-TB-22-06-SUB Result %	Qualifier	MDL	LRL	CC-TB-22-06-SURF Result %	Qualifier	MDL	LRL	CC-TB-22-06A-SUB Result %	Qualifier	MDL	LRL	CC-TB-22-06A-SURF Result %	Qualifier	MDL	LRL	CC-TB-22-07-SUB Result %	Qualifier	MDL	LRL	CC-TB-22-07-SURF Result %	Qualifier	MDL	LRL
Ammonia (as nitrogen)	111	x	x	x	2500	<0.623	U	0.628	1.26	<0.677	U	0.677	1.35	3.93	--	0.797	1.59	2.01	--	0.796	1.59	1.64	--	0.666	1.33	2.28	--	0.798	1.60	2.04	--	0.790	1.58	2.04	--	0.910	1.82
Cyanide, Total	<0.14	x	x	x	43	<0.09	U	0.09	0.24	<0.09	U	0.09	0.25	<0.10	U	0.10	0.30	<0.11	U	0.11	0.32	<0.09	U	0.09	0.25	<0.10	U	0.10	0.28	<0.10	U	0.10	0.29	<0.11	U	0.11	0.32
Petroleum Hydrocarbons, Total	9.68	x	x	x	1100	<3.68	U	3.68	11.0	<3.96	U	3.96	11.9	<4.78	U	4.78	14.3	<4.78	U	4.78	14.3	<3.99	U	3.99	12.0	<4.79	U	4.79	14.4	<4.43	U	4.43	13.3	9.68	J	5.46	16.4
% Solids	79.6	x	x	x	x	79.6	V	0.100	0.100	73.9	V	0.100	0.100	62.8	V	0.100	0.100	62.8	V	0.100	0.100	75.1	V	0.100	0.100	62.7	V	0.100	0.100	63.3	V	0.100	0.100	55.0	V	0.100	0.100
Carbon, Total Organic	0.69	x	x	x	x	0.24	--	0.02	0.10	0.31	--	0.02	0.10	0.58	--	0.02	0.10	0.61	--	0.02	0.10	0.27	--	0.02	0.10	0.33	--	0.02	0.10	0.38	--	0.02	0.10	0.49	--	0.02	0.10

TABLE 6 (*continued*)

Analytical Results for Dry Weight Metals in Sediment Samples

Analyte	Maximum Conc. mg/kg	TEL mg/kg	NOAA ERL mg/kg	NOAA ERM mg/kg	TCEQ PCL mg/kg	CC-TB-22-07A-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-07A-SURF Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-07W-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-07W-SURF Result mg/kg	Qualifier	MDL	LRL
Metals																					
Antimony	0.306	x	x	x	15.0	<0.171	U	0.171	0.342	<0.136	U	0.136	0.273	0.213	V, J	0.166	0.333	0.179	V, J	0.176	0.353
Arsenic	3.66	7.24	8.2	70	24.0	2.35	--	0.0171	0.171	2.80	--	0.0136	0.136	2.83	V	0.0166	0.166	2.89	V	0.0176	0.176
Beryllium	0.746	x	x	x	38.0	0.599	--	0.00342	0.0682	0.584	--	0.00273	0.0544	0.746	--	0.00333	0.0664	0.698	--	0.00353	0.0703
Cadmium	**7.44**	0.676	1.2	9.6	51.0	0.926	--	0.0171	0.342	**3.07**	--	0.0136	0.273	0.790	--	0.0166	0.333	0.836	--	0.0176	0.353
Chromium	14.4	52.3	81	370	27000	11.5	--	0.0512	1.02	14.2	--	0.0408	0.816	14.4	--	0.0498	0.996	13.7	--	0.0528	1.06
Chromium (III)	14.4	x	81	370	27000	11.5	--	3.49	10.7	14.2	--	2.94	9.00	14.4	--	3.63	11.1	13.7	--	4.04	12.3
Chromium (VI)	<4.04	x	x	x	120	<3.44	U	3.44	9.71	<2.90	U	2.90	8.19	<3.58	U	3.58	10.1	<3.98	U	3.98	11.3
Copper	**49.8**	18.7	34	270	1300	24.5	--	0.0682	0.342	16.3	--	0.0544	0.273	30.5	--	0.0664	0.333	30.0	--	0.0703	0.353
Lead	**36.4**	30.24	46.7	218	500.0	16.9	V	0.0171	0.171	21.8	V	0.0136	0.136	22.3	--	0.0166	0.166	23.4	--	0.0176	0.176
Mercury	**0.508**	0.13	0.15	0.71	2.10	**0.260**	--	0.00627	0.0125	**0.326**	--	0.0103	0.0205	**0.284**	--	0.00770	0.0154	**0.357**	--	0.00865	0.0173
Nickel	9.39	15.9	20.9	51.6	840.0	7.28	--	0.342	0.342	6.53	--	0.273	0.273	9.39	--	0.333	0.333	8.34	--	0.353	0.353
Selenium	2.56	x	x	x	310.0	2.13	--	0.342	1.71	1.81	--	0.273	1.36	2.37	--	0.333	1.66	2.54	--	0.353	1.76
Silver	0.219	0.73	1	3.7	97	0.0933	J	0.00854	0.171	0.157	--	0.00681	0.136	0.122	J	0.00831	0.166	0.134	J	0.00881	0.176
Thallium	0.207	x	x	x	5	0.169	J	0.00854	0.171	0.177	--	0.00681	0.136	0.200	--	0.00831	0.166	0.187	--	0.00881	0.176
Zinc	**381**	124	150	410	9900	**154**	--	0.684	1.36	**290**	--	0.818	1.63	**216**	--	0.666	1.33	**224**	--	0.705	1.41
Others																					
Analyte	Maximum Conc. %	TEL %	NOAA ERL %	NOAA ERM %	TCEQ PCL %	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL
Ammonia (as nitrogen)	111	x		x	x	1.50	J	0.893	1.79	1.80	--	0.802	1.60	105	--	19.3	38.6	100	--	20.5	41.1
Cyanide, Total	<0.14	x		x	x	<0.11	U	0.11	0.32	<0.10	U	0.10	0.29	<0.12	U	0.12	0.35	<0.14	U	0.14	0.41
Petroleum Hydrocarbons, Total	9.68	x	x	x	x	<5.36	U	5.36	16.1	<4.40	U	4.40	13.2	<5.82	U	5.82	17.5	<6.21	U	6.21	18.6
% Solids	79.6	x	x	x	x	56.0	V	0.100	0.100	62.3	V	0.100	0.100	51.6	V	0.100	0.100	48.3	V	0.100	0.100
Carbon, Total Organic	0.69	x	x	x	x	0.42	--	0.02	0.10	0.33	--	0.02	0.10	0.64	--	0.02	0.10	0.69	--	0.02	0.10

Analyte	CC-TB-22-08-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-08-SURF Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-08A-SUB Result mg/kg	Qualifier	MDL	LRL	CC-TB-22-08A-SURF Result mg/kg	Qualifier	MDL	LRL
Metals																
Antimony	<0.130	U	0.130	0.261	<0.116	U	0.116	0.232	<0.117	U	0.117	0.236	<0.131	U	0.131	0.262
Arsenic	1.69	--	0.0130	0.130	1.51	--	0.0116	0.116	1.55	--	0.0117	0.117	1.93	--	0.0131	0.131
Beryllium	0.399	--	0.00261	0.0520	0.422	--	0.00232	0.0463	0.397	--	0.00236	0.0470	0.523	--	0.00262	0.0523
Cadmium	0.730	--	0.0130	0.261	0.498	--	0.0116	0.232	0.699	--	0.0117	0.236	0.770	--	0.0131	0.262
Chromium	7.10	--	0.0391	0.781	7.18	--	0.0348	0.695	6.99	--	0.0353	0.705	9.37	--	0.0392	0.785
Chromium (III)	7.10	J	2.50	7.72	7.18	J	2.61	7.97	6.99	J	2.62	8.01	9.37	J	3.65	11.0
Chromium (VI)	<2.46	U	2.46	6.94	<2.57	U	2.57	7.27	<2.59	U	2.59	7.31	<3.61	U	3.61	10.2
Copper	13.4	--	0.0520	0.261	13.8	--	0.0463	0.232	11.7	--	0.0470	0.236	15.6	--	0.0523	0.262
Lead	10.5	V	0.0130	0.130	10.7	V	0.0116	0.116	10.7	V	0.0117	0.117	12.8	V	0.0131	0.131
Mercury	0.120	--	0.00461	0.00922	0.137	--	0.00597	0.0119	0.110	--	0.00595	0.0119	0.172	--	0.00648	0.0130
Nickel	4.46	--	0.261	0.261	4.30	--	0.232	0.232	4.38	--	0.236	0.236	5.46	--	0.262	0.262
Selenium	1.99	--	0.261	1.30	1.72	--	0.232	1.16	1.51	--	0.236	1.17	2.00	--	0.262	1.31
Silver	0.0486	J	0.00651	0.130	0.0493	J	0.00580	0.116	0.0498	J	0.00588	0.117	0.0594	J	0.00654	0.131
Thallium	0.115	J	0.00651	0.130	0.105	J	0.00580	0.116	0.111	J	0.00588	0.117	0.128	J	0.00654	0.131
Zinc	86.8	--	0.261	0.520	89.9	--	0.232	0.463	104	--	0.471	0.939	125	--	0.524	1.05
Others																
Analyte	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL
Ammonia (as nitrogen)	2.43	--	0.747	1.49	2.02	--	0.800	1.60	2.81	--	0.748	1.5	47.9	--	18.6	37.2
Cyanide, Total	<0.09	U	0.09	0.26	<0.10	U	0.10	0.29	<0.10	U	0.10	0.27	<0.12	U	0.12	0.34
Petroleum Hydrocarbons, Total	<4.44	U	4.44	13.3	<4.71	U	4.71	14.1	<4.19	U	4.19	12.6	<5.63	U	5.63	16.9
% Solids	67.0	V	0.100	0.100	62.5	V	0.100	0.100	66.8	V	0.100	0.100	53.3	V	0.100	0.100
Carbon, Total Organic	0.29	--	0.02	0.10	0.34	--	0.02	0.10	0.33	--	0.02	0.10	0.46	--	0.02	0.10

TABLE 6 (*continued*)

Analytical Results for Dry Weight Metals in Sediment Samples

Sample ID:					Sample ID:	CC-TB-22-09-SUB				CC-TB-22-09-SURF				CC-TB-22-09A-SUB				CC-TB-22-09A-SURF			
Analyte	Maximum Conc. mg/kg	TEL mg/kg	NOAA ERL mg/kg	NOAA ERM mg/kg	TCEQ PCL mg/kg	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL
Metals																					
Antimony	0.306	x	x	x	15.0	<0.131	U	0.131	0.263	<0.214	U	0.214	0.429	<0.122	U	0.122	0.245	<0.101	U	0.101	0.202
Arsenic	3.66	7.24	8.2	70	24.0	2.66	--	0.0131	0.131	2.74	--	0.0214	0.214	1.98	--	0.0122	0.122	0.936	--	0.0101	0.101
Beryllium	0.746	x	x	x	38.0	0.415	--	0.00263	0.0524	0.730	--	0.00429	0.0856	0.328	--	0.00245	0.0489	0.135	--	0.00202	0.0404
Cadmium	**7.44**	0.676	1.2	9.6	51.0	**1.55**	--	0.0131	0.263	1.03	--	0.0214	0.429	0.495	--	0.0122	0.245	0.107	J	0.0101	0.202
Chromium	14.4	52.3	81	370	27000	7.39	--	0.0393	0.786	11.3	--	0.0643	1.29	4.78	--	0.0367	0.735	2.26	--	0.0303	0.606
Chromium (III)	14.4	x	81	370	27000	7.39	J	2.80	8.59	11.3	J	4.11	12.7	4.78	J	2.39	7.38	<2.29	U	2.29	6.98
Chromium (VI)	<4.04	x	x	x	120	<2.76	U	2.76	7.81	<4.04	U	4.04	11.4	<2.35	U	2.35	6.64	<2.26	U	2.26	6.37
Copper	**49.8**	18.7	34	270	1300	9.65	--	0.0524	0.263	23.8	--	0.0856	0.429	5.28	--	0.0489	0.245	5.04	--	0.0404	0.202
Lead	**36.4**	30.24	46.7	218	500.0	11.1	V	0.0131	0.131	16.0	V	0.0214	0.214	5.99	V	0.0122	0.122	3.90	V	0.0101	0.101
Mercury	**0.508**	0.13	0.15	0.71	2.10	0.0988	--	0.00505	0.0101	**0.156**	--	0.00826	0.0165	0.0401	--	0.00458	0.00916	0.0327	--	0.00487	0.00974
Nickel	9.39	15.9	20.9	51.6	840.0	4.60	--	0.263	0.263	7.65	--	0.429	0.429	4.14	--	0.245	0.245	1.63	--	0.202	0.202
Selenium	2.56	x	x	x	310.0	1.32	--	0.263	1.31	2.09	J	0.429	2.14	1.20	J	0.245	1.22	0.937	J	0.202	1.01
Silver	0.219	0.73	1	3.7	97	0.0568	J	0.00656	0.131	0.0762	J	0.0107	0.214	0.00852	J	0.00613	0.122	0.00837	J	0.00506	0.101
Thallium	0.207	x	x	x	5	0.155	--	0.00656	0.131	0.207	J	0.0107	0.214	0.106	J	0.00613	0.122	0.0909	J	0.00506	0.101
Zinc	**381**	124	150	410	9900	**179**	--	0.525	1.05	**166**	--	0.429	0.856	64.9	--	0.245	0.489	30.1	--	0.202	0.404
Others																					
Analyte	Maximum Conc. %	TEL %	NOAA ERL %	NOAA ERM %	TCEQ PCL %	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL
Ammonia (as nitrogen)	111	x		x	x	32.6	--	15.3	30.6	69.3	--	21.7	43.4	<13.3	U	13.3	26.6	21.1	J	13.4	26.9
Cyanide, Total	<0.14	x		x	x	<0.10	U	0.10	0.28	<0.14	U	0.14	0.40	<0.09	U	0.09	0.24	<0.09	U	0.09	0.25
Petroleum Hydrocarbons, Total	9.68	x	x	x	x	<4.30	U	4.30	12.9	<6.46	U	6.46	19.4	<3.87	U	3.87	11.6	<3.70	U	3.70	11.1
% Solids	79.6	x	x	x	x	65.1	V	0.100	0.100	45.8	V	0.100	0.100	75.0	V	0.100	0.100	74.0	V	0.100	0.100
Carbon, Total Organic	0.69	x	x	x	x	0.29	--	0.02	0.10	0.60	--	0.02	0.10	0.10	--	0.02	0.10	0.16	--	0.02	0.10

Sample ID:	CC-TB-22-10-SUB				CC-TB-22-10-SURF				CC-TB-22-DUP				CC-TB-22-DUP2			
Analyte	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL	Result mg/kg	Qualifier	MDL	LRL
Metals																
Antimony	<0.122	U	0.122	0.244	<0.177	U	0.177	0.356	0.173	V, J	0.153	0.306	0.126	V, J	0.107	0.214
Arsenic	2.17	--	0.0122	0.122	2.90	--	0.0177	0.177	1.85	V	0.0153	0.153	1.56	V	0.0107	0.107
Beryllium	0.357	--	0.00244	0.0487	0.733	--	0.00356	0.0709	0.430	--	0.00306	0.0611	0.351	--	0.00214	0.0427
Cadmium	0.535	--	0.0122	0.244	1.00	--	0.0177	0.356	0.660	--	0.0153	0.306	0.577	--	0.0107	0.214
Chromium	5.75	--	0.0366	0.732	10.6	--	0.0533	1.07	8.38	--	0.0459	0.917	6.65	--	0.0321	0.641
Chromium (III)	5.75	J	2.30	7.13	10.6	J	3.80	11.7	8.38	J	3.45	10.5	6.65	J	2.56	7.78
Chromium (VI)	<2.27	U	2.27	6.40	<3.75	U	3.75	10.6	<3.40	U	3.40	9.60	<2.53	U	2.53	7.14
Copper	9.06	--	0.0487	0.244	25.7	--	0.0709	0.356	14.5	--	0.0611	0.306	10.9	--	0.0427	0.214
Lead	7.16	V	0.0122	0.122	13.4	V	0.0177	0.177	13.5	--	0.0153	0.153	9.71	--	0.0107	0.107
Mercury	0.0510	--	0.00561	0.0112	0.128	--	0.00742	0.0148	**0.168**	--	0.00603	0.0121	0.0969	--	0.00576	0.0115
Nickel	4.13	--	0.244	0.244	7.57	--	0.356	0.356	4.90	--	0.306	0.306	3.95	--	0.214	0.214
Selenium	1.07	J	0.244	1.22	1.97	--	0.356	1.77	1.53	--	0.306	1.53	1.33	--	0.214	1.07
Silver	0.0311	J	0.00610	0.122	0.0555	J	0.00888	0.177	0.0673	J	0.00765	0.153	0.0488	J	0.00535	0.107
Thallium	0.123	--	0.00610	0.122	0.197	--	0.00888	0.177	0.137	J	0.00765	0.153	0.105	J	0.00535	0.107
Zinc	70.9	--	0.244	0.487	**171**	--	0.712	1.42	108	--	0.306	0.611	84.4	--	0.214	0.427
Others																
Analyte	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL	Result %	Qualifier	MDL	LRL
Ammonia (as nitrogen)	45.3	--	13.7	27.4	111.00	--	22.8	45.5	58.3	--	18.9	37.9	55.7	--	14.6	29.3
Cyanide, Total	<0.09	U	0.10	0.25	<0.14	U	0.14	0.41	<0.12	U	0.12	0.35	<0.09	U	0.09	0.27
Petroleum Hydrocarbons, Total	<3.87	U	3.87	11.6	<6.91	U	6.91	20.7	<5.74	U	5.74	17.2	<4.11	U	4.11	12.3
% Solids	72.6	V	0.100	0.100	43.4	V	0.100	0.100	52.3	V	0.100	0.100	67.9	V	0.100	0.100
Carbon, Total Organic	0.25	--	0.02	0.10	0.62	--	0.02	0.10	0.48	--	0.02	0.10	0.28	--	0.02	0.10

Bolded values exceed one or more of the screening thresholds (TEL, ERL, ERM or TCEQ PCL)

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL.

Qualifier definitions: J = Estimated value - The reported value is between the detection limit and reporting limit. U = Indicates that the compound was analyzed for but not detected. V = Analyte was detected in both sample and method blank.

Sources: Results from NWDLS; TEL, ERL, ERM, and TCEQ PCL values from Buchman (2008).

Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 7

Analytical Results for Dry Weight Pesticides, and Total PCBs in Sediment Samples

					Sample ID:	CC-TB-22-05-SUB				CC-TB-22-05-SURF				CC-TB-22-06-SUB				CC-TB-22-06-SURF				CC-TB-22-06A-SUB				CC-TB-22-06A-SURF				CC-TB-22-07-SUB				CC-TB-22-07-SURF			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Aldrin	<0.686	x	x	x	50	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Chlordane (technical)	1.43	2.26	0.5	6	5900	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	**1.25**	P, J	0.525	1.75
α (cis)-Chlordane	<0.686	x	x	x	13000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
γ (trans)-Chlordane	<0.686	x	x	x	7300	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
p,p' (4,4')-DDD	<0.686	1.22	2	20	14000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
p,p' (4,4')-DDE	1.26	2.07	2.2	27	10000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	0.606	J	0.525	1.75
p,p' (4,4')-DDT	<0.686	1.19	1	7	5400	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Dieldrin	<0.686	0.72	0.02	8	150	**<0.373**	U	0.373	1.24	**<0.393**	U	0.393	1.31	**<0.464**	U	0.464	1.55	**<0.467**	U	0.467	1.56	**<0.399**	U	0.399	1.33	**<0.475**	U	0.475	1.58	**<0.471**	U	0.471	1.57	**<0.525**	U	0.525	1.75
Endosulfan I	<0.686	x	x	x	91000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Endosulfan II	<0.686	x	x	x	270000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Endosulfane Sulfate	<0.686	x	x	x	380000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Endrin	<0.686	x	x	x	9000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Endrin Aldehyde	<0.686	x	x	x	19000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Endrin Ketone	<0.686	x	x	x	19000	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Heptachlor	1.43	x	x	x	130	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	CQa, U	0.464	1.55	<0.467	CQa, U	0.467	1.56	<0.399	CQa, U	0.399	1.33	<0.475	CQa, U	0.475	1.58	<0.471	U	0.471	1.57	1.25	P, J	0.525	1.75
Heptachlor Epoxide	<0.686	x	x	x	240	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	U	0.464	1.55	<0.467	U	0.467	1.56	<0.399	U	0.399	1.33	<0.475	U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
α-BHC	<0.686	x	x	x	250	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	CQd, U	0.464	1.55	<0.467	CQd, U	0.467	1.56	<0.399	CQd, U	0.399	1.33	<0.475	CQd, U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
β-BHC	0.791	x	x	x	920	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	CQc, U	0.464	1.55	<0.467	CQc, U	0.467	1.56	<0.399	CQc, U	0.399	1.33	<0.475	CQc, U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
δ-BHC	1.39	x	x	x	2900	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	CQd, U	0.464	1.55	<0.467	CQd, U	0.467	1.56	<0.399	CQd, U	0.399	1.33	<0.475	CQd, U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
γ-BHC (Lindane)	<0.686	0.32	x	x	1100	<0.373	U	0.373	1.24	<0.393	U	0.393	1.31	<0.464	CQc, U	0.464	1.55	<0.467	CQc, U	0.467	1.56	<0.399	CQc, U	0.399	1.33	<0.475	CQc, U	0.475	1.58	<0.471	U	0.471	1.57	<0.525	U	0.525	1.75
Toxaphene	<34.3	0.1	x	x	1200	<18.7	U	18.7	18.7	<19.6	U	19.6	19.6	<23.2	U	23.2	23.2	<23.4	U	23.4	23.4	<20.0	U	20.0	20.0	<23.7	U	23.7	23.7	<23.6	U	23.6	23.6	<26.2	U	26.2	26.2
PCBs, Total	8.86	21.6	22.7	180	1100	2.62	--	1.22	2.45	3.04	--	1.26	2.52	5.25	--	1.51	3.03	5.46	--	1.52	3.04	1.78	J	1.23	2.47	1.58	J	1.58	3.16	2.34	J	1.49	2.97	1.97	J	1.76	3.52

TABLE 7 (*continued*)

Analytical Results for Dry Weight Pesticides, and Total PCBs in Sediment Samples

					Sample ID:	CC-TB-22-07A-SUB				CC-TB-22-07A-SURF				CC-TB-22-07W-SUB				CC-TB-22-07W-SURF				CC-TB-22-08-SUB				CC-TB-22-08-SURF				CC-TB-22-08A-SUB				CC-TB-22-08A-SURF			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Aldrin	<0.686	x	x	x	50	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Chlordane (technical)	1.43	2.26	0.5	6	5900	**<0.525**	U	0.525	1.75	<0.481	U	0.481	1.60	**1.43**	J	0.577	1.92	**<0.590**	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	**<0.550**	U	0.550	1.83
α (cis)-Chlordane	<0.686	x	x	x	13000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
γ (trans)-Chlordane	<0.686	x	x	x	7300	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
p,p' (4,4')-DDD	<0.686	1.22	2	20	14000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
p,p' (4,4')-DDE	1.26	2.07	2.2	27	10000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
p,p' (4,4')-DDT	<0.686	1.19	1	7	5400	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Dieldrin	<0.686	0.72	0.02	8	150	**<0.525**	U	0.525	1.75	**<0.481**	U	0.481	1.60	**<0.577**	U	0.577	1.92	**<0.590**	U	0.590	1.97	**<0.444**	U	0.444	1.48	**<0.455**	U	0.455	1.52	**<0.422**	U	0.422	1.41	**<0.550**	U	0.550	1.83
Endosulfan I	<0.686	x	x	x	91000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Endosulfan II	<0.686	x	x	x	270000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Endosulfane Sulfate	<0.686	x	x	x	380000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Endrin	<0.686	x	x	x	9000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Endrin Aldehyde	<0.686	x	x	x	19000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Endrin Ketone	<0.686	x	x	x	19000	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Heptachlor	1.43	x	x	x	130	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	1.43	J	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Heptachlor Epoxide	<0.686	x	x	x	240	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
α-BHC	<0.686	x	x	x	250	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	CQa, U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
β-BHC	0.791	x	x	x	920	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	0.791	P, J	0.422	1.41	<0.550	U	0.550	1.83
δ-BHC	1.39	x	x	x	2900	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
γ-BHC (Lindane)	<0.686	0.32	x	x	1100	<0.525	U	0.525	1.75	<0.481	U	0.481	1.60	<0.577	U	0.577	1.92	<0.590	CQa, U	0.590	1.97	<0.444	U	0.444	1.48	<0.455	U	0.455	1.52	<0.422	U	0.422	1.41	<0.550	U	0.550	1.83
Toxaphene	<34.3	0.1	x	x	1200	<26.2	U	26.2	26.2	<24.1	U	24.1	24.1	<28.9	U	28.9	28.9	<29.5	U	29.5	29.5	<22.2	U	22.2	22.2	<22.8	U	22.8	22.8	<21.1	U	21.1	21.1	<27.5	U	27.5	27.5
PCBs, Total	8.86	21.6	22.7	180	1100	2.76	J	1.74	3.48	8.86	--	1.53	3.06	<1.84	U	1.84	3.68	<2.02	U	2.02	4.04	<1.44	U	1.44	2.88	<1.53	U	1.53	3.06	<1.45	U	1.45	2.90	2.21	J	1.78	3.55

TABLE 7 (*continued*)

Analytical Results for Dry Weight Pesticides, and Total PCBs in Sediment Samples

					Sample ID:	CC-TB-22-09-SUB				CC-TB-22-09-SURF				CC-TB-22-09A-SUB				CC-TB-22-09A-SURF				CC-TB-22-10-SUB				CC-TB-22-10-SURF				CC-TB-22-DUP				CC-TB-22-DUP2			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Aldrin	<0.686	x	x	x	50	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Chlordane (technical)	1.43	2.26	0.5	6	5900	<0.458	U	0.458	1.53	**<0.649**	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	**<0.686**	U	0.686	2.29	**<0.568**	U	0.568	1.89	<0.413	U	0.413	1.38
α (cis)-Chlordane	<0.686	x	x	x	13000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
γ (trans)-Chlordane	<0.686	x	x	x	7300	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
p,p' (4,4')-DDD	<0.686	1.22	2	20	14000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
p,p' (4,4')-DDE	1.26	2.07	2.2	27	10000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	1.26	CQf, J	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
p,p' (4,4')-DDT	<0.686	1.19	1	7	5400	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Dieldrin	<0.686	0.72	0.02	8	150	**<0.458**	U	0.458	1.53	**<0.649**	U	0.649	2.16	**<0.400**	U	0.400	1.33	**<0.378**	U	0.378	1.26	**<0.410**	U	0.410	1.37	**<0.686**	U	0.686	2.29	**<0.568**	U	0.568	1.89	**<0.413**	U	0.413	1.38
Endosulfan I	<0.686	x	x	x	91000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Endosulfan II	<0.686	x	x	x	270000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Endosulfane Sulfate	<0.686	x	x	x	380000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Endrin	<0.686	x	x	x	9000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Endrin Aldehyde	<0.686	x	x	x	19000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Endrin Ketone	<0.686	x	x	x	19000	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Heptachlor	1.43	x	x	x	130	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
Heptachlor Epoxide	<0.686	x	x	x	240	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
α-BHC	<0.686	x	x	x	250	<0.458	CQa, U	0.458	1.53	<0.649	CQa, U	0.649	2.16	0.454	C, J	0.400	1.33	<0.378	CQa, U	0.378	1.26	<0.410	CQa, U	0.410	1.37	<0.686	CQa, U	0.686	2.29	<0.568	CQa, U	0.568	1.89	<0.413	CQa, U	0.413	1.38
β-BHC	0.791	x	x	x	920	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	<0.686	U	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
δ-BHC	1.39	x	x	x	2900	<0.458	U	0.458	1.53	<0.649	U	0.649	2.16	<0.400	U	0.400	1.33	<0.378	U	0.378	1.26	<0.410	U	0.410	1.37	1.39	CQf, J	0.686	2.29	<0.568	U	0.568	1.89	<0.413	U	0.413	1.38
γ-BHC (Lindane)	<0.686	0.32	x	x	1100	<0.458	CQa, U	0.458	1.53	<0.649	CQa, U	0.649	2.16	<0.400	CQa, U	0.400	1.33	<0.378	CQa, U	0.378	1.26	<0.410	CQa, U	0.410	1.37	<0.686	CQa, U	0.686	2.29	<0.568	CQa, U	0.568	1.89	<0.413	CQa, U	0.413	1.38
Toxaphene	<34.3	0.1	x	x	1200	<22.9	U	22.9	22.9	<32.5	U	32.5	32.5	<20.0	U	20.0	20.0	<18.9	U	18.9	18.9	<20.5	U	20.5	20.5	<34.3	U	34.3	34.3	<28.4	U	28.4	28.4	<20.6	U	20.6	20.6
PCBs, Total	8.86	21.6	22.7	180	1100	2.37	J	1.53	3.07	2.34	J	2.15	4.29	<1.24	U	1.24	2.48	<1.31	U	1.31	2.63	<1.32	U	1.32	2.64	<2.30	U	2.30	4.61	<1.88	U	1.88	3.75	<1.45	U	1.45	2.89

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL. U-qualified results use the MDL for calculating total pesticides and total PCBs (J-qualified results use the value reported by the laboratory for calculating total pesticides and total PCBs).

Qualifier definitions: J = The reported value is between the detection limit and reporting limit. P = Difference between GC column results greater than the method requirement. U = Indicates that the compound was analyzed for but not detected. Higher result reported. CQ = CCV out of control high, no hit in sample, data unaffected. CQa = ICV out of control high, no hit in sample, data unaffected. CQc = ICV out of control high, no hit in sample, data unaffected. CQd = ICV&CCV out of control high, no hit in sample, data unaffected. CQf = No confirmation channel due to interference at the internal standard

Sources: Results from NWDLS; TEL and ERL values from Buchman (2008).

Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 8

Analytical Results for Dry Weight PAHs in Sediment Samples

					Sample ID:	CC-TB-22-05-SUB				CC-TB-22-05-SURF				CC-TB-22-06-SUB				CC-TB-22-06-SURF				CC-TB-22-06A-SUB				CC-TB-22-06A-SURF				CC-TB-22-07-SUB				CC-TB-22-07-SURF			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Acenaphthene^{LPAH}	<2.79	6.71	16	500	3000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Acenaphthylene^{LPAH}	5.00	5.87	44	640	3800000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	2.00	J	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Anthracene^{LPAH}	4.17	46.85	85.3	1100	59000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	2.85	J	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Benzo(a)anthracene^{HPAH}	13.5	74.83	261	1600	41000	3.87	--	1.49	2.97	2.04	J	1.60	3.21	<1.94	U	1.94	3.87	6.93	--	1.92	3.84	<1.58	U	1.58	3.16	7.77	--	1.96	3.93	<1.95	U	1.95	3.90	3.60	J	2.26	4.53
Benzo(a)pyrene^{HPAH}	20.7	88.81	430	1600	41000	8.67	--	1.49	2.97	3.46	--	1.60	3.21	3.04	J	1.94	3.87	11.6	--	1.92	3.84	2.83	J	1.58	3.16	11.5	--	1.96	3.93	3.51	J	1.95	3.90	7.22	--	2.26	4.53
Benzo(b&k)fluoranthene^{HPAH}	43.6	x	x	x	41000	21.2	--	1.49	2.97	7.66	--	1.60	3.21	6.24	--	1.94	3.87	23.7	--	1.92	3.84	6.16	--	1.58	3.16	23.6	--	1.96	3.93	7.83	--	1.95	3.90	15.9	--	2.26	4.53
Benzo(g,h,i)perylene^{HPAH}	13.5	x	x	x	1800000	6.04	--	1.49	2.97	2.39	J	1.60	3.21	2.24	J	1.94	3.87	8.52	--	1.92	3.84	2.33	J	1.58	3.16	8.45	--	1.96	3.93	2.56	J	1.95	3.90	5.05	--	2.26	4.53
Chrysene^{HPAH}	17.3	107.77	384	2800	4100000	5.16	--	1.49	2.97	2.70	J	1.60	3.21	2.18	J	1.94	3.87	9.90	--	1.92	3.84	2.03	J	1.58	3.16	11.2	--	1.96	3.93	2.86	J	1.95	3.90	5.71	--	2.26	4.53
Dibenzo(a,h)anthracene^{HPAH}	<2.79	6.22	63.4	260	4000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Fluoranthene^{HPAH}	11.4	112.82	600	5100	2300000	5.59	--	1.49	2.97	3.07	J	1.60	3.21	<1.94	U	1.94	3.87	9.11	--	1.92	3.84	1.74	J	1.58	3.16	11.4	--	1.96	3.93	2.20	J	1.95	3.90	4.30	J	2.26	4.53
Fluorene^{LPAH}	<2.79	21.17	19	540	2300000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Indeno(1,2,3-cd)pyrene^{HPAH}	10.8	x	x	x	42000	4.77	--	1.49	2.97	1.95	J	1.60	3.21	<1.94	U	1.94	3.87	6.44	--	1.92	3.84	1.74	J	1.58	3.16	6.19	--	1.96	3.93	1.95	J	1.95	3.90	3.74	J	2.26	4.53
Naphthalene^{LPAH}	<2.79	34.57	160	2100	120000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Phenanthrene^{LPAH}	3.71	86.68	240	1500	1700000	2.79	J	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	3.03	J	1.92	3.84	<1.58	U	1.58	3.16	2.92	J	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Pyrene^{HPAH}	22.5	152.66	665	2600	1700000	5.13	--	1.49	2.97	3.02	J	1.60	3.21	2.46	J	1.94	3.87	13.0	--	1.92	3.84	2.25	J	1.58	3.16	12.5	--	1.96	3.93	2.71	J	1.95	3.90	5.25	--	2.26	4.53
Total LPAHs	21.3	312	552	3160	x	10.2				9.60				11.6				12.6				9.48				13.7				11.7				13.6			
Total HPAHs	148	655	1700	9600	x	61.9				27.9				23.9				91.1				22.2				94.6				27.5				53.0			
Total PAHs	170	1684	4022	44792	x	72.2				37.5				35.6				104				31.7				108				39.2				66.6			

TABLE 8 (*continued*)

Analytical Results for Dry Weight PAHs in Sediment Samples

Analyte					Sample ID:	CC-TB-22-07A-SUB				CC-TB-22-07A-SURF				CC-TB-22-07W-SUB				CC-TB-22-07W-SURF			
	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Acenaphthene[LPAH]	<2.79	6.71	16	500	3000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Acenaphthylene[LPAH]	5.00	5.87	44	640	3800000	2.26	J	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Anthracene[LPAH]	4.17	46.85	85.3	1100	59000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Benzo(a)anthracene[HPAH]	13.5	74.83	261	1600	41000	5.12	--	2.17	4.34	<1.95	U	1.95	3.89	3.62	J	2.36	4.72	4.31	J	2.53	5.07
Benzo(a)pyrene[HPAH]	20.7	88.81	430	1600	41000	9.58	--	2.17	4.34	<1.95	U	1.95	3.89	8.19	--	2.36	4.72	7.48	--	2.53	5.07
Benzo(b&k)fluoranthene[HPAH]	43.6	x	x	x	41000	20.7	--	2.17	4.34	3.45	J	1.95	3.89	14.8	--	2.36	4.72	16.3	--	2.53	5.07
Benzo(g,h,i)perylene[HPAH]	13.5	x	x	x	1800000	6.68	--	2.17	4.34	<1.95	U	1.95	3.89	5.94	--	2.36	4.72	5.90	--	2.53	5.07
Chrysene[HPAH]	17.3	107.77	384	2800	4100000	7.65	--	2.17	4.34	<1.95	U	1.95	3.89	5.75	--	2.36	4.72	6.12	--	2.53	5.07
Dibenzo(a,h)anthracene[HPAH]	<2.79	6.22	63.4	260	4000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Fluoranthene[HPAH]	11.4	112.82	600	5100	2300000	5.47	--	2.17	4.34	<1.95	U	1.95	3.89	3.25	J	2.36	4.72	4.71	J	2.53	5.07
Fluorene[LPAH]	<2.79	21.17	19	540	2300000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Indeno(1,2,3-cd)pyrene[HPAH]	10.8	x	x	x	42000	5.08	--	2.17	4.34	<1.95	U	1.95	3.89	3.97	J	2.36	4.72	4.41	J	2.53	5.07
Naphthalene[LPAH]	<2.79	34.57	160	2100	120000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Phenanthrene[LPAH]	3.71	86.68	240	1500	1700000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07
Pyrene[HPAH]	22.5	152.66	665	2600	1700000	5.39	--	2.17	4.34	<1.95	U	1.95	3.89	2.73	J	2.36	4.72	8.28	--	2.53	5.07
Total LPAHs	21.3	312	552	3160	x	13.1				11.7				14.2				15.2			
Total HPAHs	148	655	1700	9600	x	67.8				19.1				50.6				60.0			
Total PAHs	170	1684	4022	44792	x	81.0				30.8				64.8				75.2			

Analyte	CC-TB-22-08-SUB				CC-TB-22-08-SURF				CC-TB-22-08A-SUB				CC-TB-22-08A-SURF			
	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
Acenaphthene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Acenaphthylene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Anthracene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Benzo(a)anthracene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	3.91	J	2.27	4.54
Benzo(a)pyrene[HPAH]	<1.84	U	1.84	3.69	2.10	J	1.98	3.96	<1.83	U	1.83	3.66	6.90	--	2.27	4.54
Benzo(b&k)fluoranthene[HPAH]	2.51	J	1.84	3.69	4.60	--	1.98	3.96	2.24	J	1.83	3.66	15.6	--	2.27	4.54
Benzo(g,h,i)perylene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	5.38	--	2.27	4.54
Chrysene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	7.06	--	2.27	4.54
Dibenzo(a,h)anthracene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Fluoranthene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	6.27	--	2.27	4.54
Fluorene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Indeno(1,2,3-cd)pyrene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	3.90	J	2.27	4.54
Naphthalene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Phenanthrene[LPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Pyrene[HPAH]	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	2.14	J	1.83	3.66	8.31	--	2.27	4.54
Total LPAHs	11.0				11.9				11.0				13.6			
Total HPAHs	17.2				20.6				17.2				59.6			
Total PAHs	28.3				32.4				28.2				73.2			

TABLE 8 (*continued*)

Analytical Results for Dry Weight PAHs in Sediment Samples

Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	CC-TB-22-09-SUB Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-09-SURF Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-09A-SUB Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-09A-SURF Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-10-SUB Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-10-SURF Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-DUP Result µg/kg	Qualifier	MDL	LRL	CC-TB-22-DUP2 Result µg/kg	Qualifier	MDL	LRL
Acenaphthene[LPAH]	<2.79	6.71	16	500	3000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Acenaphthylene[LPAH]	5.00	5.87	44	640	3800000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	5.00	J	2.79	5.59	2.41	J	2.34	4.68	<1.72	U	1.72	3.45
Anthracene[LPAH]	4.17	46.85	85.3	1100	59000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	1.93	J	1.61	3.22	<1.63	U	1.63	3.27	4.17	J	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Benzo(a)anthracene[HPAH]	13.5	74.83	261	1600	41000	<1.90	U	1.90	3.80	2.60	J	2.59	5.19	<1.55	U	1.55	3.10	2.15	J	1.61	3.22	<1.63	U	1.63	3.27	13.5	--	2.79	5.59	5.07	--	2.34	4.68	2.00	J	1.72	3.45
Benzo(a)pyrene[HPAH]	20.7	88.81	430	1600	41000	<1.90	U	1.90	3.80	4.07	J	2.59	5.19	<1.55	U	1.55	3.10	3.65	--	1.61	3.22	<1.63	U	1.63	3.27	20.7	--	2.79	5.59	9.05	--	2.34	4.68	3.45	--	1.72	3.45
Benzo(b&k)fluoranthene[HPAH]	43.6	x	x	x	41000	4.67	--	1.90	3.80	8.42	--	2.59	5.19	<1.55	U	1.55	3.10	7.77	--	1.61	3.22	2.61	J	1.63	3.27	43.6	--	2.79	5.59	20.4	--	2.34	4.68	6.87	--	1.72	3.45
Benzo(g,h,i)perylene[HPAH]	13.5	x	x	x	1800000	<1.90	U	1.90	3.80	2.76	J	2.59	5.19	<1.55	U	1.55	3.10	2.97	J	1.61	3.22	<1.63	U	1.63	3.27	13.5	--	2.79	5.59	7.03	--	2.34	4.68	2.39	J	1.72	3.45
Chrysene[HPAH]	17.3	107.77	384	2800	4100000	<1.90	U	1.90	3.80	3.29	J	2.59	5.19	<1.55	U	1.55	3.10	4.43	--	1.61	3.22	<1.63	U	1.63	3.27	17.3	--	2.79	5.59	7.73	--	2.34	4.68	2.47	J	1.72	3.45
Dibenzo(a,h)anthracene[HPAH]	<2.79	6.22	63.4	260	4000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Fluoranthene[HPAH]	11.4	112.82	600	5100	2300000	<1.90	U	1.90	3.80	3.79	J	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	3.74	J	2.79	5.59	6.65	--	2.34	4.68	2.49	J	1.72	3.45
Fluorene[LPAH]	<2.79	21.17	19	540	2300000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Indeno(1,2,3-cd)pyrene[HPAH]	10.8	x	x	x	42000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	2.13	J	1.61	3.22	<1.63	U	1.63	3.27	10.8	--	2.79	5.59	5.04	--	2.34	4.68	1.77	J	1.72	3.45
Naphthalene[LPAH]	<2.79	34.57	160	2100	120000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Phenanthrene[LPAH]	3.71	86.68	240	1500	1700000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	3.71	J	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Pyrene[HPAH]	22.5	152.66	665	2600	1700000	2.30	J	1.90	3.80	4.00	J	2.59	5.19	<1.55	U	1.55	3.10	3.72	--	1.61	3.22	<1.63	U	1.63	3.27	22.5	--	2.79	5.59	9.16	--	2.34	4.68	6.16	--	1.72	3.45
Total LPAHs	21.3	312	552	3160	x	11.4				15.5				9.30				9.98				9.78				21.3				14.1				10.3			
Total HPAHs	148	655	1700	9600	x	20.3				34.1				14.0				30.0				15.7				148				72.5				29.3			
Total PAHs	170	1684	4022	44792	x	31.7				49.7				23.3				40.0				25.4				170				86.6				39.6			

LPAH = Low molecular weight PAH as defined in the *Regional Implementation Agreement* by USEPA/USACE (2003).

HPAH = High molecular weight PAH as defined in the *Regional Implementation Agreement* by USEPA/USACE (2003).

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL. For calculating total PAHs, U-qualified results use the MDL and J-qualified results use the value reported by the laboratory.

Qualifier definitions: J = The value is an estimated value. U = Indicates that the compound was analyzed for but not detected.

Sources: Results from NWDLS; TEL and ERL values from Buchman (2008).
Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 9

Analytical Results for Dry Weight SVOCs in Sediment Samples

					Sample ID:	CC-TB-22-05-SUB				CC-TB-22-05-SURF				CC-TB-22-06-SUB				CC-TB-22-06-SURF				CC-TB-22-06A-SUB				CC-TB-22-06A-SURF				CC-TB-22-07-SUB				CC-TB-22-07-SURF			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<2.79	x	x	x	70000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
1,2-Dichlorobenzene (o-Dichlorobenzene)	<2.79	x	x	x	390000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
1,2-Diphenylhydrazine	<2.79	x	x	x	5600	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
1,3-Dichlorobenzene (m-Dichlorobenzene)	<2.79	x	x	x	62000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
1,4-Dichlorobenzene (p-Dichlorobenzene)	<2.79	x	x	x	6100000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
2,4,6-Trichlorophenol	<5.59	x	x	x	67000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
2,4-Dichlorophenol	<5.59	x	x	x	200000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
2,4-Dimethylphenol	<5.59	x	x	x	1300000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
2,4-Dinitrophenol	<5.59	x	x	x	130000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
2,4-Dinitrotoluene (2,4-DNT)	<2.79	x	x	x	130000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
2,6-Dinitrotoluene (2,6-DNT)	<2.79	x	x	x	67000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
2-Chloronaphthalene	<2.79	x	x	x	5000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
2-Chlorophenol	<5.59	x	x	x	410000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
2-Nitrophenol	<5.59	x	x	x	130000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
3,3'-Dichlorobenzidine	<2.79	x	x	x	10000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
4,6-Dinitro-2-methylphenol	<22.3	x	x	x	6700	<11.9	U	11.9	23.8	<12.8	U	12.8	25.7	<15.5	U	15.5	31.0	<15.4	U	15.4	30.7	<12.6	U	12.6	25.3	<15.7	U	15.7	31.4	<15.6	U	15.6	31.2	<18.1	U	18.1	36.2
4-Bromophenyl phenyl ether (BDE-3)	<2.79	x	x	x	270	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
4-Chloro-3-methylphenol	<5.59	x	x	x	330000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
4-Chlorophenyl phenyl ether	<2.79	x	x	x	150	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
4-Nitrophenol	<2.79	x	x	x	130000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Benzidine	<2.79	x	x	x	200000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Bis(2-Chloroethoxy) methane	<2.79	x	x	x	200000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Bis(2-Chloroethyl) ether	<2.79	x	x	x	1400	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Bis(2-chloroisopropyl) ether	<2.79	x	x	x	x	<1.60	U	1.60	3.21	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Bis(2-ethylhexyl) phthalate	18.0	182	x	x	2700000	5.12	--	1.49	2.97	2.97	J	1.60	3.21	4.67	--	1.94	3.87	6.29	--	1.92	3.84	2.65	J	1.58	3.16	9.05	--	1.96	3.93	4.56	--	1.95	3.90	4.25	J	2.26	4.53
Butyl benzyl phthalate	<2.79	x	x	x	10000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Diethyl phthalate	<2.79	x	x	x	53000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Dimethyl phthalate	5.18	x	x	x	53000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Di-n-butyl phthalate	8.50	x	x	x	6200000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	8.50	--	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Di-n-octyl phthalate	<2.79	x	x	x	640000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Hexachlorobenzene	<2.79	x	x	x	29000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Hexachlorobutadiene	<2.79	x	x	x	67000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Hexachlorocyclopentadiene	<2.79	x	x	x	7200	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Hexachloroethane	<2.79	x	x	x	46000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Isophorone	<2.79	x	x	x	13000000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Nitrobenzene	4.35	x	x	x	110000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
N-Nitrosodimethylamine	<2.79	x	x	x	520	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
N-Nitrosodi-n-propylamine	<2.79	x	x	x	400	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
N-Nitrosodiphenylamine	<2.79	x	x	x	5700000	<1.49	U	1.49	2.97	<1.60	U	1.60	3.21	<1.94	U	1.94	3.87	<1.92	U	1.92	3.84	<1.58	U	1.58	3.16	<1.96	U	1.96	3.93	<1.95	U	1.95	3.90	<2.26	U	2.26	4.53
Pentachlorophenol	<5.59	x	x	x	36000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	<3.93	U	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05
Phenol, Total	8.04	x	x	x	950000	<2.97	U	2.97	5.95	<3.21	U	3.21	6.42	<3.87	U	3.87	7.74	<3.84	U	3.84	7.68	<3.16	U	3.16	6.32	3.95	J	3.93	7.85	<3.90	U	3.90	7.80	<4.53	U	4.53	9.05

TABLE 9 (*continued*)

Analytical Results for Dry Weight SVOCs in Sediment Samples

					Sample ID:	CC-TB-22-07A-SUB				CC-TB-22-07A-SURF				CC-TB-22-07W-SUB				CC-TB-22-07W-SURF				CC-TB-22-08-SUB				CC-TB-22-08-SURF				CC-TB-22-08A-SUB				CC-TB-22-08A-SURF			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<2.79	x	x	x	70000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
1,2-Dichlorobenzene (o-Dichlorobenzene)	<2.79	x	x	x	390000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
1,2-Diphenylhydrazine	<2.79	x	x	x	5600	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
1,3-Dichlorobenzene (m-Dichlorobenzene)	<2.79	x	x	x	62000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
1,4-Dichlorobenzene (p-Dichlorobenzene)	<2.79	x	x	x	6100000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
2,4,6-Trichlorophenol	<5.59	x	x	x	67000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
2,4-Dichlorophenol	<5.59	x	x	x	200000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
2,4-Dimethylphenol	<5.59	x	x	x	1300000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
2,4-Dinitrophenol	<5.59	x	x	x	130000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
2,4-Dinitrotoluene (2,4-DNT)	<2.79	x	x	x	130000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
2,6-Dinitrotoluene (2,6-DNT)	<2.79	x	x	x	67000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
2-Chloronaphthalene	<2.79	x	x	x	5000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
2-Chlorophenol	<5.59	x	x	x	410000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
2-Nitrophenol	<5.59	x	x	x	130000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
3,3'-Dichlorobenzidine	<2.79	x	x	x	10000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
4,6-Dinitro-2-methylphenol	<22.3	x	x	x	6700	<17.4	U	17.4	34.7	<15.6	U	15.6	31.2	<18.9	U	18.9	37.8	<20.3	U	20.3	40.5	<14.7	U	14.7	29.5	<15.9	U	15.9	31.7	<14.6	U	14.6	29.2	<18.2	U	18.2	36.3
4-Bromophenyl phenyl ether (BDE-3)	<2.79	x	x	x	270	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
4-Chloro-3-methylphenol	<5.59	x	x	x	330000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
4-Chlorophenyl phenyl ether	<2.79	x	x	x	150	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
4-Nitrophenol	<2.79	x	x	x	130000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Benzidine	<2.79	x	x	x	200000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Bis(2-Chloroethoxy) methane	<2.79	x	x	x	200000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Bis(2-Chloroethyl) ether	<2.79	x	x	x	1400	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Bis(2-chloroisopropyl) ether	<2.79	x	x	x	x	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Bis(2-ethylhexyl) phthalate	18.0	182	x	x	2700000	4.51	--	2.17	4.34	3.46	J	1.95	3.89	8.14	V	2.36	4.72	5.50	--	2.53	5.07	2.92	J	1.84	3.69	6.58	--	1.98	3.96	3.07	J	1.83	3.66	3.90	J	2.27	4.54
Butyl benzyl phthalate	<2.79	x	x	x	10000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Diethyl phthalate	<2.79	x	x	x	53000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Dimethyl phthalate	5.18	x	x	x	53000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	5.18	--	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Di-n-butyl phthalate	8.50	x	x	x	6200000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	B, U	2.36	4.72	3.31	J	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Di-n-octyl phthalate	<2.79	x	x	x	640000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Hexachlorobenzene	<2.79	x	x	x	29000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Hexachlorobutadiene	<2.79	x	x	x	67000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Hexachlorocyclopentadiene	<2.79	x	x	x	7200	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Hexachloroethane	<2.79	x	x	x	46000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Isophorone	<2.79	x	x	x	13000000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Nitrobenzene	4.35	x	x	x	110000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
N-Nitrosodimethylamine	<2.79	x	x	x	520	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
N-Nitrosodi-n-propylamine	<2.79	x	x	x	400	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
N-Nitrosodiphenylamine	<2.79	x	x	x	5700000	<2.17	U	2.17	4.34	<1.95	U	1.95	3.89	<2.36	U	2.36	4.72	<2.53	U	2.53	5.07	<1.84	U	1.84	3.69	<1.98	U	1.98	3.96	<1.83	U	1.83	3.66	<2.27	U	2.27	4.54
Pentachlorophenol	<5.59	x	x	x	36000	<4.34	U	4.34	8.69	<3.89	U	3.89	7.79	<4.72	U	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	<3.66	U	3.66	7.31	<4.54	U	4.54	9.08
Phenol, Total	8.04	x	x	x	950000	<4.34	U	4.34	8.69	4.76	J	3.89	7.79	6.71	J	4.72	9.44	<5.07	U	5.07	10.1	<3.69	U	3.69	7.37	<3.96	U	3.96	7.93	3.98	J	3.66	7.31	8.93	J	4.54	9.08

TABLE 9 (*continued*)
Analytical Results for Dry Weight SVOCs in Sediment Samples

					Sample ID:	CC-TB-22-09-SUB				CC-TB-22-09-SURF				CC-TB-22-09A-SUB				CC-TB-22-09A-SURF				CC-TB-22-10-SUB				CC-TB-22-10-SURF				CC-TB-22-DUP				CC-TB-22-DUP2			
Analyte	Maximum Conc. µg/kg	TEL µg/kg	ERL µg/kg	ERM µg/kg	PCL µg/kg	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<2.79	x	x	x	70000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
1,2-Dichlorobenzene (o-Dichlorobenzene)	<2.79	x	x	x	390000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
1,2-Diphenylhydrazine	<2.79	x	x	x	5600	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
1,3-Dichlorobenzene (m-Dichlorobenzene)	<2.79	x	x	x	62000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
1,4-Dichlorobenzene (p-Dichlorobenzene)	<2.79	x	x	x	6100000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
2,4,6-Trichlorophenol	<5.59	x	x	x	67000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
2,4-Dichlorophenol	<5.59	x	x	x	200000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
2,4-Dimethylphenol	<5.59	x	x	x	1300000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
2,4-Dinitrophenol	<5.59	x	x	x	130000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
2,4-Dinitrotoluene (2,4-DNT)	<2.79	x	x	x	130000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
2,6-Dinitrotoluene (2,6-DNT)	<2.79	x	x	x	67000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
2-Chloronaphthalene	<2.79	x	x	x	5000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
2-Chlorophenol	<5.59	x	x	x	410000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
2-Nitrophenol	<5.59	x	x	x	130000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
3,3'-Dichlorobenzidine	<2.79	x	x	x	10000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
4,6-Dinitro-2-methylphenol	<22.3	x	x	x	6700	<15.2	U	15.2	30.4	<20.7	U	20.7	41.5	<12.4	U	12.4	24.8	<12.9	U	12.9	25.8	<13.1	U	13.1	26.1	<22.3	U	22.3	44.7	<18.7	U	18.7	37.4	<13.8	U	13.8	27.6
4-Bromophenyl phenyl ether (BDE-3)	<2.79	x	x	x	270	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
4-Chloro-3-methylphenol	<5.59	x	x	x	330000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
4-Chlorophenyl phenyl ether	<2.79	x	x	x	150	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
4-Nitrophenol	<2.79	x	x	x	130000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Benzidine	<2.79	x	x	x	200000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Bis(2-Chloroethoxy) methane	<2.79	x	x	x	200000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Bis(2-Chloroethyl) ether	<2.79	x	x	x	1400	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Bis(2-chloroisopropyl) ether	<2.79	x	x	x	x	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Bis(2-ethylhexyl) phthalate	18.0	182	x	x	2700000	2.70	J	1.90	3.80	4.34	J	2.59	5.19	2.47	J	1.55	3.10	2.76	J	1.61	3.22	2.32	J	1.63	3.27	18.0	V	2.79	5.59	11.8	V	2.34	4.68	3.29	V, J	1.72	3.45
Butyl benzyl phthalate	<2.79	x	x	x	10000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Diethyl phthalate	<2.79	x	x	x	53000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Dimethyl phthalate	5.18	x	x	x	53000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Di-n-butyl phthalate	8.50	x	x	x	6200000	<1.90	U	1.90	3.80	6.89	--	2.59	5.19	<1.55	U	1.55	3.10	1.82	J	1.61	3.22	<1.63	U	1.63	3.27	5.53	V, J	2.79	5.59	<2.34	B, U	2.34	4.68	<1.72	B, U	1.72	3.45
Di-n-octyl phthalate	<2.79	x	x	x	640000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Hexachlorobenzene	<2.79	x	x	x	29000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Hexachlorobutadiene	<2.79	x	x	x	67000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Hexachlorocyclopentadiene	<2.79	x	x	x	7200	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Hexachloroethane	<2.79	x	x	x	46000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Isophorone	<2.79	x	x	x	13000000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Nitrobenzene	4.35	x	x	x	110000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	4.35	J	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
N-Nitrosodimethylamine	<2.79	x	x	x	520	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
N-Nitrosodi-n-propylamine	<2.79	x	x	x	400	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
N-Nitrosodiphenylamine	<2.79	x	x	x	5700000	<1.90	U	1.90	3.80	<2.59	U	2.59	5.19	<1.55	U	1.55	3.10	<1.61	U	1.61	3.22	<1.63	U	1.63	3.27	<2.79	U	2.79	5.59	<2.34	U	2.34	4.68	<1.72	U	1.72	3.45
Pentachlorophenol	<5.59	x	x	x	36000	<3.80	U	3.80	7.61	<5.19	U	5.19	10.4	<3.10	U	3.10	6.19	<3.22	U	3.22	6.44	<3.27	U	3.27	6.54	<5.59	U	5.59	11.2	<4.68	U	4.68	9.36	<3.45	U	3.45	6.90
Phenol, Total	8.04	x	x	x	950000	4.37	J	3.80	7.61	7.14	J	5.19	10.4	<3.10	U	3.10	6.19	5.09	J	3.22	6.44	3.50	J	3.27	6.54	8.04	J	5.59	11.2	5.92	J	4.68	9.36	<3.45	U	3.45	6.90

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL.
Qualifier definitions: J = The value is an estimated value. U = Indicates that the compound was analyzed for but not detected. B = Analyte was found to be associated with the method blank. V = Analyte was detected in both sample and method blank.

Sources: Results from NWDLS; TEL and ERL values from Buchman (2008).
Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 10

Analytical Results for Metals in Site Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-05 (Water)				CC-TB-22-05-SUB (Elutriate)				CC-TB-22-05-SURF (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals															
Antimony	6.84	x	x	<1.00	U	1.00	5.00	5.57	--	1.00	5.00	3.74	J	1.00	5.00
Arsenic	26.1	69	149	12.2	--	0.500	2.50	20.1	CQ	0.500	2.50	13.6	CQ	0.500	2.50
Beryllium	0.130	x	x	<0.0500	U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00
Cadmium	<0.250	40	40	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	0.575	x	x	0.448	J	0.400	15.0	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0
Chromium (III)	<1.90	x	x	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.166	1.1	1.09	<1.50	U	1.50	3.00	0.0173	--	0.00150	0.00300	0.0179	--	0.00150	0.00300
Copper	3.34	4.8	13.5	2.66	J	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00
Lead	<0.500	210	133	<0.500	U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50
Mercury	0.205	1.8	2.1	<0.150	U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	2.61	74	118	1.19	J	0.250	5.00	1.80	CQ, J	0.250	5.00	1.27	CQ, J	0.250	5.00
Selenium	8.85	290	564	6.95	J	1.65	25.0	5.82	V, J	1.65	25.0	4.51	V, J	1.65	25.0
Silver	<0.150	1.9	2	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	x	x	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	12.3	90	92.7	10.1	--	1.00	10.0	5.76	CQ,V,J	1.00	10.0	6.22	CQ,V,J	1.00	10.0
Others															
Analyte	Maximum Conc. mg/L	CMC mg/L	TWQS Acute mg/L	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	8.28	x	x	0.555	--	0.02	0.05	0.826	--	0.10	0.25	0.822	--	0.10	0.25
Cyanide, Total	0.071	0.001	0.0056	<0.0005	U	0.0005	0.02	<0.0005	U	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	3.12	x	x	<0.451	U	0.451	4.51	1.57	--	0.18	6.45	1.92	--	0.18	6.45
Carbon, Total Organic	7.50	x	x	2.60	--	0.07	0.50	4.30	--	0.07	0.50	5.50	--	0.07	0.50

Sample ID:	CC-TB-22-06-SUB (Elutriate)				CC-TB-22-06-SURF (Elutriate)				CC-TB-22-06A-SUB (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	6.84	--	1.00	5.00	4.31	J	1.00	5.00	2.62	J	1.00	5.00
Arsenic	20.8	CQ	0.500	2.50	15.1	CQ	0.500	2.50	17.4	CQ	0.500	2.50
Beryllium	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0	0.534	CQ, J	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.0316	--	0.00150	0.00300	0.0207	--	0.00150	0.00300	0.0184	--	0.00150	0.00300
Copper	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00
Lead	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50
Mercury	<0.150	B,C,CQa,U	0.150	0.200	0.152	C,CQ,V,J	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	1.18	CQ, J	0.250	5.00	1.16	CQ, J	0.250	5.00	0.687	CQ, J	0.250	5.00
Selenium	3.72	V, J	1.65	25.0	4.14	V, J	1.65	25.0	3.51	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	8.77	CQ,V,J	1.00	10.0	1.92	CQ,V,J	1.00	10.0	1.97	CQ,V,J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	8.28	--	0.20	0.50	2.33	--	0.10	0.25	4.20	--	0.10	0.25
Cyanide, Total	<0.0005	U	0.0005	0.02	0.0006	J	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	2.49	--	0.18	6.45	1.79	--	0.18	6.45	2.52	--	0.18	6.45
Carbon, Total Organic	6.10	--	0.07	0.50	5.90	--	0.07	0.50	4.80	--	0.07	0.50

Sample ID:	CC-TB-22-06A-SURF (Elutriate)				CC-TB-22-07-SUB (Elutriate)				CC-TB-22-07-SURF (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	2.22	J	1.00	5.00	3.43	J	1.00	5.00	3.03	J	1.00	5.00
Arsenic	14.5	CQ	0.500	2.50	16.6	CQ	0.500	2.50	9.18	CQ	0.500	2.50
Beryllium	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.0220	--	0.00150	0.00300	0.0220	--	0.00150	0.00300	0.0198	--	0.00150	0.00300
Copper	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00
Lead	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50
Mercury	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	0.884	CQ, J	0.250	5.00	0.370	CQ, J	0.250	5.00	0.464	CQ, J	0.250	5.00
Selenium	2.72	V, J	1.65	25.0	4.25	V, J	1.65	25.0	4.68	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	1.64	CQ,V,J	1.00	10.0	2.22	CQ,V,J	1.00	10.0	1.75	CQ,V,J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	2.61	--	0.10	0.25	3.77	--	0.20	0.50	2.04	--	0.10	0.25
Cyanide, Total	0.0008	J	0.0005	0.02	<0.0005	U	0.0005	0.02	0.0006	J	0.0005	0.02
Petroleum Hydrocarbons, Total	3.12	--	0.18	6.45	1.56	--	0.18	6.45	1.41	--	0.18	6.45
Carbon, Total Organic	6.10	--	0.07	0.50	5.10	--	0.07	0.50	6.20	--	0.07	0.50

TABLE 10 (*continued*)

Analytical Results for Metals in Site Water and Elutriates Generated from Sediment

Sample ID:			Sample ID:	CC-TB-22-07A-SUB (Elutriate)				CC-TB-22-07A-SURF (Elutriate)				CC-TB-22-07W-SUB (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals															
Antimony	6.84	x	x	3.72	J	1.00	5.00	2.86	J	1.00	5.00	3.24	J	1.00	5.00
Arsenic	26.1	69	149	14.2	CQ	0.500	2.50	19.2	CQ	0.500	2.50	6.64	--	0.500	2.50
Beryllium	0.130	x	x	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	0.0890	V, J	0.0500	1.00
Cadmium	<0.250	40	40	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	0.575	x	x	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0	<0.400	U	0.400	15.0
Chromium (III)	<1.90	x	x	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.166	1.1	1.09	0.0301	--	0.00150	0.00300	0.0228	--	0.00150	0.00300	0.166	CQ	0.00150	0.00300
Copper	3.34	4.8	13.5	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	U	1.00	5.00
Lead	<0.500	210	133	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	U	0.500	2.50
Mercury	0.205	1.8	2.1	0.171	C,CQ,V,J	0.150	0.200	0.205	C,CQ,R,V	0.150	0.200	0.163	CQ,V,C,J	0.150	0.200
Nickel	2.61	74	118	0.553	CQ, J	0.250	5.00	0.980	CQ, J	0.250	5.00	2.41	V, J	0.250	5.00
Selenium	8.85	290	564	4.91	V, J	1.65	25.0	3.52	V, J	1.65	25.0	6.74	V, J	1.65	25.0
Silver	<0.150	1.9	2	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	x	x	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	12.3	90	92.7	3.79	CQ,V,J	1.00	10.0	4.00	CQ,V,J	1.00	10.0	3.96	V, J	1.00	10.0
Others															
Analyte	Maximum Conc. mg/L	CMC mg/L	TWQS Acute mg/L	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	8.28	x	x	1.11	--	0.10	0.25	2.50	--	0.10	0.25	7.67	--	0.20	0.50
Cyanide, Total	0.071	0.001	0.0056	0.0006	J	0.0005	0.02	<0.0005	U	0.0005	0.02	**0.002**	J	0.0005	0.02
Petroleum Hydrocarbons, Total	3.12	x	x	1.21	--	0.18	6.45	2.41	--	0.18	6.45	2.14	--	0.18	6.45
Carbon, Total Organic	7.50	x	x	5.20	--	0.07	0.50	4.60	--	0.07	0.50	7.50	--	0.07	0.50

Sample ID:	CC-TB-22-07W-SURF (Elutriate)				CC-TB-22-08-SUB (Elutriate)				CC-TB-22-08-SURF (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	2.90	J	1.00	5.00	2.78	J	1.00	5.00	3.27	J	1.00	5.00
Arsenic	6.14	--	0.500	2.50	14.9	CQ	0.500	2.50	15.4	CQ	0.500	2.50
Beryllium	0.0640	V, J	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	0.0610	CQa, J	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	<0.400	U	0.400	15.0	<0.400	CQa, U	0.400	15.0	0.404	CQ, J	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.0306	CQ	0.00150	0.00300	0.0227	--	0.00150	0.00300	0.0211	--	0.00150	0.00300
Copper	<1.00	U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00
Lead	<0.500	U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50
Mercury	<0.150	B,C,CQa,U	0.150	0.200	0.150	C,CQ,V,J	0.150	0.200	0.175	C,CQ,V,J	0.150	0.200
Nickel	1.18	V, J	0.250	5.00	0.512	CQ, J	0.250	5.00	0.523	CQ, J	0.250	5.00
Selenium	5.16	V, J	1.65	25.0	4.85	V, J	1.65	25.0	5.93	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	2.24	V, J	1.00	10.0	6.69	CQ,V,J	1.00	10.0	6.30	CQ,V,J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	5.74	--	0.20	0.50	5.3	--	0.20	0.50	2.76	--	0.10	0.25
Cyanide, Total	**0.002**	J	0.0005	0.02	<0.0005	U	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	2.27	--	0.18	6.45	1.85	--	0.18	6.45	1.91	--	0.18	6.45
Carbon, Total Organic	7.20	--	0.07	0.50	5.80	--	0.07	0.50	5.50	--	0.07	0.50

Sample ID:	CC-TB-22-08A-SUB (Elutriate)				CC-TB-22-08A-SURF (Elutriate)				CC-TB-22-09-SUB (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	2.95	J	1.00	5.00	2.55	J	1.00	5.00	2.39	J	1.00	5.00
Arsenic	18.8	CQ	0.500	2.50	11.4	CQ	0.500	2.50	26.1	CQ	0.500	2.50
Beryllium	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.0195	--	0.00150	0.00300	0.0149	--	0.00150	0.00300	0.0208	--	0.00150	0.00300
Copper	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00
Lead	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50
Mercury	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	0.733	CQ, J	0.250	5.00	0.545	CQ, J	0.250	5.00	1.20	CQ, J	0.250	5.00
Selenium	4.01	V, J	1.65	25.0	4.28	V, J	1.65	25.0	5.90	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	5.37	CQ,V,J	1.00	10.0	6.44	CQ,V,J	1.00	10.0	3.59	CQ,V,J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	6.72	--	0.20	0.50	2.99	--	0.10	0.25	3.50	--	0.10	0.25
Cyanide, Total	0.0006	J	0.0005	0.02	**0.001**	J	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	2.06	--	0.18	6.45	1.79	--	0.18	6.45	1.66	--	0.18	6.45
Carbon, Total Organic	5.70	--	0.07	0.50	6.20	--	0.07	0.50	5.60	--	0.07	0.50

TABLE 10 (*continued*)

Analytical Results for Metals in Site Water and Elutriates Generated from Sediment

Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	CC-TB-22-09-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-09A-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-09A-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL
Metals															
Antimony	6.84	x	x	1.88	J	1.00	5.00	2.89	J	1.00	5.00	4.09	J	1.00	5.00
Arsenic	26.1	69	149	10.9	--	0.500	2.50	21.8	CQ	0.500	2.50	10.9	--	0.500	2.50
Beryllium	0.130	x	x	<0.0500	U	0.0500	1.00	<0.0500	CQa, U	0.0500	1.00	0.123	V, J	0.0500	1.00
Cadmium	<0.250	40	40	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	0.575	x	x	<0.400	CQa, U	0.400	15.0	<0.400	CQa, U	0.400	15.0	0.575	J	0.400	15.0
Chromium (III)	<1.90	x	x	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	0.166	1.1	1.09	0.0233	--	0.00150	0.00300	0.0168	--	0.00150	0.00300	0.0232	--	0.00150	0.00300
Copper	3.34	4.8	13.5	<1.00	CQa, U	1.00	5.00	<1.00	CQa, U	1.00	5.00	<1.00	U	1.00	5.00
Lead	<0.500	210	133	<0.500	CQa, U	0.500	2.50	<0.500	CQa, U	0.500	2.50	<0.500	U	0.500	2.50
Mercury	0.205	1.8	2.1	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	2.61	74	118	<0.250	CQa, U	0.250	5.00	1.69	CQ, J	0.250	5.00	1.28	V, J	0.250	5.00
Selenium	8.85	290	564	3.82	CQ,V,J	1.65	25.0	8.85	V, J	1.65	25.0	4.84	V, J	1.65	25.0
Silver	<0.150	1.9	2	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	x	x	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	12.3	90	92.7	4.50	CQ,V,J	1.00	10.0	3.63	CQ,V,J	1.00	10.0	4.62	V, J	1.00	10.0
Others															
Analyte	Maximum Conc. mg/L	CMC mg/L	TWQS Acute mg/L	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	8.28	x	x	5.46	CQe	0.20	0.50	0.73	--	0.1	0.25	1.25	--	0.1	0.25
Cyanide, Total	0.071	0.001	0.0056	**0.071**	--	0.0005	0.02	0.0006	J	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	3.12	x	x	1.58	--	0.18	6.45	1.27	--	0.18	6.45	1.40	--	0.18	6.45
Carbon, Total Organic	7.50	x	x	4.30	--	0.07	0.50	4.50	--	0.07	0.50	5.60	--	0.07	0.50

Analyte	CC-TB-22-10 (Water) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-10-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-10-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	1.20	J	1.00	5.00	3.57	J	1.00	5.00	2.17	J	1.00	5.00
Arsenic	12.7	--	0.500	2.50	15.5	--	0.500	2.50	6.11	--	0.500	2.50
Beryllium	<0.0500	U	0.0500	1.00	0.0650	V, J	0.0500	1.00	0.130	V, J	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	0.452	J	0.400	15.0	<0.400	U	0.400	15.0	<0.400	U	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	<1.50	U	1.50	3.00	0.0178	--	0.00150	0.00300	0.0252	--	0.00150	0.00300
Copper	3.34	J	1.00	5.00	1.44	J	1.00	5.00	<1.00	U	1.00	5.00
Lead	<0.500	U	0.500	2.50	<0.500	U	0.500	2.50	<0.500	U	0.500	2.50
Mercury	<0.150	U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200	<0.150	B,C,CQa,U	0.150	0.200
Nickel	1.18	J	0.250	5.00	1.42	V, J	0.250	5.00	1.59	V, J	0.250	5.00
Selenium	4.39	J	1.65	25.0	5.50	V, J	1.65	25.0	2.89	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	11.5	--	1.00	10.0	4.18	V, J	1.00	10.0	4.05	V, J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	0.312	--	0.02	0.05	6.07	--	0.20	0.50	7.81	--	0.20	0.50
Cyanide, Total	<0.0005	U	0.0005	0.02	<0.0005	U	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	<0.449	U	0.449	4.49	0.928	--	0.18	6.45	1.16	--	0.18	6.45
Carbon, Total Organic	3.00	--	0.07	0.50	5.40	--	0.07	0.50	7.00	--	0.07	0.50

Analyte	CC-TB-22-DUP (Water) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-DUP (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-DUP2 (Elutriate) Result µg/L	Qualifier	MDL	LRL
Metals												
Antimony	<1.00	U	1.00	5.00	2.88	J	1.00	5.00	2.48	J	1.00	5.00
Arsenic	12.5	--	0.500	2.50	4.80	--	0.500	2.50	9.84	--	0.500	2.50
Beryllium	<0.0500	U	0.0500	1.00	<0.0500	B, U	0.0500	1.00	0.104	V, J	0.0500	1.00
Cadmium	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00	<0.250	U	0.250	5.00
Chromium	0.500	J	0.400	15.0	<0.400	U	0.400	15.0	<0.400	U	0.400	15.0
Chromium (III)	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0	<1.90	U	1.90	18.0
Chromium (VI)	<1.50	U	1.50	3.00	0.0278	CQ	0.00150	0.00300	0.0219	CQ	0.00150	0.00300
Copper	2.50	J	1.00	5.00	2.44	J	1.00	5.00	<1.00	U	1.00	5.00
Lead	<0.500	U	0.500	2.50	<0.500	U	0.500	2.50	<0.500	U	0.500	2.50
Mercury	<0.150	U	0.150	0.200	0.167	C,CQ,V,J	0.150	0.200	0.156	C,CQ,V,J	0.150	0.200
Nickel	1.11	J	0.250	5.00	2.61	V, J	0.250	5.00	1.09	V, J	0.250	5.00
Selenium	2.52	J	1.65	25.0	3.07	V, J	1.65	25.0	3.90	V, J	1.65	25.0
Silver	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Thallium	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50	<0.150	U	0.150	2.50
Zinc	10.0	--	1.00	10.0	12.3	V	1.00	10.0	2.96	V, J	1.00	10.0
Others												
Analyte	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL	Result mg/L	Qualifier	MDL	LRL
Ammonia (as nitrogen)	0.446	--	0.02	0.05	3.05	--	0.10	0.25	6.86	--	0.20	0.50
Cyanide, Total	<0.0005	U	0.0005	0.02	**0.02**	J	0.0005	0.02	<0.0005	U	0.0005	0.02
Petroleum Hydrocarbons, Total	<0.448	U	0.448	4.48	1.17	--	0.18	6.45	1.16	--	0.18	6.45
Carbon, Total Organic	2.70	--	0.07	0.50	6.70	--	0.07	0.50	5.60	--	0.07	0.50

Bolded values exceed one or more of the screening thresholds (CMC, TWQS)

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL.

Qualifier definitions: B = Analyte was found in the associated method blank. C = Associated calibration QC is outside the established quality control criteria for accuracy. CQ = The analyte was detected in both sample and leach blank. CQa = The analyte was detected in the associated leach blank. J = Estimated value - The reported value is between the detection limit and reporting limit. R = The sample result was rejected. A rerun is being performed. U = Indicates that the compound was analyzed for but not detected. V = Analyte was detected in both sample and method blank.

Sources: Results from NWDLS; CMC values from EPA (2015); Texas surface water quality (acute) standards from Texas Commission on Environmental Quality (2018).

Compiled by: ANAMAR Environmental Consulting, Inc.

TABLE 11

Analytical Results for Pesticides, and Total PCBs in Site Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-05 (Water)				CC-TB-22-05-SUB (Elutriate)				CC-TB-22-05-SURF (Elutriate)				CC-TB-22-06-SUB (Elutriate)				CC-TB-22-06-SURF (Elutriate)				CC-TB-22-06A-SUB (Elutriate)				CC-TB-22-06A-SURF (Elutriate)				CC-TB-22-07-SUB (Elutriate)				CC-TB-22-07-SURF (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Aldrin	<0.00608	1.3	1.3	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Chlordane (technical)	0.00644	0.09	0.09	0.00606	P	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
α (cis)-Chlordane	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
γ (trans)-Chlordane	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDD	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDE	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDT	<0.00608	0.13	0.13	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Dieldrin	<0.00608	0.71	0.71	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan I	<0.00608	0.034	0.034	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan II	<0.00608	0.034	0.034	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan Sulfate	<0.00608	x	0.034	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin	<0.00608	0.037	0.037	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin Aldehyde	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin Ketone	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Heptachlor	0.00644	0.053	0.053	0.00606	P	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Heptachlor Epoxide	<0.00608	0.053	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
α-BHC	0.0317	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
β-BHC	0.0157	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	0.00721	--	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
δ-BHC	<0.00608	x	x	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
γ-BHC (Lindane)	<0.00608	0.16	0.16	<0.00596	U	0.00596	0.00596	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Toxaphene	<0.304	0.21	0.21	<0.298	U	0.298	0.298	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300
PCBs, Total	<0.00609	x	10	<0.00600	U	0.00600	0.120	<0.00600	U	0.00600	0.120	<0.00600	U	0.00600	0.120	<0.00600	U	0.00600	0.120	<0.00606	U	0.00606	0.121	<0.00601	U	0.00601	0.120	<0.00609	U	0.00609	0.122	<0.00610	U	0.00610	0.122	<0.00606	U	0.00606	0.121

TABLE 11 (*continued*)

Analytical Results for Pesticides, and Total PCBs in Site Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-07A-SUB (Elutriate)				CC-TB-22-07A-SURF (Elutriate)				CC-TB-22-07W-SUB (Elutriate)				CC-TB-22-07W-SURF (Elutriate)				CC-TB-22-08-SUB (Elutriate)				CC-TB-22-08-SURF (Elutriate)				CC-TB-22-08A-SUB (Elutriate)				CC-TB-22-08A-SURF (Elutriate)				CC-TB-22-09-SUB (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Aldrin	<0.00608	1.3	1.3	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Chlordane (technical)	0.00644	0.09	0.09	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
α (cis)-Chlordane	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
γ (trans)-Chlordane	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
p,p' (4,4')-DDD	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
p,p' (4,4')-DDE	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
p,p' (4,4')-DDT	<0.00608	0.13	0.13	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Dieldrin	<0.00608	0.71	0.71	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endosulfan I	<0.00608	0.034	0.034	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endosulfan II	<0.00608	0.034	0.034	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endosulfan Sulfate	<0.00608	x	0.034	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endrin	<0.00608	0.037	0.037	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endrin Aldehyde	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Endrin Ketone	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Heptachlor	0.00644	0.053	0.053	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Heptachlor Epoxide	<0.00608	0.053	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
α-BHC	0.0317	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	0.0178	P	0.00608	0.00608	<0.00604	U	0.00604	0.00604	0.0317	CQ	0.00602	0.00602
β-BHC	0.0157	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	0.00639	P	0.00600	0.00600	0.00873	--	0.00606	0.00606	<0.00598	U	0.00598	0.00598	0.0104	P	0.00604	0.00604	<0.00608	U	0.00608	0.00608	0.00972	P	0.00604	0.00604	<0.00602	U	0.00602	0.00602
δ-BHC	<0.00608	x	x	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
γ-BHC (Lindane)	<0.00608	0.16	0.16	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600	<0.00606	U	0.00606	0.00606	<0.00598	U	0.00598	0.00598	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00604	U	0.00604	0.00604	<0.00602	U	0.00602	0.00602
Toxaphene	<0.304	0.21	0.21	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300	<0.300	CQa, U	0.300	0.300	<0.303	CQa, U	0.303	0.303	<0.299	CQa, U	0.299	0.299	<0.302	CQa, U	0.302	0.302	<0.304	CQa, U	0.304	0.304	<0.302	CQa, U	0.302	0.302	<0.301	CQa, U	0.301	0.301
PCBs, Total	<0.00609	x	10	<0.00602	U	0.00602	0.120	<0.00602	U	0.00602	0.120	<0.00604	U	0.00604	0.121	<0.00604	U	0.00604	0.121	<0.00608	U	0.00608	0.122	<0.00607	U	0.00607	0.121	<0.00606	U	0.00606	0.121	<0.00608	U	0.00608	0.122	<0.00607	U	0.00607	0.121

TABLE 11 (*continued*)

Analytical Results for Pesticides, and Total PCBs in Site Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-09-SURF (Elutriate)				CC-TB-22-09A-SUB (Elutriate)				CC-TB-22-09A-SURF (Elutriate)				CC-TB-22-10 (Water)				CC-TB-22-10-SUB (Elutriate)				CC-TB-22-10-SURF (Elutriate)				CC-TB-22-DUP (Water)				CC-TB-22-DUP (Elutriate)				CC-TB-22-DUP2 (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Aldrin	<0.00608	1.3	1.3	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Chlordane (technical)	0.00644	0.09	0.09	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	0.00644	P	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
α (cis)-Chlordane	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
γ (trans)-Chlordane	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDD	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDE	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
p,p' (4,4')-DDT	<0.00608	0.13	0.13	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Dieldrin	<0.00608	0.71	0.71	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan I	<0.00608	0.034	0.034	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan II	<0.00608	0.034	0.034	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endosulfan Sulfate	<0.00608	x	0.034	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin	<0.00608	0.037	0.037	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin Aldehyde	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Endrin Ketone	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Heptachlor	0.00644	0.053	0.053	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	0.00644	P	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Heptachlor Epoxide	<0.00608	0.053	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
α-BHC	0.0317	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	0.0271	CQ	0.00604	0.00604	0.0155	CQ, P	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
β-BHC	0.0157	x	x	<0.00604	U	0.00604	0.00604	0.0109	--	0.00606	0.00606	0.0107	P	0.00605	0.00605	<0.00599	U	0.00599	0.00599	0.0139	--	0.00604	0.00604	0.0157	--	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
δ-BHC	<0.00608	x	x	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
γ-BHC (Lindane)	<0.00608	0.16	0.16	<0.00604	U	0.00604	0.00604	<0.00606	U	0.00606	0.00606	<0.00605	U	0.00605	0.00605	<0.00599	U	0.00599	0.00599	<0.00604	U	0.00604	0.00604	<0.00608	U	0.00608	0.00608	<0.00592	U	0.00592	0.00592	<0.00600	U	0.00600	0.00600	<0.00600	U	0.00600	0.00600
Toxaphene	<0.304	0.21	0.21	<0.302	CQa, U	0.302	0.302	<0.303	CQa, U	0.303	0.303	<0.303	CQa, U	0.303	0.303	<0.299	U	0.299	0.299	<0.302	CQa, U	0.302	0.302	<0.304	CQa, U	0.304	0.304	<0.296	U	0.296	0.296	<0.300	U	0.300	0.300	<0.300	U	0.300	0.300
PCBs, Total	<0.00609	x	10	<0.00597	U	0.00597	0.119	<0.00607	U	0.00607	0.121	<0.00609	U	0.00609	0.122	<0.00606	U	0.00606	0.121	<0.00604	U	0.00604	0.121	<0.00604	U	0.00604	0.121	<0.00600	U	0.00600	0.120	<0.00609	U	0.00609	0.122	<0.00605	U	0.00605	0.121

TABLE 12

Analytical Results for PAHs in Site Water and Elutriates Generated from Sediment

Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	CC-TB-22-05 (Water) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-05-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-05-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-06-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-06-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-06A-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-06A-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-07-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-07-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL
Acenaphthene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Acenaphthylene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Anthracene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Benzo(a)anthracene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Benzo(a)pyrene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Benzo(b&k)fluoranthene^{HPAH}	<0.562	x	x	<0.279	U	0.279	1.12	<0.561	U	0.561	1.12	<0.558	U	0.558	1.12	<0.562	U	0.562	1.12	<0.562	U	0.562	1.12	<0.561	U	0.561	1.12	<0.560	U	0.560	1.12	<0.558	U	0.558	1.12	<0.560	U	0.560	1.12
Benzo(g,h,i)perylene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Chrysene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Dibenzo(a,h)anthracene^{HPAH}	0.334	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Fluoranthene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Fluorene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Indeno(1,2,3-cd)pyrene^{HPAH}	0.404	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Naphthalene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Phenanthrene^{LPAH}	<0.281	x	7.7	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Pyrene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558	<0.281	U	0.281	0.562	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Total LPAHs	1.69	x	x	1.67				1.68				1.67				1.69				1.69				1.68				1.68				1.67				1.68			
Total HPAHs	2.97	x	x	2.51				2.80				2.79				2.81				2.81				2.80				2.80				2.79				2.80			
Total PAHs	4.65	x	x	4.19				4.48				4.46				4.50				4.50				4.48				4.48				4.46				4.48			

TABLE 12 (*continued*)

Analytical Results for PAHs in Site Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-07A-SUB (Elutriate)				CC-TB-22-07A-SURF (Elutriate)				CC-TB-22-07W-SUB (Elutriate)				CC-TB-22-07W-SURF (Elutriate)				CC-TB-22-08-SUB (Elutriate)				CC-TB-22-08-SURF (Elutriate)				CC-TB-22-08A-SUB (Elutriate)				CC-TB-22-08A-SURF (Elutriate)				CC-TB-22-09-SUB (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
Acenaphthene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Acenaphthylene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Anthracene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Benzo(a)anthracene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Benzo(a)pyrene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Benzo(b&k)fluoranthene^{HPAH}	<0.562	x	x	<0.558	U	0.558	1.12	<0.559	U	0.559	1.12	<0.562	U	0.562	1.12	<0.561	U	0.561	1.12	<0.557	U	0.557	1.11	<0.561	U	0.561	1.12	<0.560	U	0.560	1.12	<0.548	U	0.548	1.10	<0.560	U	0.560	1.12
Benzo(g,h,i)perylene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Chrysene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Dibenzo(a,h)anthracene^{HPAH}	0.334	x	x	<0.279	U	0.279	0.558	0.334	J	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Fluoranthene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Fluorene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Indeno(1,2,3-cd)pyrene^{HPAH}	0.404	x	x	<0.279	U	0.279	0.558	0.404	J	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Naphthalene^{LPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Phenanthrene^{LPAH}	<0.281	x	7.7	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Pyrene^{HPAH}	<0.281	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Total LPAHs	1.69	x	x	1.67				1.67				1.69				1.68				1.67				1.68				1.68				1.64				1.68			
Total HPAHs	2.97	x	x	2.79				2.97				2.81				2.80				2.78				2.80				2.80				2.74				2.80			
Total PAHs	4.65	x	x	4.46				4.65				4.50				4.48				4.45				4.48				4.48				4.38				4.48			

TABLE 12 (*continued*)

Analytical Results for PAHs in Site Water and Elutriates Generated from Sediment

Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	CC-TB-22-09-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-09A-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-09A-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-10 (Water) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-10-SUB (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-10-SURF (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-DUP (Water) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-DUP (Elutriate) Result µg/L	Qualifier	MDL	LRL	CC-TB-22-DUP2 (Elutriate) Result µg/L	Qualifier	MDL	LRL
Acenaphthene^{LPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Acenaphthylene^{LPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Anthracene^{LPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Benzo(a)anthracene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Benzo(a)pyrene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Benzo(b&k)fluoranthene^{HPAH}	<0.562	x	x	<0.553	U	0.553	1.11	<0.561	U	0.561	1.12	<0.560	U	0.560	1.12	<0.280	U	0.280	1.12	<0.548	U	0.548	1.10	<0.557	U	0.557	1.11	<0.280	U	0.280	1.12	<0.561	U	0.561	1.12	<0.561	U	0.561	1.12
Benzo(g,h,i)perylene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Chrysene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Dibenzo(a,h)anthracene^{HPAH}	0.334	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Fluoranthene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Fluorene^{LPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Indeno(1,2,3-cd)pyrene^{HPAH}	0.404	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Naphthalene^{LPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Phenanthrene^{LPAH}	<0.281	x	7.7	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Pyrene^{HPAH}	<0.281	x	x	<0.276	U	0.276	0.553	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Total LPAHs	1.69	x	x	1.66				1.68				1.68				1.68				1.64				1.67				1.68				1.68				1.68			
Total HPAHs	2.97	x	x	2.76				2.80				2.80				2.52				2.74				2.78				2.52				2.80				2.80			
Total PAHs	4.65	x	x	4.42				4.48				4.48				4.20				4.38				4.45				4.20				4.48				4.48			

ANAMAR Environmental Consulting, Inc.

TABLE 13

Analytical Results for SVOCs in Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-05 (Water)				CC-TB-22-05-SUB (Elutriate)				CC-TB-22-05-SURF (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
1,2-Dichlorobenzene (o-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
1,2-Diphenylhydrazine	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
1,3-Dichlorobenzene (m-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
1,4-Dichlorobenzene (p-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
2,4,6-Trichlorophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
2,4-Dichlorophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	0.561	<0.556	U	0.556	0.558
2,4-Dimethylphenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
2,4-Dinitrophenol	<4.49	x	x	<4.46	U	4.46	4.46	<4.49	U	4.49	4.49	<4.47	U	4.47	4.47
2,4-Dinitrotoluene (2,4-DNT)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
2,6-Dinitrotoluene (2,6-DNT)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
2-Chloronaphthalene	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
2-Chlorophenol	<3.87	x	x	<0.555	U	0.555	1.1	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
2-Nitrophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
3,3'-Dichlorobenzidine	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
4,6-Dinitro-2-methylphenol	<15.5	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
4-Bromophenyl phenyl ether (BDE-3)	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
4-Chloro-3-methylphenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
4-Chlorophenyl phenyl ether	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
4-Nitrophenol	<4.49	x	x	<4.46	U	4.46	4.46	<4.49	U	4.49	4.49	<4.47	U	4.47	4.47
Benzidine	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Bis(2-Chloroethoxy) methane	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Bis(2-Chloroethyl) ether	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Bis(2-ethylhexyl) phthalate	7.51	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Butyl benzyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Diethyl phthalate	<1.94	x	x	<0.279	U	0.279	0.56	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Dimethyl phthalate	<1.94	x	x	<0.279	U	0.279	0.56	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Di-n-butyl phthalate	1.04	x	x	1.04	V	0.279	0.558	0.838	CQg, V	0.280	0.561	0.905	CQg, V	0.279	0.558
Di-n-octyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Hexachlorobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Hexachlorobutadiene	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Hexachlorocyclopentadiene	<1.94	x	x	<0.558	U	0.558	1.12	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Hexachloroethane	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Isophorone	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Nitrobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
N-Nitrosodimethylamine	<1.94	x	x	<0.279	U	0.279	2.23	<0.280	U	0.280	2.24	<0.279	U	0.279	2.23
N-Nitrosodi-n-propylamine	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
N-Nitrosodiphenylamine	<1.94	x	x	<0.279	U	0.279	0.558	<0.280	U	0.280	0.561	<0.279	U	0.279	0.558
Pentachlorophenol	<3.87	13	15.1	<0.555	U	0.555	1.12	<0.559	U	0.559	1.12	<0.556	U	0.556	1.12
Phenol, Total	3.43	x	x	<0.555	U	0.555	1.12	1.41	CQg, V	0.559	1.12	1.25	CQg, V	0.556	1.12

	CC-TB-22-06-SUB (Elutriate)				CC-TB-22-06-SURF (Elutriate)				CC-TB-22-06A-SUB (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
1,2-Dichlorobenzene (o-Dichlorobenzene)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
1,2-Diphenylhydrazine	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
1,3-Dichlorobenzene (m-Dichlorobenzene)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
1,4-Dichlorobenzene (p-Dichlorobenzene)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
2,4,6-Trichlorophenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2,4-Dichlorophenol	<3.87	U	3.87	7.74	<0.559	U	0.559	0.562	<0.559	U	0.559	0.561
2,4-Dimethylphenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2,4-Dinitrophenol	<3.87	U	3.87	7.74	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49
2,4-Dinitrotoluene (2,4-DNT)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
2,6-Dinitrotoluene (2,6-DNT)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
2-Chloronaphthalene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
2-Chlorophenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2-Nitrophenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
3,3'-Dichlorobenzidine	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
4,6-Dinitro-2-methylphenol	<15.5	U	15.5	31.0	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
4-Bromophenyl phenyl ether (BDE-3)	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
4-Chloro-3-methylphenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
4-Chlorophenyl phenyl ether	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
4-Nitrophenol	<1.94	U	1.94	3.87	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49
Benzidine	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Bis(2-Chloroethoxy) methane	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Bis(2-Chloroethyl) ether	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Bis(2-ethylhexyl) phthalate	4.67	--	1.94	3.87	<0.281	U	0.281	0.562	1.75	--	0.280	0.561
Butyl benzyl phthalate	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Diethyl phthalate	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Dimethyl phthalate	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Di-n-butyl phthalate	<1.94	U	1.94	3.87	0.808	CQg, V	0.281	0.562	0.889	CQg, V	0.280	0.561
Di-n-octyl phthalate	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Hexachlorobenzene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Hexachlorobutadiene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Hexachlorocyclopentadiene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Hexachloroethane	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Isophorone	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Nitrobenzene	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
N-Nitrosodimethylamine	<1.94	U	1.94	3.87	<0.281	U	0.281	2.25	<0.280	U	0.280	2.24
N-Nitrosodi-n-propylamine	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
N-Nitrosodiphenylamine	<1.94	U	1.94	3.87	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561
Pentachlorophenol	<3.87	U	3.87	7.74	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
Phenol, Total	<3.87	U	3.87	7.74	1.10	CQg, V, [illegible]	0.559	1.12	1.31	CQg, V	0.559	1.12

	CC-TB-22-06A-SURF (Elutriate)				CC-TB-22-07-SUB (Elutriate)				CC-TB-22-07-SURF (Elutriate)			
Analyte	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
1,2-Dichlorobenzene (o-Dichlorobenzene)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
1,2-Diphenylhydrazine	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
1,3-Dichlorobenzene (m-Dichlorobenzene)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
1,4-Dichlorobenzene (p-Dichlorobenzene)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
2,4,6-Trichlorophenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
2,4-Dichlorophenol	<0.557	U	0.557	0.560	<0.556	U	0.556	0.558	<0.557	U	0.557	0.560
2,4-Dimethylphenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
2,4-Dinitrophenol	<4.48	U	4.48	4.48	<4.47	U	4.47	4.47	<4.48	U	4.48	4.48
2,4-Dinitrotoluene (2,4-DNT)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
2,6-Dinitrotoluene (2,6-DNT)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
2-Chloronaphthalene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
2-Chlorophenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
2-Nitrophenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
3,3'-Dichlorobenzidine	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
4,6-Dinitro-2-methylphenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
4-Bromophenyl phenyl ether (BDE-3)	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
4-Chloro-3-methylphenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
4-Chlorophenyl phenyl ether	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
4-Nitrophenol	<4.48	U	4.48	4.48	<4.47	U	4.47	4.47	<4.48	U	4.48	4.48
Benzidine	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Bis(2-Chloroethoxy) methane	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Bis(2-Chloroethyl) ether	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Bis(2-ethylhexyl) phthalate	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Butyl benzyl phthalate	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Diethyl phthalate	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Dimethyl phthalate	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Di-n-butyl phthalate	0.940	CQg, V	0.280	0.560	1.02	V, CQg	0.279	0.558	0.945	CQg, V	0.280	0.560
Di-n-octyl phthalate	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Hexachlorobenzene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Hexachlorobutadiene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Hexachlorocyclopentadiene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Hexachloroethane	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Isophorone	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Nitrobenzene	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
N-Nitrosodimethylamine	<0.280	U	0.280	2.24	<0.279	U	0.279	2.23	<0.280	U	0.280	2.24
N-Nitrosodi-n-propylamine	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
N-Nitrosodiphenylamine	<0.280	U	0.280	0.560	<0.279	U	0.279	0.558	<0.280	U	0.280	0.560
Pentachlorophenol	<0.557	U	0.557	1.12	<0.556	U	0.556	1.12	<0.557	U	0.557	1.12
Phenol, Total	1.25	CQg, V	0.557	1.12	1.25	CQg, V	0.556	1.12	1.34	CQg, V	0.557	1.12

TABLE 13 (*continued*)

Analytical Results for SVOCs in Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-07A-SUB (Elutriate)				CC-TB-22-07A-SURF (Elutriate)				CC-TB-22-07W-SUB (Elutriate)				CC-TB-22-07W-SURF (Elutriate)				CC-TB-22-08-SUB (Elutriate)				CC-TB-22-08-SURF (Elutriate)				CC-TB-22-08A-SUB (Elutriate)				CC-TB-22-08A-SURF (Elutriate)				CC-TB-22-09-SUB (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/kg	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
1,2-Dichlorobenzene (o-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
1,2-Diphenylhydrazine	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
1,3-Dichlorobenzene (m-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
1,4-Dichlorobenzene (p-Dichlorobenzene)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
2,4,6-Trichlorophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
2,4-Dichlorophenol	<3.87	x	x	<0.555	U	0.555	0.558	<0.557	U	0.557	0.559	<0.559	U	0.559	0.562	<0.559	U	0.559	0.561	<0.554	U	0.554	0.557	<0.559	U	0.559	0.561	<0.557	U	0.557	0.560	<0.546	U	0.546	0.548	<0.558	U	0.558	0.560
2,4-Dimethylphenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
2,4-Dinitrophenol	<4.49	x	x	<4.46	U	4.46	4.46	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49	<4.45	U	4.45	4.45	<4.49	U	4.49	4.49	<4.48	U	4.48	4.48	<4.39	U	4.39	4.39	<4.48	U	4.48	4.48
2,4-Dinitrotoluene (2,4-DNT)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
2,6-Dinitrotoluene (2,6-DNT)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
2-Chloronaphthalene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
2-Chlorophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
2-Nitrophenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
3,3'-Dichlorobenzidine	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
4,6-Dinitro-2-methylphenol	<15.5	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
4-Bromophenyl phenyl ether (BDE-3)	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
4-Chloro-3-methylphenol	<3.87	x	x	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
4-Chlorophenyl phenyl ether	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
4-Nitrophenol	<4.49	x	x	<4.46	U	4.46	4.46	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49	<4.45	U	4.45	4.45	<4.49	U	4.49	4.49	<4.48	U	4.48	4.48	<4.39	U	4.39	4.39	<4.48	U	4.48	4.48
Benzidine	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Bis(2-Chloroethoxy) methane	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Bis(2-Chloroethyl) ether	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	CQ, U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	CQ, U	0.278	0.557	<0.280	CQ, U	0.280	0.561	<0.280	CQ, U	0.280	0.560	<0.274	CQ, U	0.274	0.548	<0.280	CQ, U	0.280	0.560
Bis(2-ethylhexyl) phthalate	7.51	x	x	<0.279	U	0.279	0.558	7.51	--	0.279	0.559	<0.281	CQf, U	0.281	0.562	<0.280	CQf, U	0.280	0.561	<0.278	CQf, U	0.278	0.557	<0.280	CQf, U	0.280	0.561	<0.280	CQf, U	0.280	0.560	<0.274	CQf, U	0.274	0.548	<0.280	CQf, U	0.280	0.560
Butyl benzyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Diethyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	B, U	0.281	0.562	<0.280	B, U	0.280	0.561	<0.278	B, U	0.278	0.557	<0.280	B, U	0.280	0.561	<0.280	B, U	0.280	0.560	<0.274	B, U	0.274	0.548	<0.280	B, U	0.280	0.560
Dimethyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Di-n-butyl phthalate	1.02	x	x	0.754	CQg, V	0.279	0.558	0.795	CQg, V	0.279	0.559	0.705	CQg, V	0.281	0.562	0.767	CQg, V	0.280	0.561	0.828	CQg, V	0.278	0.557	0.688	CQg, V	0.280	0.561	0.816	CQg, V	0.280	0.560	0.920	CQg, V	0.274	0.548	0.795	CQg, V	0.280	0.560
Di-n-octyl phthalate	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Hexachlorobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Hexachlorobutadiene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Hexachlorocyclopentadiene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Hexachloroethane	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Isophorone	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Nitrobenzene	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
N-Nitrosodimethylamine	<1.94	x	x	<0.279	U	0.279	2.23	<0.279	U	0.279	2.24	<0.281	U	0.281	2.25	<0.280	U	0.280	2.24	<0.278	U	0.278	2.23	<0.280	U	0.280	2.24	<0.280	U	0.280	2.24	<0.274	U	0.274	2.19	<0.280	U	0.280	2.24
N-Nitrosodi-n-propylamine	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
N-Nitrosodiphenylamine	<1.94	x	x	<0.279	U	0.279	0.558	<0.279	U	0.279	0.559	<0.281	U	0.281	0.562	<0.280	U	0.280	0.561	<0.278	U	0.278	0.557	<0.280	U	0.280	0.561	<0.280	U	0.280	0.560	<0.274	U	0.274	0.548	<0.280	U	0.280	0.560
Pentachlorophenol	<3.87	13	15.1	<0.555	U	0.555	1.12	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12	<0.554	U	0.554	1.11	<0.559	U	0.559	1.12	<0.557	U	0.557	1.12	<0.546	U	0.546	1.10	<0.558	U	0.558	1.12
Phenol, Total	3.43	x	x	1.31	CQg, V	0.555	1.12	1.29	CQg, V	0.557	1.12	1.04	CQg, V,	0.559	1.12	0.901	CQg, V,	0.559	1.12	0.921	CQg, V,	0.554	1.11	1.18	CQg, V	0.559	1.12	0.983	CQg, V,	0.557	1.12	0.995	CQg, V,	0.546	1.10	0.979	CQg, V,	0.558	1.12

TABLE 13 (*continued*)
Analytical Results for SVOCs in Water and Elutriates Generated from Sediment

			Sample ID:	CC-TB-22-09-SURF (Elutriate)				CC-TB-22-09A-SUB (Elutriate)				CC-TB-22-09A-SURF (Elutriate)				CC-TB-22-10 (Water)				CC-TB-22-10-SUB (Elutriate)				CC-TB-22-10-SURF (Elutriate)				CC-TB-22-DUP (Water)				CC-TB-22-DUP (Elutriate)				CC-TB-22-DUP2 (Elutriate)			
Analyte	Maximum Conc. µg/L	CMC µg/L	TWQS Acute µg/L	Result µg/kg	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL	Result µg/L	Qualifier	MDL	LRL
1,2,4-Trichlorobenzene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
1,2-Dichlorobenzene (o-Dichlorobenzene)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
1,2-Diphenylhydrazine	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
1,3-Dichlorobenzene (m-Dichlorobenzene)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
1,4-Dichlorobenzene (p-Dichlorobenzene)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
2,4,6-Trichlorophenol	<3.87	x	x	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2,4-Dichlorophenol	<3.87	x	x	<0.551	U	0.551	0.553	<3.10	U	3.10	6.19	<0.557	U	0.557	0.560	<0.559	U	0.559	1.12	<0.546	U	0.546	0.548	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	0.561	<0.559	U	0.559	0.561
2,4-Dimethylphenol	<3.87	x	x	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2,4-Dinitrophenol	<4.49	x	x	<4.43	U	4.43	4.43	<3.10	U	3.10	6.19	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.39	U	4.39	4.39	<4.46	U	4.46	4.46	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49
2,4-Dinitrotoluene (2,4-DNT)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
2,6-Dinitrotoluene (2,6-DNT)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
2-Chloronaphthalene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
2-Chlorophenol	<3.87	x	x	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
2-Nitrophenol	<3.87	x	x	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
3,3'-Dichlorobenzidine	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
4,6-Dinitro-2-methylphenol	<15.5	x	x	<0.551	U	0.551	1.11	<12.4	U	12.4	24.8	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
4-Bromophenyl phenyl ether (BDE-3)	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
4-Chloro-3-methylphenol	<3.87	x	x	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
4-Chlorophenyl phenyl ether	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
4-Nitrophenol	<4.49	x	x	<4.43	U	4.43	4.43	<1.55	U	1.55	3.10	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.39	U	4.39	4.39	<4.46	U	4.46	4.46	<4.48	U	4.48	4.48	<4.49	U	4.49	4.49	<4.49	U	4.49	4.49
Benzidine	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Bis(2-Chloroethoxy) methane	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Bis(2-Chloroethyl) ether	<1.94	x	x	<0.276	CQ, U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	CQ, U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	CQ, U	0.274	0.548	<0.278	CQ, U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Bis(2-ethylhexyl) phthalate	7.51	x	x	<0.276	CQf, U	0.276	0.553	2.47	J	1.55	3.10	<0.280	CQf, U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	CQf, U	0.274	0.548	<0.278	CQf, U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	0.579	--	0.280	0.561
Butyl benzyl phthalate	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Diethyl phthalate	<1.94	x	x	<0.276	B, U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	B, U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	B, U	0.274	0.548	<0.278	B, U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Dimethyl phthalate	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Di-n-butyl phthalate	1.02	x	x	0.757	CQg, V	0.276	0.553	<1.55	U	1.55	3.10	0.744	CQg, V	0.280	0.560	1.07	V	0.280	0.561	0.751	CQg, V	0.274	0.548	0.705	CQg, V	0.278	0.557	0.909	V	0.280	0.560	0.860	CQg, V	0.280	0.561	0.785	CQg, V	0.280	0.561
Di-n-octyl phthalate	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Hexachlorobenzene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Hexachlorobutadiene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Hexachlorocyclopentadiene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.561	U	0.561	1.12	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.560	U	0.560	1.12	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Hexachloroethane	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Isophorone	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Nitrobenzene	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
N-Nitrosodimethylamine	<1.94	x	x	<0.276	U	0.276	2.21	<1.55	U	1.55	3.10	<0.280	U	0.280	2.24	<0.280	U	0.280	2.25	<0.274	U	0.274	2.19	<0.278	U	0.278	2.23	<0.280	U	0.280	2.24	<0.280	U	0.280	2.24	<0.280	U	0.280	2.24
N-Nitrosodi-n-propylamine	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
N-Nitrosodiphenylamine	<1.94	x	x	<0.276	U	0.276	0.553	<1.55	U	1.55	3.10	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.274	U	0.274	0.548	<0.278	U	0.278	0.557	<0.280	U	0.280	0.560	<0.280	U	0.280	0.561	<0.280	U	0.280	0.561
Pentachlorophenol	<3.87	13	15.1	<0.551	U	0.551	1.11	<3.10	U	3.10	6.19	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.546	U	0.546	1.10	<0.555	U	0.555	1.11	<0.557	U	0.557	1.12	<0.559	U	0.559	1.12	<0.559	U	0.559	1.12
Phenol, Total	3.43	x	x	1.05	CQg, V,	0.551	1.11	<3.10	U	3.10	6.19	0.899	CQg, V,	0.557	1.12	<0.559	U	0.559	1.12	0.815	CQg, V,	0.546	1.10	0.867	CQg, V,	0.555	1.11	<0.557	U	0.557	1.12	3.43	CQg, V	0.559	1.12	1.43	CQg, V	0.559	1.12

< #.## = The analyte was not detected (ND) at or above the MDL. The value indicates the MDL.
Qualifier definitions: V = Analyte was both detected in the sample and method blank. J = The value is an estimated value. U = Indicates that the compound was analyzed for but not detected. B = Analyte was found in the associated method blank. CQg = Analyte was detected in the sample and associated leach blank. CQf = Analyte was deetcted in the associated leach blank. CQ = CCV out of control high, no hit in sample, data unaffected.

Sources: Results from NWDLS; CMC values from EPA (2015); Texas surface water quality (acute) standards from Texas Commission on Environmental Quality (2018).
Compiled by: ANAMAR Environmental Consulting, Inc.

Attachment C
Laboratory Analyses QA/QC Reports and Chain of Custody Forms

130 S. Trade Center Parkway, Conroe TX 77385
Tel: (936) 321-6060
Email: lab@nwdls.com
www. NWDLS.com
TCEQ T104704238-22-36
TCEQ-TOX T104704202-21-16

July 13, 2022

LAB REPORT

Paul Berman
Anamar Environmental Consulting, Inc
2106 NW 67th Place, Ste. 5
Gainseville, FL 32653

Report ID: 20220713143550MM

RE: Corpus Christi 2022

The following test results meet all NELAP requirements for analytes for which certification is available. Any deviations from our quality system will be noted in the case narrative. All analyses performed by North Water District Laboratory Services, Inc. unless noted.

For questions regarding this report, contact Monica Martin at 936-321-6060.

Sincerely,

Monica O. Martin
Chief Administrative Officer

130 S. Trade Center Parkway, Conroe TX 77385
Tel: (936) 321-6060
Email: lab@nwdls.com
www. NWDLS.com
TCEQ T104704238-22-36
TCEQ-TOX T104704202-21-16

Anamar Environmental Consulting, Inc	Project: Corpus Christi 2022	
2106 NW 67th Place, Ste. 5	Project Number:	**Reported:**
Gainseville, FL 32653	Project Manager: Paul Berman	07/13/2022 14:35

Work Order Case Narrative

A total of 54 samples were collected on:

Laboratory ID	Sample Name	Sample Date
22D3303-01	CC-TB-22-EQ BLK	04/21/2022 15:45
22D3303-02	CC-TB-22-EQ BLK2	04/19/2022 00:00
22D3303-03	CC-TB-22-05-W	04/21/2022 13:00
22D3303-04	CC-TB-22-10-W	04/21/2022 13:45
22D3303-05	CC-TB-22-DUP-W	04/21/2022 13:15
22D3303-06	CC-TB-22-05-SUB-E	04/25/2022 12:50
22D3303-07	CC-TB-22-05-SURF-E	04/25/2022 12:45
22D3303-08	CC-TB-22-06-SUB-E	04/27/2022 08:00
22D3303-09	CC-TB-22-06-SURF-E	04/27/2022 08:00
22D3303-10	CC-TB-22-06A-SUB-E	04/27/2022 10:15
22D3303-11	CC-TB-22-06A-SURF-E	04/27/2022 10:15
22D3303-12	CC-TB-22-07-SUB-E	04/26/2022 12:40
22D3303-13	CC-TB-22-07-SURF-E	04/26/2022 12:40
22D3303-14	CC-TB-22-07A-SUB-E	04/26/2022 11:00
22D3303-15	CC-TB-22-07A-SURF-E	04/26/2022 11:00
22D3303-16	CC-TB-22-08-SUB-E	04/26/2022 10:10
22D3303-17	CC-TB-22-08-SURF-E	04/26/2022 10:10
22D3303-18	CC-TB-22-08A-SUB-E	04/26/2022 08:15
22D3303-19	CC-TB-22-08A-SURF-E	04/26/2022 08:45
22D3303-20	CC-TB-22-09-SUB-E	04/25/2022 09:45
22D3303-21	CC-TB-22-09-SURF-E	04/25/2022 09:45
22D3303-22	CC-TB-22-09A-SUB-E	04/25/2022 08:45
22D3303-23	CC-TB-22-09A-SURF-E	04/25/2022 08:45
22D3303-24	CC-TB-22-10-SUB-E	04/25/2022 07:45
22D3303-25	CC-TB-22-10-SURF-E	04/25/2022 07:45
22D3303-26	CC-TB-22-DUP-E	04/26/2022 08:15
22D3303-27	CC-TB-22-DUP2-E	04/26/2022 08:15
22D3303-28	CC-TB-22-05-SUB-S	04/25/2022 12:45
22D3303-29	CC-TB-22-05-SURF-S	04/25/2022 12:50
22D3303-30	CC-TB-22-06-SUB-S	04/27/2022 08:00
22D3303-31	CC-TB-22-06-SURF-S	04/27/2022 08:00
22D3303-32	CC-TB-22-06A-SUB-S	04/27/2022 10:15
22D3303-33	CC-TB-22-06A-SURF-S	04/27/2022 10:15
22D3303-34	CC-TB-22-07-SUB-S	04/26/2022 12:40
22D3303-35	CC-TB-22-07-SURF-S	04/26/2022 12:40
22D3303-36	CC-TB-22-07A-SUB-S	04/26/2022 11:00
22D3303-37	CC-TB-22-07A-SURF-S	04/26/2022 11:00
22D3303-38	CC-TB-22-08-SUB-S	04/26/2022 10:10
22D3303-39	CC-TB-22-08-SURF-S	04/26/2022 10:10
22D3303-40	CC-TB-22-08A-SUB-S	04/26/2022 08:15
22D3303-41	CC-TB-22-08A-SURF-S	04/26/2022 08:15
22D3303-42	CC-TB-22-09-SUB-S	04/26/2022 09:45
22D3303-43	CC-TB-22-09-SURF-S	04/26/2022 09:45
22D3303-44	CC-TB-22-09A-SUB-S	04/26/2022 08:45
22D3303-45	CC-TB-22-09A-SURF-S	04/26/2022 08:45
22D3303-46	CC-TB-22-10-SUB-S	04/26/2022 07:45

130 S. Trade Center Parkway, Conroe TX 77385
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Email: lab@nwdls.com
www. NWDLS.com
TCEQ T104704238-22-36
TCEQ-TOX T104704202-21-16

Anamar Environmental Consulting, Inc	Project: Corpus Christi 2022	
2106 NW 67th Place, Ste. 5	Project Number:	**Reported:**
Gainseville, FL 32653	Project Manager: Paul Berman	07/13/2022 14:35

22D3303-47	CC-TB-22-10-SURF-S	04/26/2022 07:45
22D3303-48	CC-TB-22-DUP-S	04/26/2022 08:15
22D3303-49	CC-TB-22-DUP2-S	04/26/2022 08:15
22D3303-50	CC-TB-22-07W-W	04/21/2022 11:45
22D3303-51	CC-TB-22-07W-SUB-E	04/27/2022 11:30
22D3303-52	CC-TB-22-07W-SURF-E	04/27/2022 11:30
22D3303-53	CC-TB-22-07W-SUB-S	04/27/2022 11:30
22D3303-54	CC-TB-22-07W-SURF-S	04/27/2022 11:30

Samples were received and accepted at NWDLS on 04/22/2022 09:00 - 04/28/2022 10:45. Any receiving discrepancies are recorded and stored in NWDLS' database. The samples received a Work Order of 22D3303. The lab sample IDs, client sample IDs, and dates of collection can be found at the top of each result page.

NWDLS provided their lowest detection limit for all requested analyses. Note that detection and reporting limits are adjusted to account for sample specific parameters.

Any QC that did not meet the laboratory specified control limits was flagged and reported with qualifiers. For additional information, please refer to the included quality control data pages.

CC-TB-22-09-SURF Elutriate, 22D3303-21, was inadvertently dropped during the leaching process. No additional site water was available thus synthetic lab water was used with the station sediment to prepare a new leachate for analysis.

The elutriate samples for TPH analysis were prepared and extracted by NWDLS; however, to avoid missed holding times for analysis, the extracts were subcontracted to another NELAP lab for analsyis as reflected in the Sample Results section of the deliverables.

Laboratory Analyses, QA/QC Reports and Chain of Custody Forms not included for concision

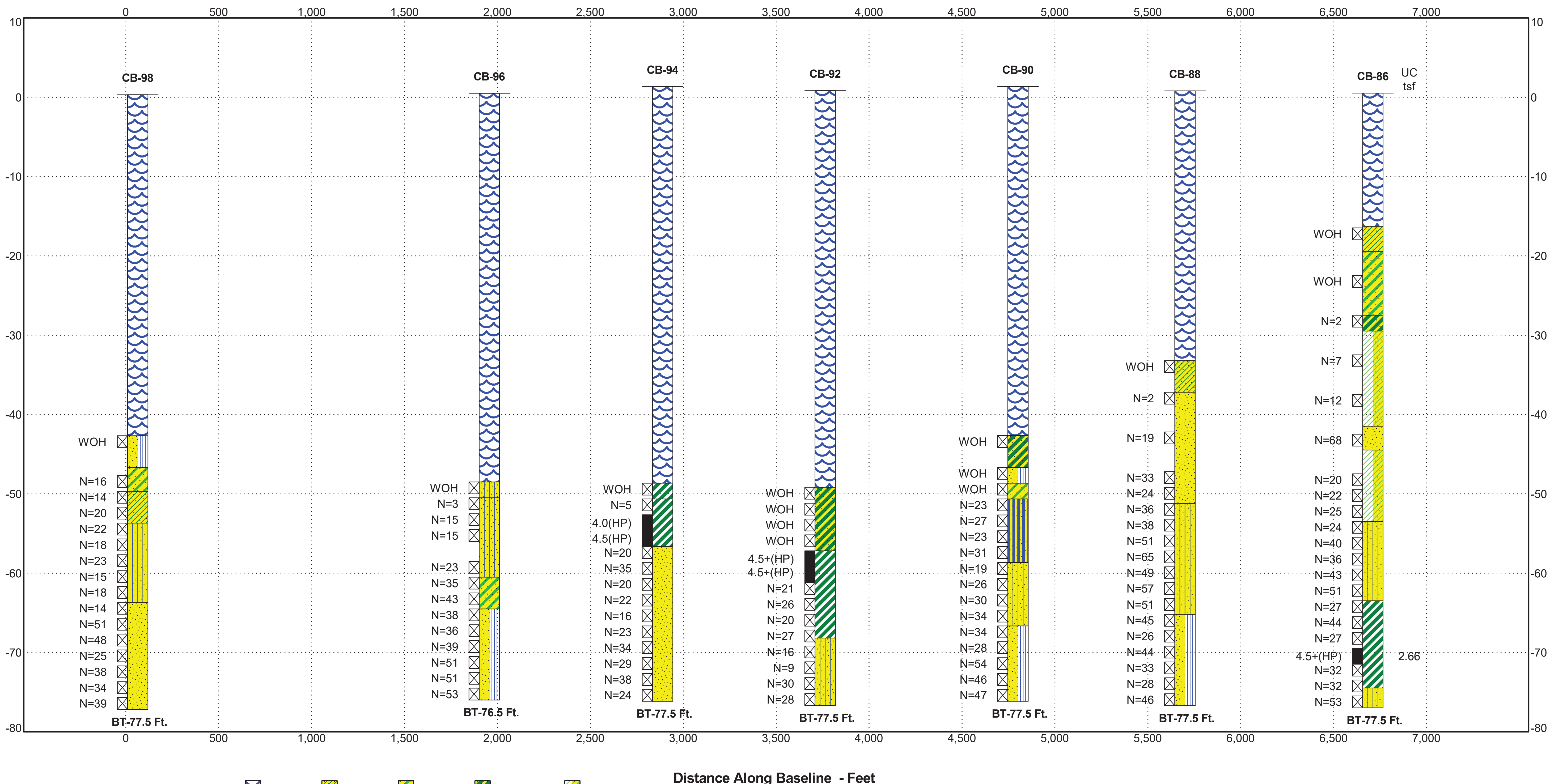
Laboratory Analyses are available upon request

Attachment D
Electronic Data Deliverable (EDD) Raw Laboratory Results (Provided Electronically)

Electronic Data Deliverable not included for concision

EDD tables are available upon request

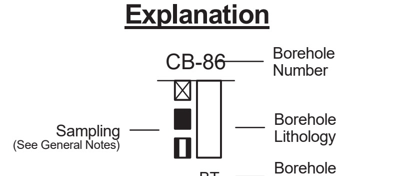
Attachment E
Geotechnical Data Report



Water 1 | Sandy Lean Clay | Clayey Sand | Sandy Fat Clay | Lean Clay with Sand

Poorly-graded Sand | Silty Sand | Fat Clay | Poorly-graded Sand with Silt | Sandy Silt

Explanation



NOTES:

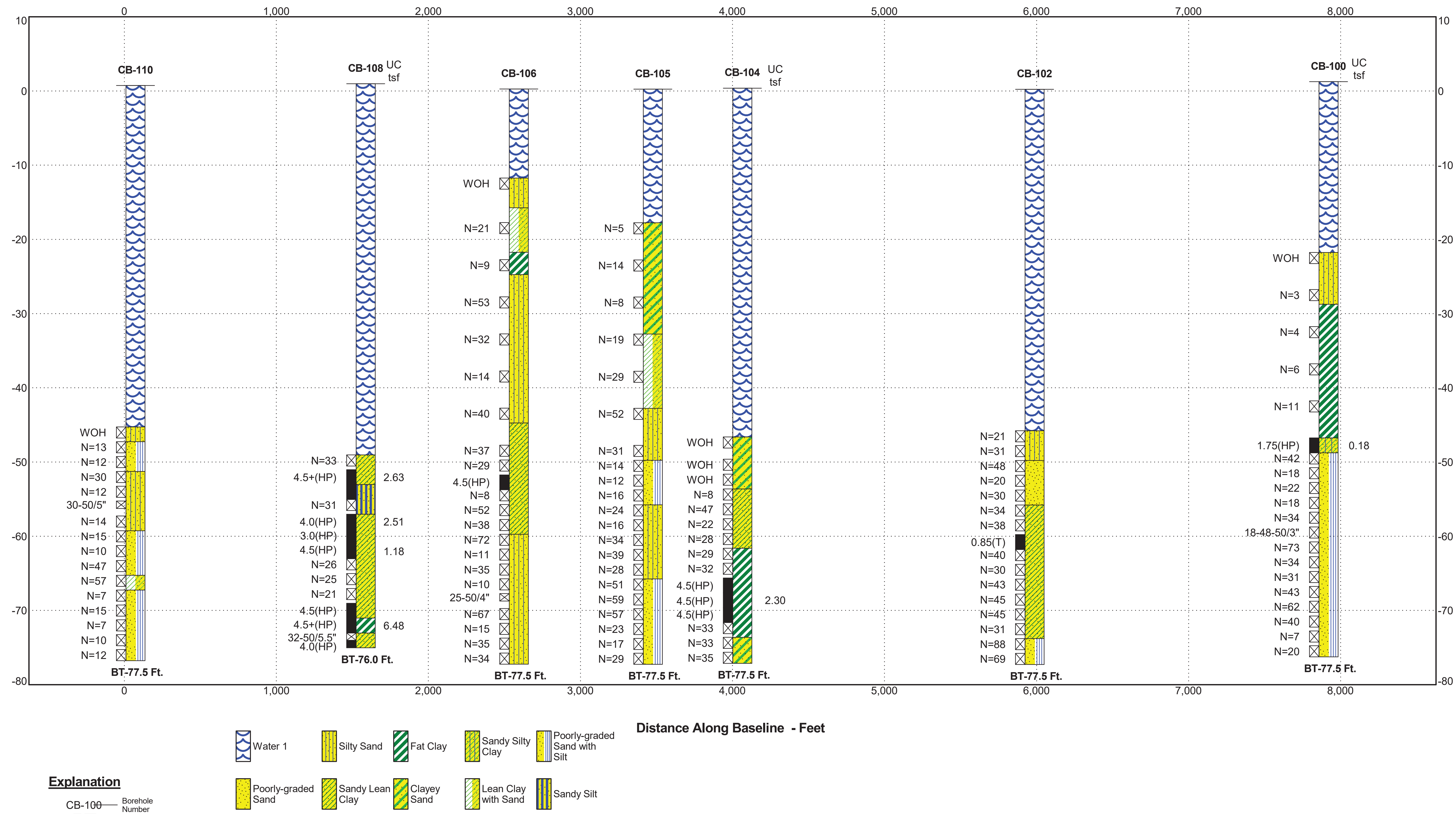
See Exploration Plan for Boring Location.
See General Notes in Supporting Information for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
BT - Boring Termination
N - Standard Peneration Test Resistance (blows/ft.)
WOH - Weight of Hammer
UC - Unconfined Compressive Strength

Project No.: CD20P074	
Date: 10/8/2020	
Scale: NTS	

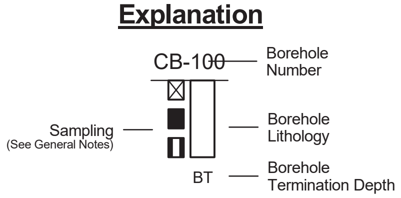
Terracon
3606 Wow Rd
Corpus Christi, TX

SUBSURFACE PROFILE

NORTH SIDE (CB-86 Through CB-124)
PCCA INNER HARBOR GEOTECHNICAL INVESTIGATION
INNER HARBOR CHANNEL BORINGS
CORPUS CHRISTI, TEXAS



Explanation



NOTES:

See Exploration Plan for boring locations.
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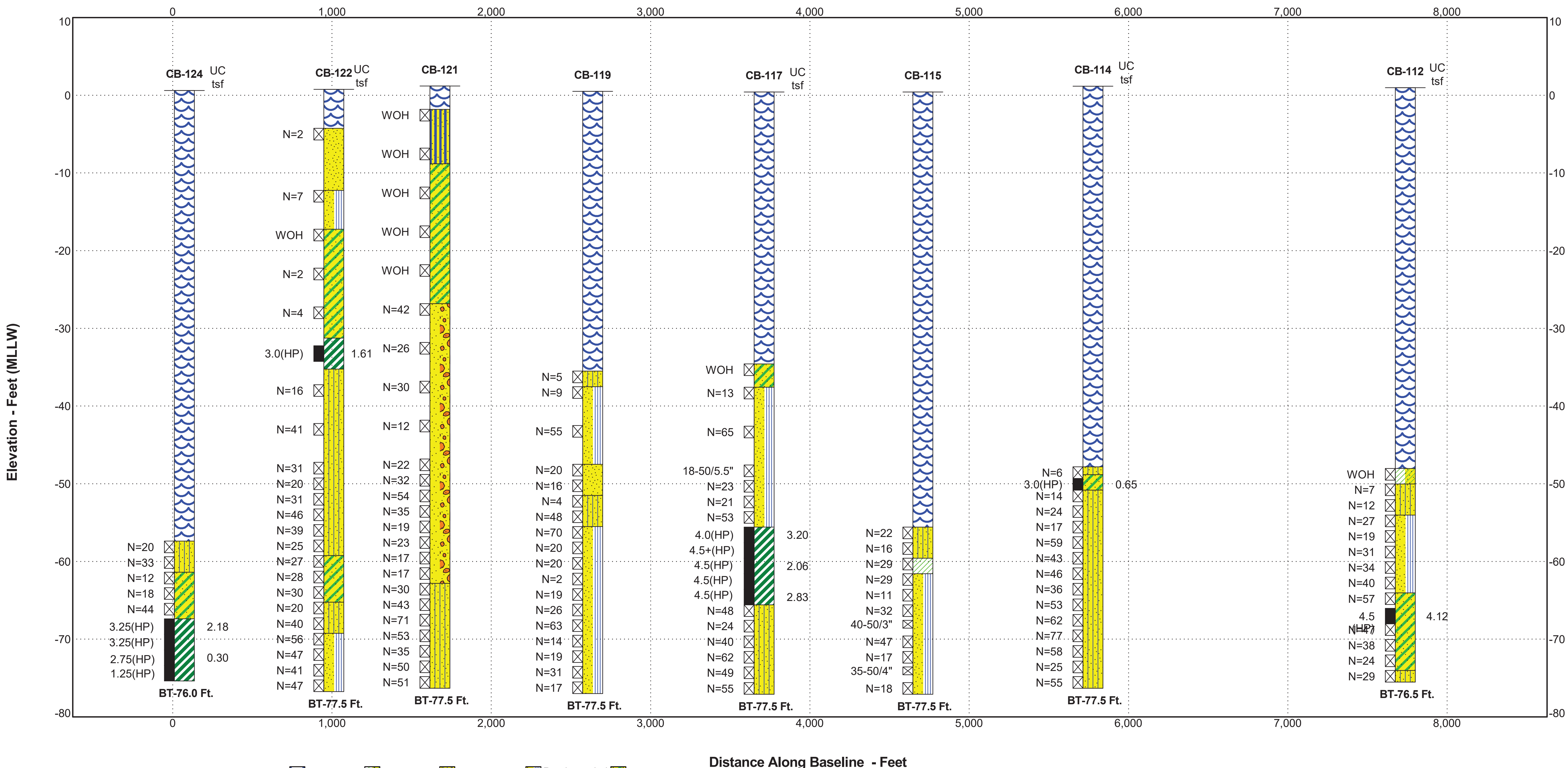
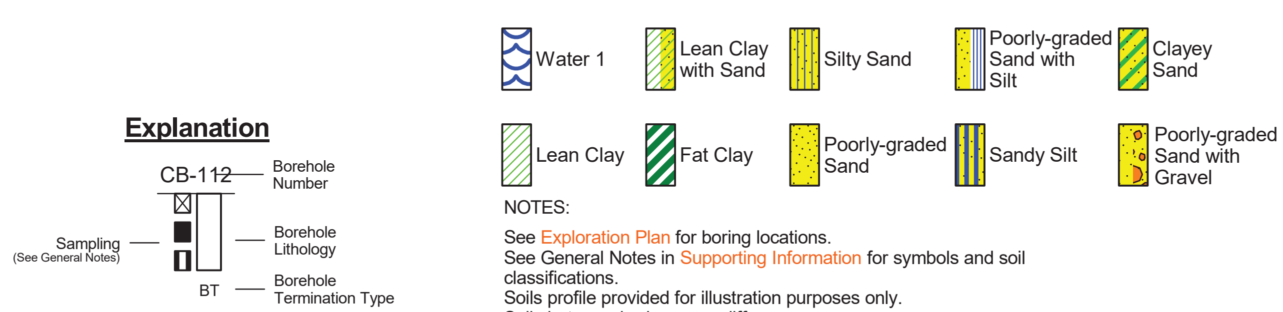
Project No.: CD20P074	Terracon	**SUBSURFACE PROFILE**	
Date: 10/8/2020		NORTH SIDE (CB-86 Through CB-124) PCCA INNER HARBOR GEOTECHNICAL INVESTIGATION INNER HARBOR CHANNEL BORINGS CORPUS CHRISTI, TEXAS	
Scale: NTS	3606 Wow Rd Corpus Christi, TX		





NOTES:

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See General Notes in Supporting Information for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
BT - Boring Termination
N - Standard Peneration Test Resistance (blows/ft.)
WOH - Weight of Hammer
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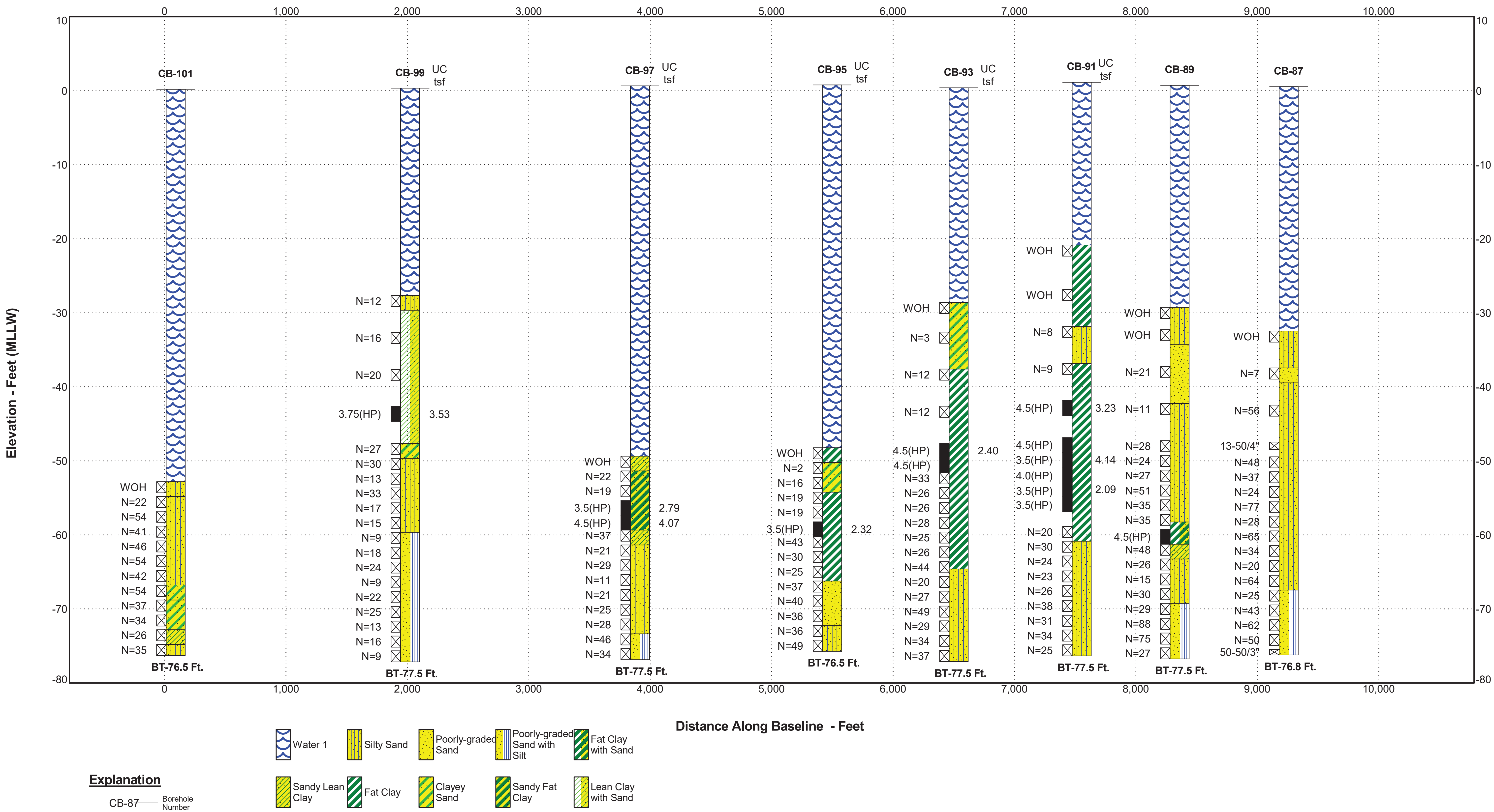
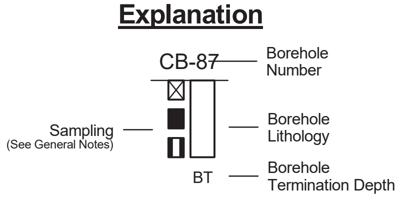
Project No.: CD20P074	Terracon 3606 Wow Rd Corpus Christi, TX	**SUBSURFACE PROFILE**
Date: 10/8/2020		NORTH SIDE (CB-86 Through CB-124) PCCA INNER HARBOR GEOTECHNICAL INVESTIGATION INNER HARBOR CHANNEL BORINGS CORPUS CHRISTI, TEXAS
Scale: NTS		



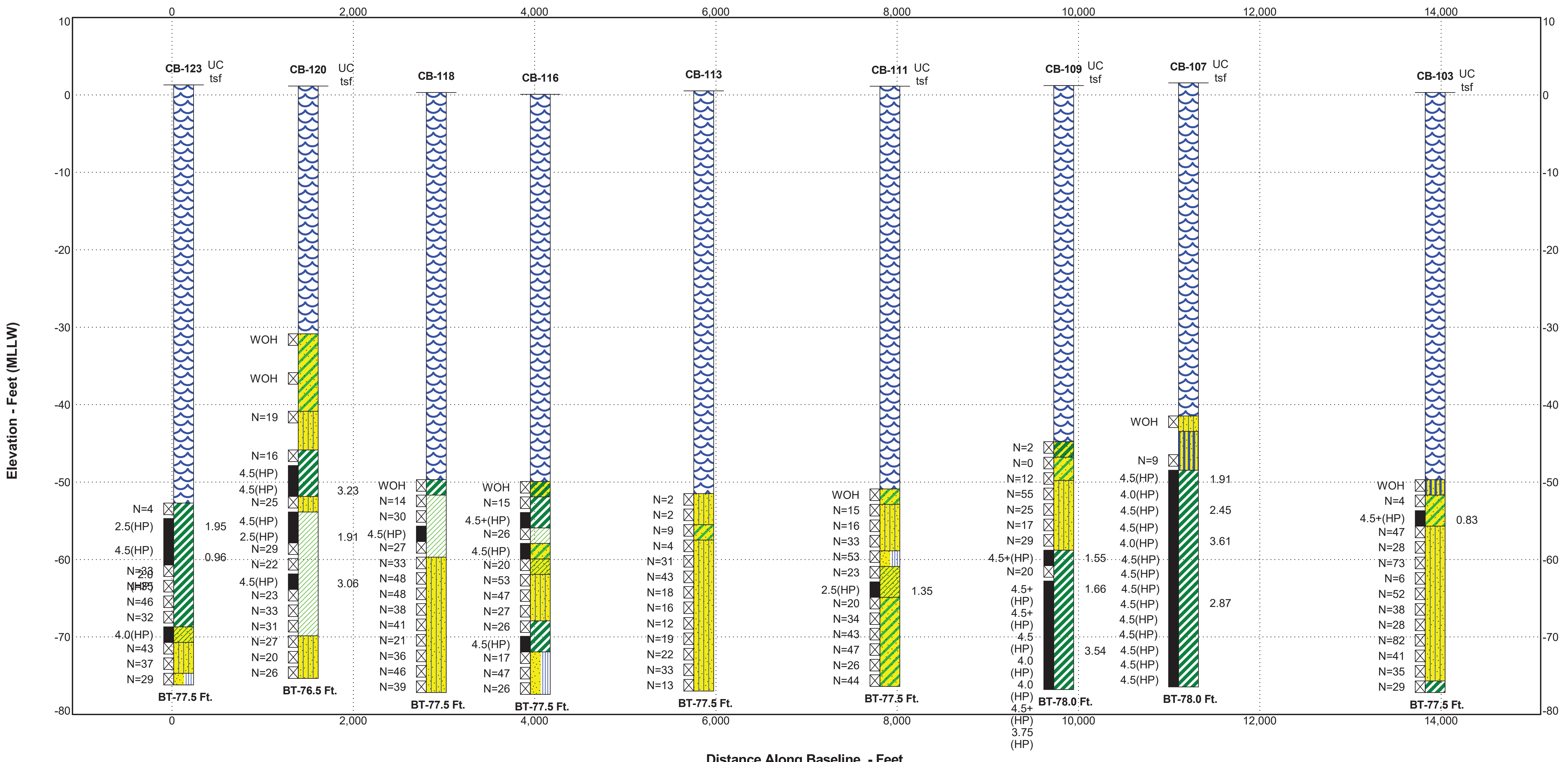
Explanation



NOTES:

See Exploration Plan for boring locations.
See General Notes in Supporting Information for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
BT - Boring Termination
N - Standard Peneration Test Resistance (blows/ft.)
WOH - Weight of Hammer
UC - Unconfined Compressive Strength

Project No.: CD20P074	Terracon 3606 Wow Rd Corpus Christi, TX	**SUBSURFACE PROFILE**
Date: 10/8/2020		SOUTH SIDE (CB-86 Through CB-124) PCCA INNER HARBOR GEOTECHNICAL INVESTIGATION INNER HARBOR CHANNEL BORINGS CORPUS CHRISTI, TEXAS
Scale: NTS		



Water 1 | Sandy Silt | Clayey Sand | Silty Sand | Fat Clay

Sandy Fat Clay | Poorly-graded Sand with Silt | Sandy Lean Clay | Lean Clay

Explanation

CB-103 — Borehole Number

Sampling (See General Notes) — Borehole Lithology

BT — Borehole Termination Depth

NOTES:

See Exploration Plan for boring locations.
See General Notes in Supporting Information for symbols and soil classifications.
Soils profile provided for illustration purposes only.
Soils between borings may differ
BT - Boring Termination
N - Standard Peneration Test Resistance (blows/ft.)
WOH - Weight of Hammer
UC - Unconfined Compressive Strength

Project No.: CD20P074

Date: 10/8/2020

Scale: NTS

Terracon
3606 Wow Rd
Corpus Christi, TX

SUBSURFACE PROFILE

SOUTH SIDE (CB-86 Through CB-124)
PCCA INNER HARBOR GEOTECHNICAL INVESTIGATION
INNER HARBOR CHANNEL BORINGS
CORPUS CHRISTI, TEXAS

INDEX OF DRAWINGS

DWG. NO.	TITLE
O	COVER SHEET
C-00	INDEX OF DRAWINGS
C-01	LOCATION PLAN
	ENTRANCE CHANNEL TO VIOLA TURNING BASIN
C-1	DREDGING PLAN= STA. 1460+00 TO STA. 1561+57.5734
C-2	DREDGING PLAN= STA. 1350+00 TO STA. 1460+00
C-3	DREDGING PLAN= STA. 1240+00 TO STA. 1350+00
C-4	DREDGING PLAN= STA. 1140+00 TO STA. 1240+00
C-5	DREDGING PLAN= STA. 1030+00 TO STA. 1140+00
C-6	DREDGING PLAN= STA. 930+00 TO STA. 1030+00
C-7	DREDGING PLAN= STA. 830+00 TO STA. 930+00
C-8	DREDGING PLAN= STA. 720+00 TO STA. 830+00
C-9	DREDGING PLAN= STA. 610+00 TO STA. 720+00
C-10	DREDGING PLAN=STA.500+00 TO STA.610+00 & STA.70+00
C-11	DREDGING PLAN= STA. 390+00 TO STA. 500+00
C-12	DREDGING PLAN= STA. 280+00 TO STA. 390+00
C-13	DREDGING PLAN= STA. 170+00 TO STA. 280+00
C-14	DREDGING PLAN= STA. 60+00 TO STA. 170+00
C-15	DREDGING PLAN= STA. +30+00 TO STA. 60+00
C-16	DREDGING PLAN= STA. +140+00 TO STA. +30+00
C-17	DREDGING PLAN= STA. +240+00 TO STA. +140+00
C-18	DREDGING PLAN= STA. +240+00 TO STA. +310+00
	PROPOSED LA QUINTA EXTENSION CHANNEL
C-19	DREDGING PLAN= STA. 209+00 TO STA. 383+37.31
	ENTRANCE CHANNEL TO VIOLA TURNING BASIN
C-20	CROSS SECTIONS= STA. 382+00 TO STA. 310+00
C-21	CROSS SECTIONS= STA. 1516+00 TO STA. 1500+00
C-22	CROSS SECTIONS= STA. 1490+00 TO STA. 1420+00
C-23	CROSS SECTIONS= STA. 1410+00 TO STA. 1340+00
C-24	CROSS SECTIONS= STA. 1335+00 TO STA. 1270+00
C-25	CROSS SECTIONS= STA. 1260+00 TO STA. 1201+70
C-26	CROSS SECTIONS= STA. 1191+70 TO STA. 1131+70
C-27	CROSS SECTIONS= STA. 1121+70 TO STA. 1020+00
C-28	CROSS SECTIONS= STA. 1010+00 TO STA. 940+00
C-29	CROSS SECTIONS= STA. 930+00 TO STA. 860+00
C-30	CROSS SECTIONS= STA. 850+00 TO STA. 780+00
C-31	CROSS SECTIONS= STA. 770+00 TO STA. 700+00
C-32	CROSS SECTIONS= STA. 690+00 TO STA. 620+00
C-33	CROSS SECTIONS= STA. 610+00 TO STA. 540+00
C-34	CROSS SECTIONS= STA. 530+00 TO STA. 460+00
C-35	CROSS SECTIONS= STA. 450+00 TO STA. 380+00
C-36	CROSS SECTIONS= STA. 370+00 TO STA. 300+00
C-37	CROSS SECTIONS= STA. 290+00 TO STA. 220+00
C-38	CROSS SECTIONS= STA. 210+00 TO STA. 142+55
C-39	CROSS SECTIONS= STA. 132+55 TO STA. 62+55
C-40	CROSS SECTIONS= STA. 52+55 TO STA. -18+00
C-41	CROSS SECTIONS= STA. -17+78 TO STA. +70+00
C-42	CROSS SECTIONS= STA. +72+50 TO STA. +142+50
C-43	CROSS SECTIONS= STA. +150+00 TO STA. +220+00
C-44	CROSS SECTIONS= STA. +230+00 TO STA. +310+00

DWG. NO.	TITLE
F-1	LOGS OF BORINGS= STA. 1561+58 TO STA. 1535+69
F-2	LOGS OF BORINGS= STA. 1530+30 TO STA. 1500+26
F-3	LOGS OF BORINGS= STA. 1500+26 TO STA. 1465+20
F-4	LOGS OF BORINGS= STA. 1460+20 TO STA. 1430+26
F-5	LOGS OF BORINGS= STA. 1425+80 TO STA. 1390+23
F-6	LOGS OF BORINGS= STA. 1386+00 TO STA. 1350+23
F-7	LOGS OF BORINGS= STA. 1346+23 TO STA. 1290+16
F-8	LOGS OF BORINGS= STA. 1287+68 TO STA. 1260+21
F-9	LOGS OF BORINGS= STA. 1255+26 TO STA. 1220+22
F-10	LOGS OF BORINGS= STA. 1220+22 TO STA. 1162+22
F-11	LOGS OF BORINGS= STA. 1150+22 TO STA. 1120+22
F-12	LOGS OF BORINGS= STA. 1120+22 TO STA. 1080+00
F-13	LOGS OF BORINGS= STA. 1080+00 TO STA. 1030+22
F-14	LOGS OF BORINGS= STA. 1020+39 TO STA. 930+22
F-15	LOGS OF BORINGS= STA. 921+92 TO STA. 830+22
F-16	LOGS OF BORINGS= STA. 820+22 TO STA. 730+22
F-17	LOGS OF BORINGS= STA. 720+22 TO STA. 630+22
F-18	LOGS OF BORINGS= STA. 622+42 TO STA. 530+21
F-19	LOGS OF BORINGS= STA. 520+50 TO STA. 473+21
F-20	LOGS OF BORINGS= STA. 470+21 TO STA. 435+21
F-21	LOGS OF BORINGS= STA. 430+21 TO STA. 370+34
F-22	LOGS OF BORINGS= STA. 370+21 TO STA. 280+21
F-23	LOGS OF BORINGS= STA. 272+55 TO STA. 180+21
F-24	LOGS OF BORINGS= STA. 170+21 TO STA. 80+21
F-25	LOGS OF BORINGS= STA. 72+65 TO STA. -38+03
F-26	LOGS OF BORINGS= STA. -1+79 TO STA. +269+38
F-27	LOGS OF BORINGS= STA. 310+31 TO STA. 383+73
F-28	LOGS OF BORINGS= B-U SITES
	CHANNEL TO LA QUINTA= STA. 390+00 TO STA. 332+90
	CORPUS CHRISTI SHIP CHANNEL=STA. 373+95 TO STA. 308+47
F-29	BU 1SITE M-N AND PLACEMENT AREA
F-30	BU 2 SITE I
F-31	DMPA 10 AND BU 3 SITE R AND BU4 SITE S
F-32	BU 5 SITE C-O AND BU9 SITE P
F-33	BU 6 SITE G-H
F-34	BU 7 PELICAN
F-35	BU 8 SITE L
F-36	BREAKWATER/SHORE PROTECTION TYPICAL SECTIONS B-B, C-C, D-D AND DETAIL 1AND UNDERWATER RELIEF A-A
F-37	BREAKWATER/SHORE PROTECTION TYPICAL SECTIONS H-H, AND MOUNDED MARSH HABITAT SECTION E-E AND ARMORED WAVE BREAK SECTIONS G-G AND I-I
F-38	BREAKWATER/SHORE PROTECTION TYPICAL SECTIONS J-J, SHALLOW WATER HABITAT SECTION K-K
F-39	ROCK BREAKWATER TYPICAL SECTIONS L-L AND M-M,
F-40	ARMORED LEVEE TYPICAL SECTIONS N-N AND O-O, AND SHALLOW WATER HABITAT SECTION P-P
F-41	PERIMETER LEVEE TYPICAL SECTION R-R AND REVETMENT/ SHORE PROTECTION TYPICAL SECTION S-S
F-42	DMPA 8 SUNTIDE AND DMPA 7 TULE LAKE
F-43	DMPA 3-A AND DMPA 3-B SOUTH SHORE
F-44	DMPA 2 RINCON AND DMPA 1INNER HARBOR
F-45	DMPA 13 LA QUINTA

DWG. NO.	TITLE	DWG. NO.	TITLE

US Army Corps of Engineers
Galveston District

Drawn by: E.S.R.
Designed by: E.S.R.
Checked by: C.T.
Date: X
Scale: AS SHOWN
Rev.
Submitted by: ELIUD GARZA JR. P.E. Area Engineer
Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch
Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

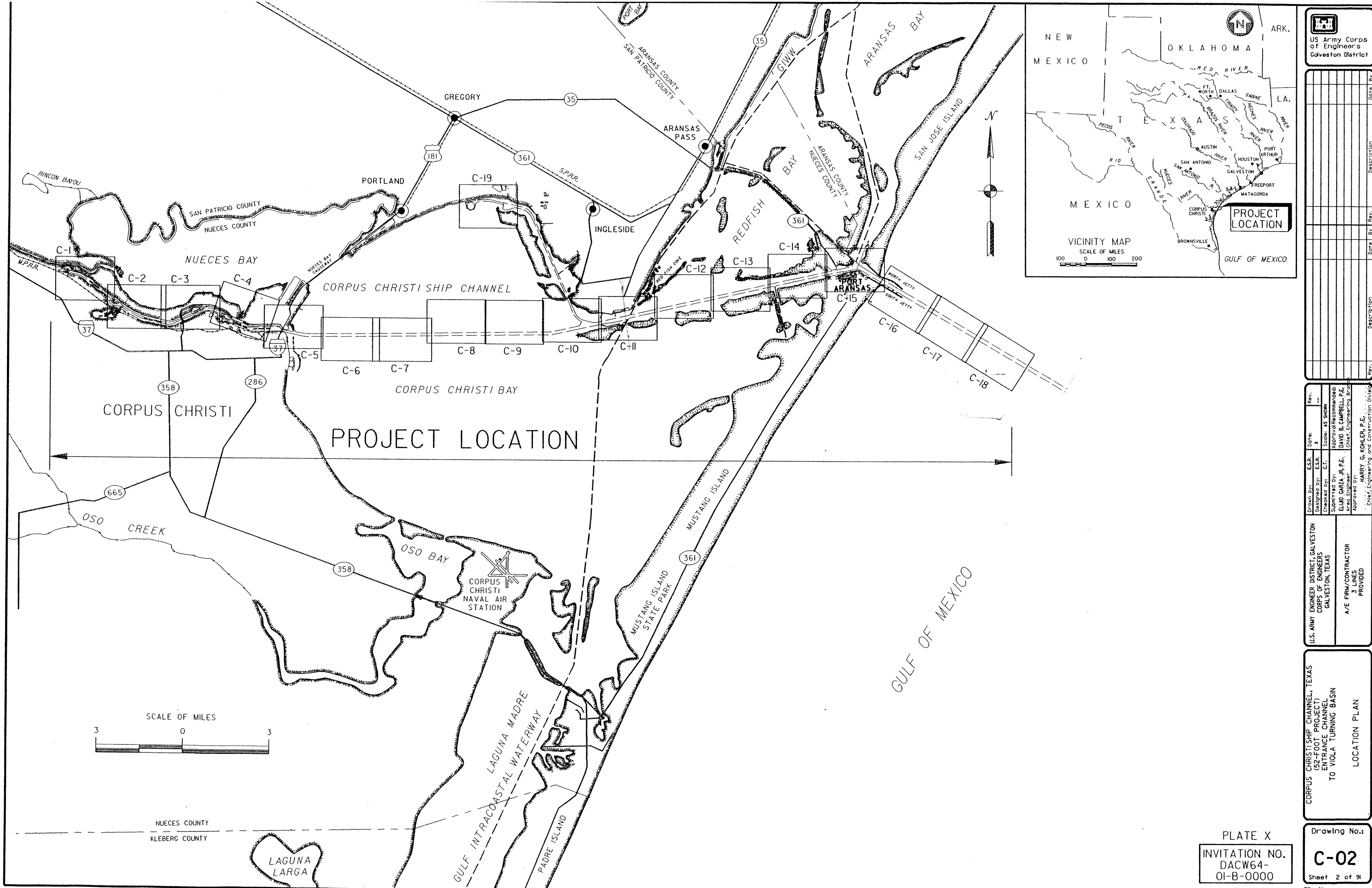
CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN

INDEX OF DRAWINGS

PLATE X

INVITATION NO.
DACW64-
01-B-0000

Drawing No.:
C-01
Sheet 1 of 91
File No.



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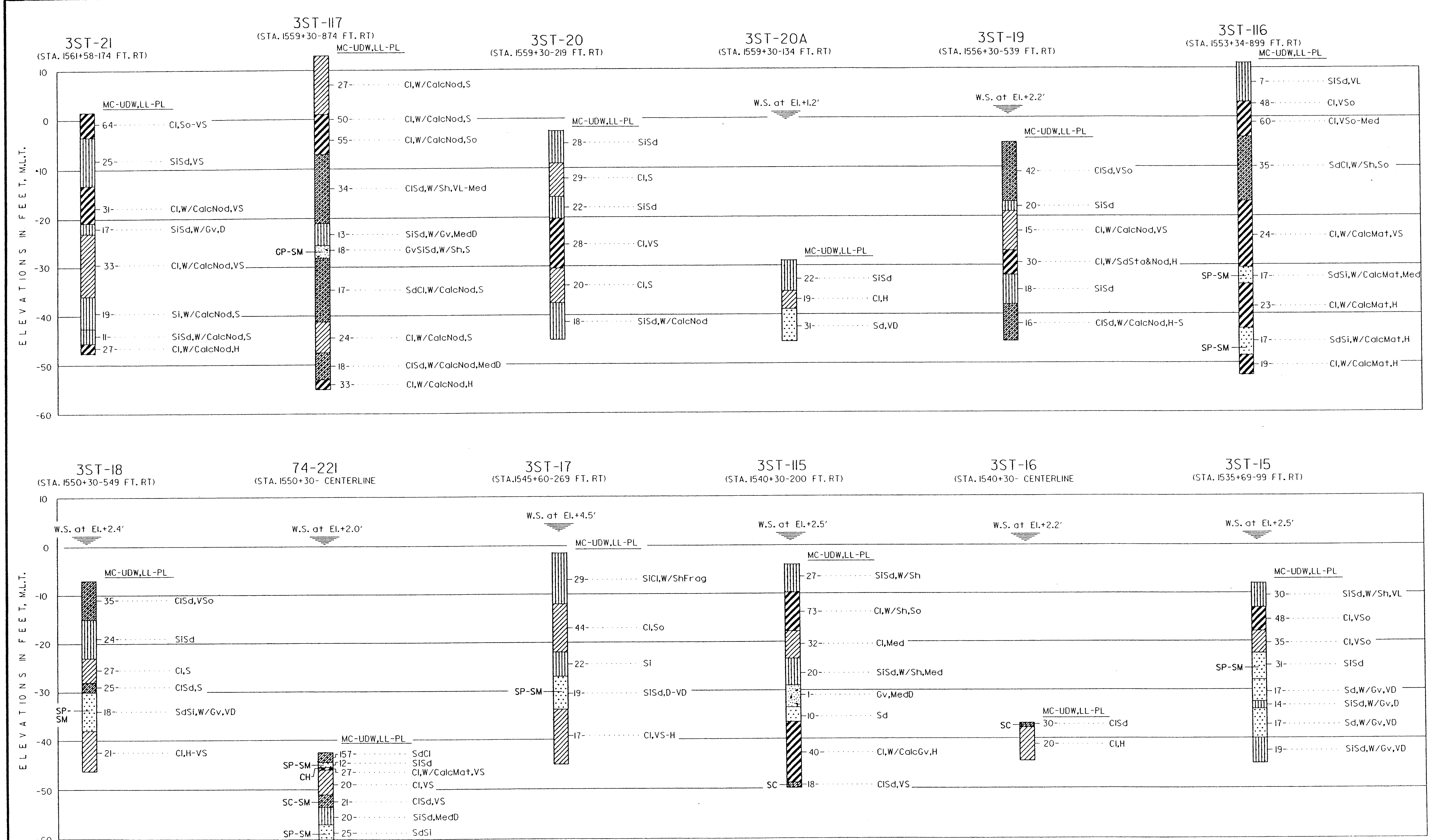

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-1 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0000

US Army Corps of Engineers
Galveston District

Drawn by: E.S.R. | Designed by: E.S.R. | Checked by: C.T. | Scale: AS SHOWN
Submitted by: ELIAS ... JR.,P.E. Area Engineer
Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch
Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN
LOGS OF BORINGS
STA. 1561+58 TO STA. 1535+69

Drawing No.: F-1
Sheet 47 of 91
File No.

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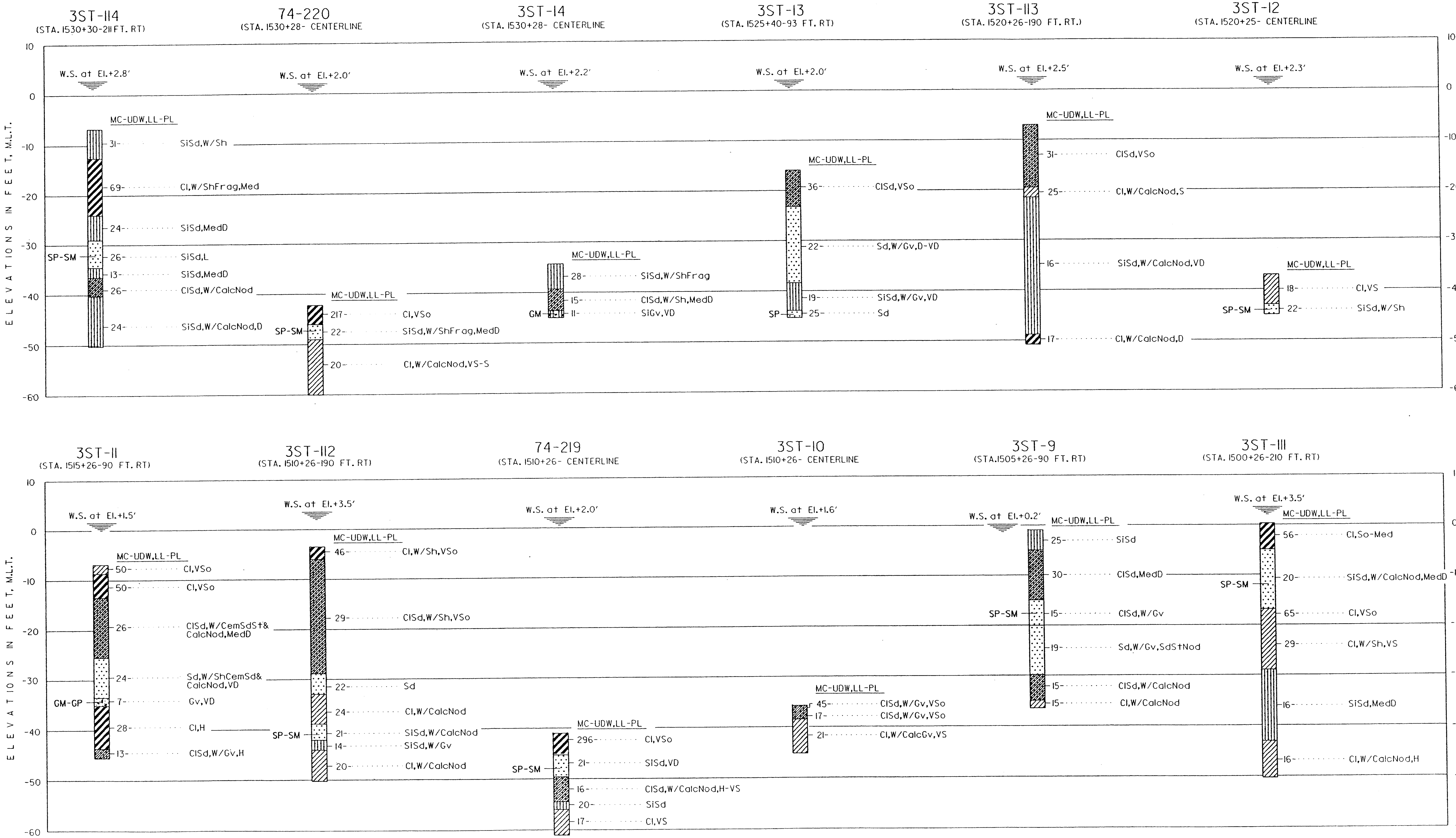

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-1 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0000

US Army Corps of Engineers Galveston District

Drawn by: E.S.R. | Designed by: E.S.R. | Checked by: C.T. | Scale: AS SHOWN
Submitted by: ELIUD GARZA JR.,P.E. Area Engineer
Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch
Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON CORPS OF ENGINEERS GALVESTON, TEXAS

A/E FIRM/CONTRACTOR 3 LINES PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS (52-FOOT PROJECT) ENTRANCE CHANNEL TO VIOLA TURNING BASIN

LOGS OF BORINGS STA. 1530+30 TO STA. 1500+26

Drawing No.: F-2

Sheet 48 of 91

File No.

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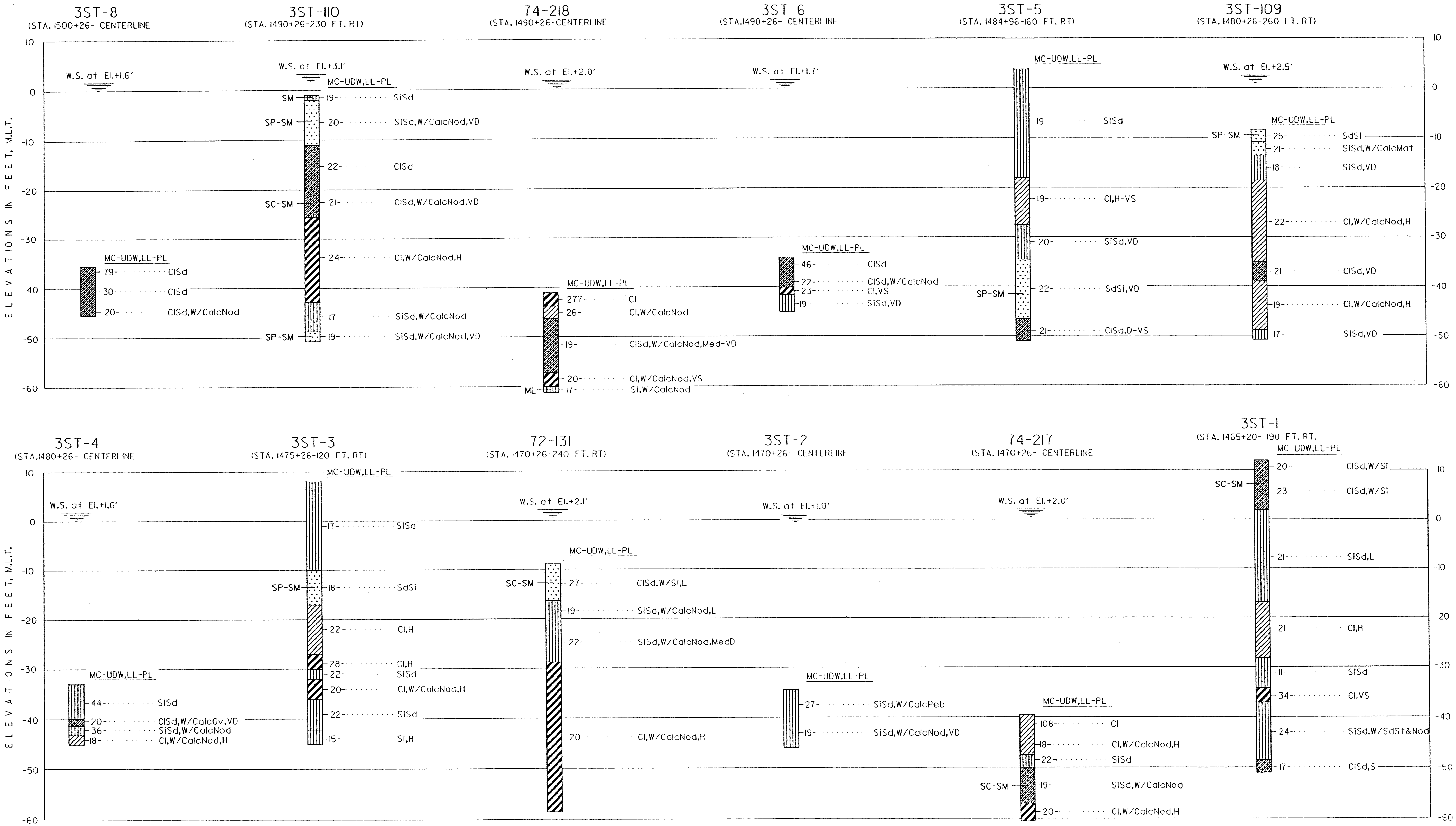

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-1 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0002

PLATE 22

US Army Corps of Engineers
Galveston District

Drawn by:	E.S.R.
Designed by:	E.S.R.
Checked by:	C.T.
Date:	X
Scale:	AS SHOWN
Submitted by: ELIJIO GARZA JR.,P.E. Area Engineer	Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch
Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division	

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN

LOGS OF BORINGS
STA. 1500+26 TO STA. 1465+20

Drawing No.: F-3

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File No.

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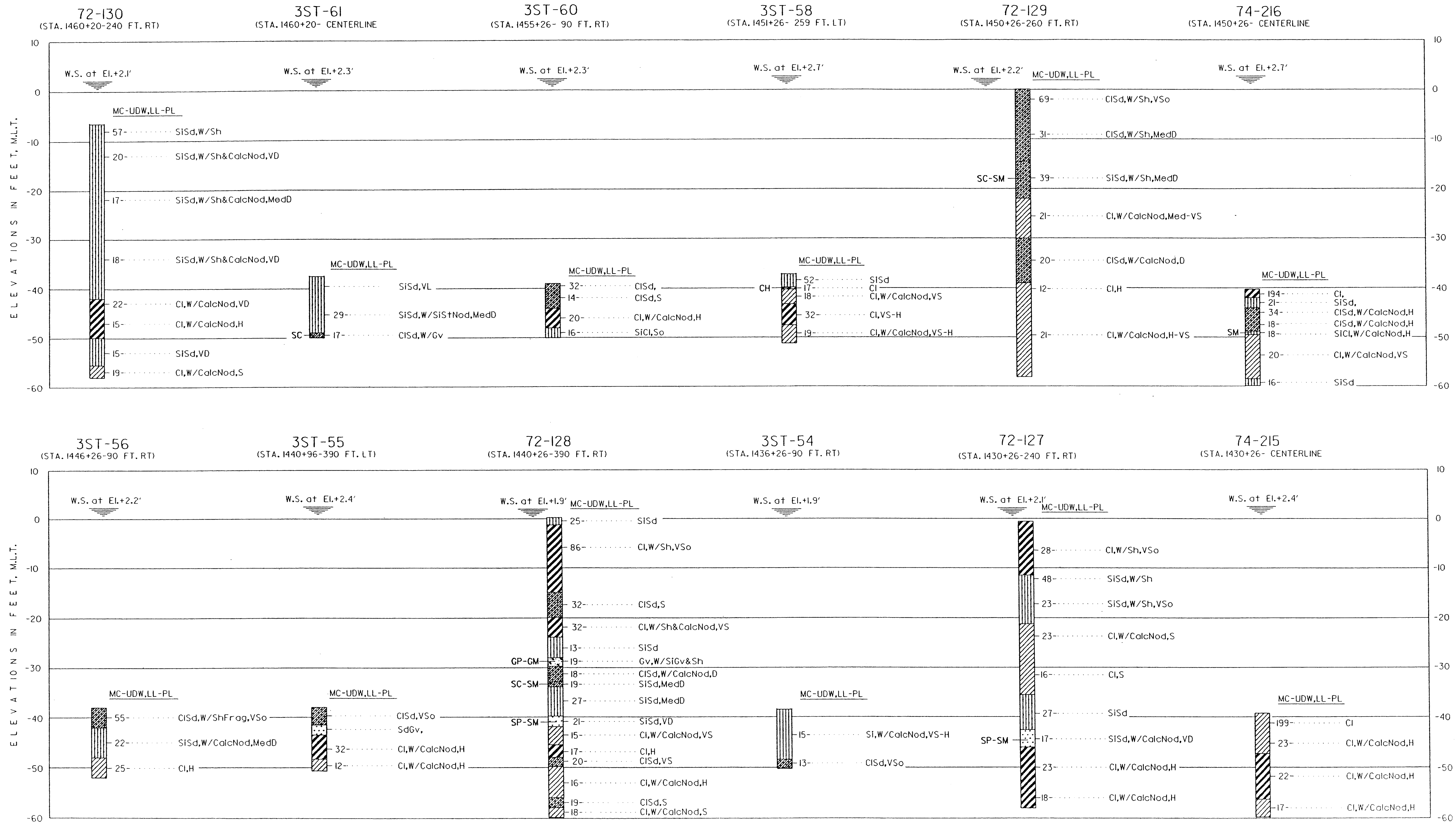

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-2 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO.
DACW64-
01-B-0000

US Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

Drawn by: E.S.R. Date: X Rev.
Designed by: E.S.R.
Checked by: C.T.
Scale: AS SHOWN
Approval Recommended:
DAVID B. CAMPBELL, P.E.
Chief, Engineering Branch
Submitted by:
ELIUD GARZA, JR. P.E.
Area Engineer
Approved by:
HARRY G. KOHLER, P.E.
Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN

LOGS OF BORINGS
STA. 1460+20 TO STA. 1430+26

Drawing No.:
F-4
Sheet 50 of 91
File No.

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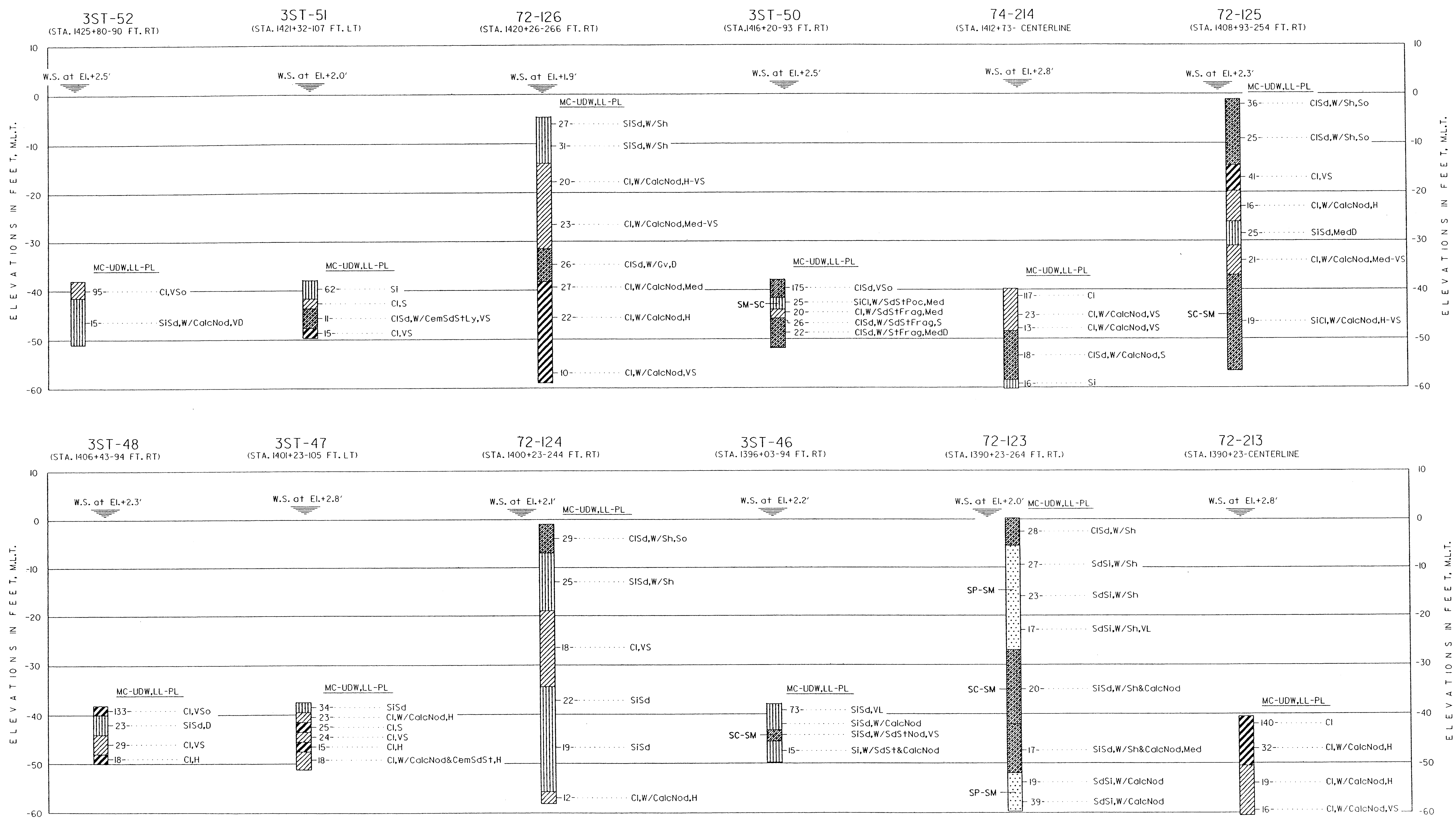

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-2 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0000

US Army Corps of Engineers Galveston District

Drawn by: E.S.R. Designed by: E.S.R. Checked by: C.T. Submitted by: ELVIO GARZA JR.,P.E. Area Engineer. Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division. Scale: AS SHOWN. Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN
LOGS OF BORINGS
STA. 1425+80 TO STA. 1390+23

Drawing No.: F-5

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File No.

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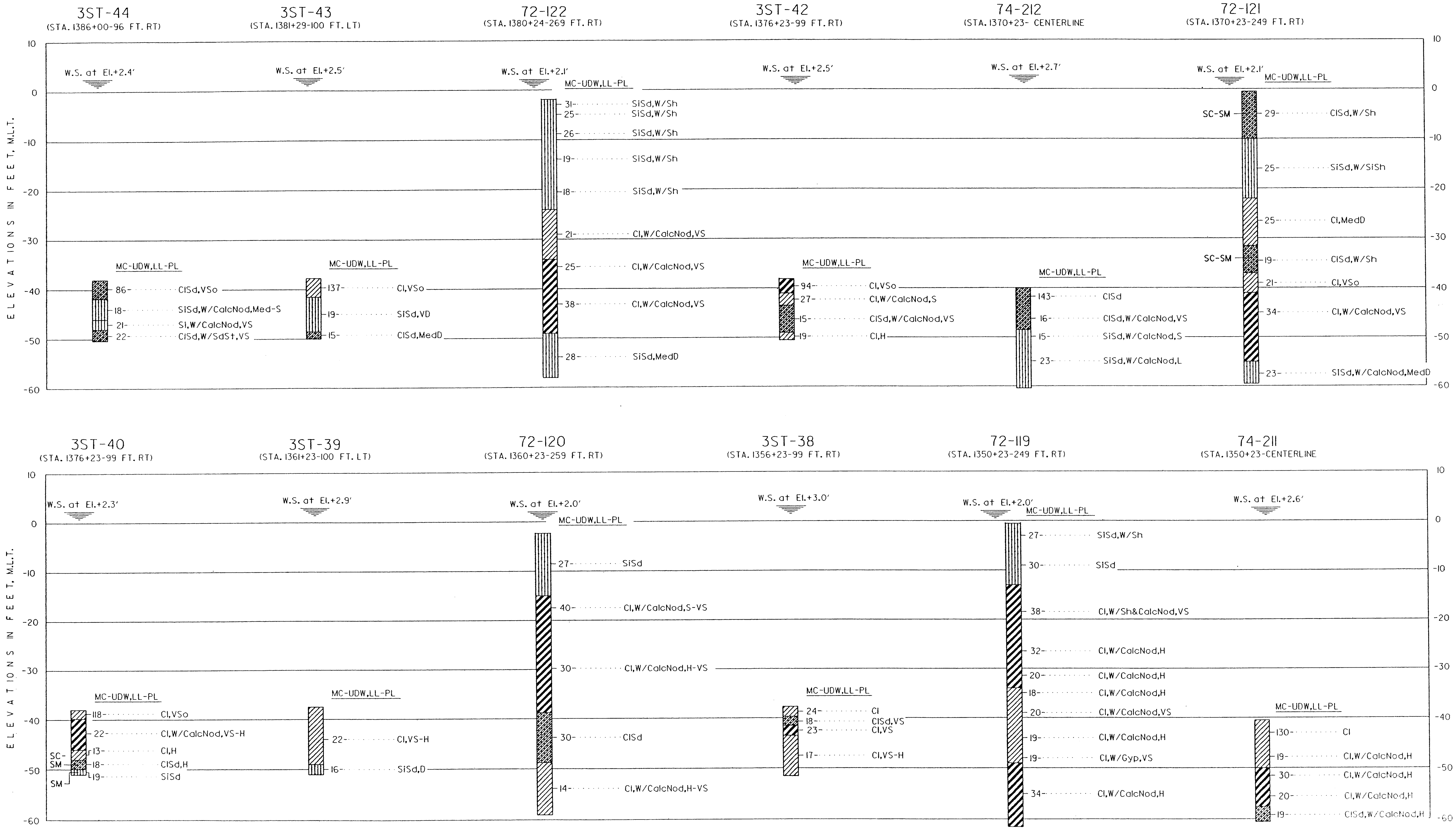

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-2 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0000

US Army Corps of Engineers Galveston District

U.S. ARMY ENGINEER DISTRICT, GALVESTON CORPS OF ENGINEERS GALVESTON, TEXAS

A/E FIRM/CONTRACTOR 3 LINES PROVIDED

Drawn by: E.S.R. Designed by: E.S.R. Checked by: C.T. Submitted by: ELMO GARZA JR, P.E. Area Engineer Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division

Date: X Scale: AS SHOWN Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch

CORPUS CHRISTI SHIP CHANNEL, TEXAS (52-FOOT PROJECT) ENTRANCE CHANNEL TO VIOLA TURNING BASIN

LOGS OF BORINGS STA. 1386+00 TO STA. 1350+23

Drawing No.: F-6

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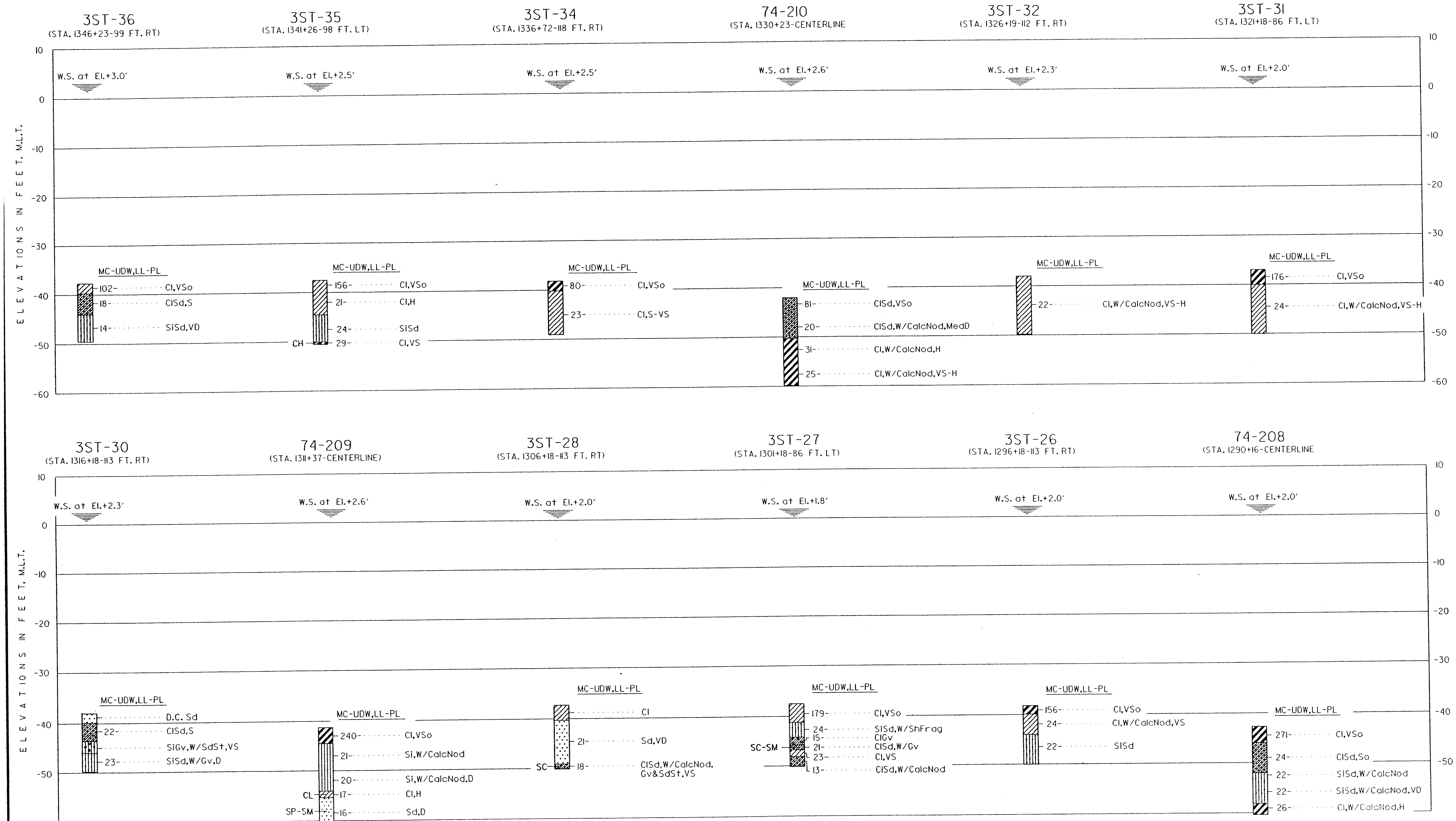

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING C-3 FOR BORING LOCATIONS.
3. SEE DRAWING F-26 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO.
DACW64-
01-B-0000

US Army Corps of Engineers Galveston District

Rev.	Description	Date	By

Drawn by: E.S.R. Designed by: E.S.R. Checked by: C.T. Date: Scale: AS SHOWN

Submitted by: ELIJIO GARZA JR, P.E. Area Engineer

Approval Recommended: DAVID B. CAMPBELL, P.E. Chief, Engineering Branch

Approved by: HARRY G. KOHLER, P.E. Chief, Engineering and Construction Division

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

A/E FIRM/CONTRACTOR
3 LINES
PROVIDED

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(52-FOOT PROJECT)
ENTRANCE CHANNEL
TO VIOLA TURNING BASIN
LOGS OF BORINGS
STA. 1346+23 TO STA. 1290+16

Drawing No.:
F-7
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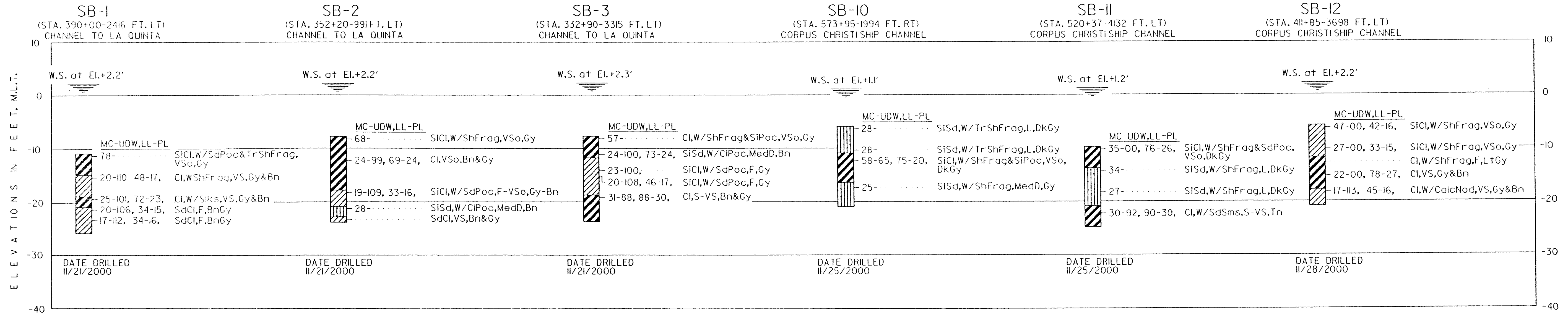
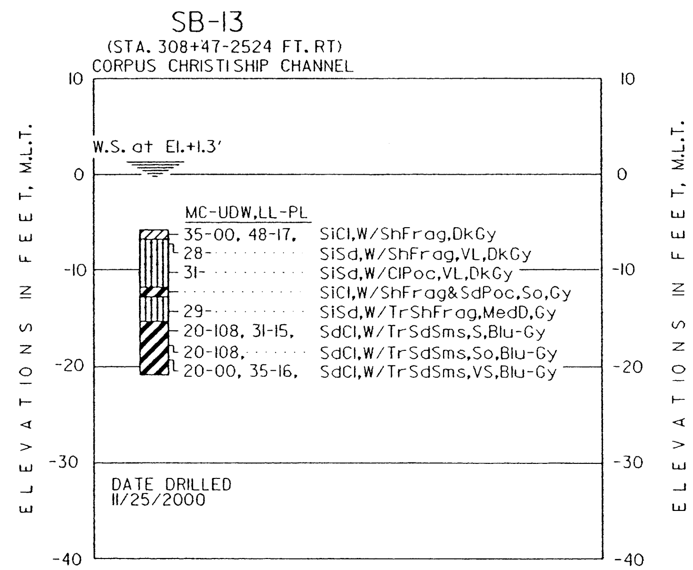
File No.





NOTES:

1. SOILS HAVE BEEN CLASSIFIED IN ACCORDANCE WITH ASTM 2487-93 "CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (UNIFIED SOILS CLASSIFICATION SYSTEM)". CONSISTENCY OF SOILS SUCH AS SOFT, MEDIUM, HARD, LOOSE, DENSE, ETC., ARE RELATIVE TERMS BASED ON ESTIMATED UNDISTURBED SHEAR STRENGTH OF THE MATERIAL AS DETERMINED BY VISUAL CLASSIFICATION POCKET PENETROMETER TESTS AND PENETRATION RESISTANCE DURING SAMPLING.
2. FIGURES TO THE RIGHT OF BORING LOGS ARE WATER CONTENTS IN PERCENT OF THE DRY WEIGHT, DRY DENSITY, LIQUID LIMIT, PLASTIC LIMIT, AND BAR LINEAR SHRINKAGE. (MC-UDW),(LL-PL),(B.L.S.)• FIGURES TO THE LEFT OF BORING LOGS ARE BLOWS PER FOOT OF PENETRATION FROM STANDARD PENETRATION TESTING.
3. BORINGS WERE DRILLED USING WET ROTARY DRILLING TECHNIQUES AND UNDISTURBED SAMPLES WERE RECOVERED WITH A 3-INCH DIAMETER THIN WALL SAMPLER WHERE COHESIVE MATERIALS WERE ENCOUNTERED. WHERE COHESIONLESS MATERIALS WERE ENCOUNTERED, DISTURBED SAMPLES WERE TAKEN WITH A SPLIT SPOON SAMPLER DURING PERFORMANCE OF STANDARD PENETRATION TESTING.

LABORATORY CLASSIFICATION

CH INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.

CL INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS.
CL-ML OR ML-CL CLAY AND SILT MIXTURES WITH SLIGHT PLASTICITY

ML INORGANIC SILTS AND VERY FINE SANDS, WITH SLIGHT PLASTICITY.

SC CLAYEY SANDS, SAND-CLAY MIXTURES.
SC-SM SLIGHTLT SILTY AND CLAYEY SAND, SAND WITH SILTS AND CLAYS.

SM SILTY SANDS, SAND-SILT MIXTURES.

SP POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
SP-SM SLIGHTLY SILTY SANDS, SANDS WITH SOME SILTS.

VISUAL CLASSIFICATIONS:

Bn. Brown(ish)	Gv. Gravel(ly)	Si Silty
Calc. Calcareous	H. Hard	Sms. Seams
Cl. Clay(ey)	L. Loose	So. Soft
D. Dense	Lt. Light	Sta. Stain(s)
Dk. Dark	Med. Medium	Tn. Tan(nish)
Fer. Ferrous	Nod. Nodules	Tr. Trace(s)
Fi. Fine(s)	Poc. Pocket(s)	V. Very
F. Firm	S. Stiff	W. With
Frag. Fragment(s)	Sd. Sand(y)	W.S. Water Surface
Gr. Grained	Sh. Shell(y)	
Gy. Gray(ish)	Siks. Slicken Sides	

NOTES: TO BORINGS

1. DIRECTIONS LEFT AND RIGHT OF CENTERLINE ARE AS VIEWED LOOKING UPSTREAM (TOWARD INCREASING STATION)
2. SEE DRAWING F-30 & F-34 FOR BORING LOCATIONS.
3. SEE DRAWING F-28 FOR BORING NOTES AND LEGEND.

PLATE X

INVITATION NO. DACW64-01-B-0000

US Army Corps of Engineers
Galveston District

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

CORPUS CHRISTI SHIP CHANNEL, TEXAS
(45-FOOT PROJECT)
LOGS OF BORING B-U SITES
LA QUINTA
STA. 390+00 TO STA. 332+90
CORIPUS CHRISTI SHIP CHANNEL
STA. 573+95 TO STA. 380+20

Drawing No.: F-28

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SOIL BORING LOCATIONS

COPRUS CHRISTI SHIP CHANNEL

Location No.	Easting (X)	Northing (Y)	Mudline EL. (MLLW)	Station	Offset
CB-86	1,323,735.10	17,188,657.50	-16.50	131+770.97	212.54
CB-87	1,323,439.70	17,188,037.00	-32.50	132+309.86	213.94
CB-88	1,322,785.30	17,188,198.80	-33.00	132+825.71	220.02
CB-89	1,322,515.50	17,187,607.50	-29.50	133+328.74	191.54
CB-90	1,321,952.10	17,187,722.80	-42.50	133+783.44	160.54
CB-91	1,321,684.70	17,187,211.60	-21.00	134+248.98	180.21
CB-92	1,320,949.20	17,187,423.70	-49.00	134+847.59	320.00
CB-93	1,320,647.10	17,186,817.60	-28.50	135+319.35	177.16
CB-94	1,320,080.50	17,187,314.70	-48.50	135+829.05	395.17
CB-95	1,319,600.10	17,186,776.30	-48.00	136+321.27	150.71
CB-96	1,319,140.00	17,187,292.40	-48.50	136+862.99	283.69
CB-97	1,318,035.80	17,187,134.30	-49.50	137+907.74	107.13
CB-98	1,317,165.20	17,187,647.10	-42.50	138+867.94	207.40
CB-99	1,316,163.90	17,187,551.70	-27.50	139+825.60	100.15
CB-100	1,315,311.50	17,188,224.70	-22.00	140+845.89	349.04
CB-101	1,314,267.60	17,188,201.70	-53.00	141+815.10	107.87
CB-102	1,313,469.70	17,188,929.70	-46.00	141+815.10	192.62
CB-103	1,312,534.30	17,189,089.40	-49.50	142+852.57	77.45
CB-104	1,311,794.20	17,189,876.00	-46.50	143+762.26	207.13
CB-105	1,311,389.70	17,190,338.20	-18.00	144+819.22	333.80
CB-106	1,310,712.70	17,190,918.10	-11.50	145+420.22	390.96
CB-107	1,309,564.10	17,190,243.60	-48.50	146+309.79	838.13
CB-108	1,309,947.70	17,191,591.90	-49.00	146+823.19	470.35
CB-109	1,308,729.00	17,190,796.90	-45.00	147+326.12	897.19
CB-110	1,308,581.60	17,192,264.60	-45.50	147+823.21	187.89
CB-111	1,307,654.50	17,192,606.20	-51.00	148+822.44	95.69
CB-112	1,307,004.60	17,193,448.20	-48.00	149+768.90	187.32
CB-113	1,306,002.90	17,193,829.40	-51.50	150+794.20	109.40
CB-114	1,305,434.10	17,194,635.70	-48.00	151+824.10	193.76
CB-115	1,304,582.20	17,195,287.00	-55.50	152+763.11	202.98
CB-116	1,303,974.50	17,195,300.50	-49.50	153+835.42	151.16
CB-117	1,303,811.20	17,195,935.40	-34.50	154+329.45	274.17
CB-118	1,303,156.20	17,195,795.80	-49.50	154+821.06	174.00
CB-119	1,302,822.00	17,196,382.20	-35.50	155+314.65	223.55
CB-120	1,302,207.50	17,196,013.80	-31.00	155+858.17	323.79
CB-121	1,301,923.80	17,196,753.30	-2.00	156+325.72	324.82
CB-122	1,301,409.80	17,197,189.20	-4.00	156+787.24	633.69
CB-123	1,300,731.60	17,196,300.50	-52.50	157+386.25	384.98
CB-124	1,300,502.50	17,197,505.80	-57.50	157+846.75	

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT
2000 FORT POINT ROAD
GALVESTON, TEXAS 77550

DESIGNED BY: RATNAM THARMENDIRA	ISSUE DATE: MONTH 2022
DRAWN BY: MIKE NELSON	SOLICITATION NO.: W912HY22B
CHECKED BY: ZIAUL HAIDER	CONTRACT NO.: W912HY22C
SUBMITTED BY: DAVID B. BOOTHBY, P.E	SWG FILE NO.: NUECES 0803-0361
SIZE: ANSI D	

CORPUS CHRISTI SHIP CHANNEL, TEXAS
UPPER HARBOR REACH
CHANNEL IMPROVEMENT PROJECT

CORPUS CHRISTI SHIP CHANNEL
GEOTECHNICAL
SAMPLING LOCATIONS

SHEET ID
CHANNEL
01B-101

65% - BCOES

...\NUECES-800_Corpus-Christi\...\0803-0361 CCSC CIP-4 Inner Harbor\...\0803-0361_sht102_01B-101_CHANNEL BORING LOCATIONS.dgn
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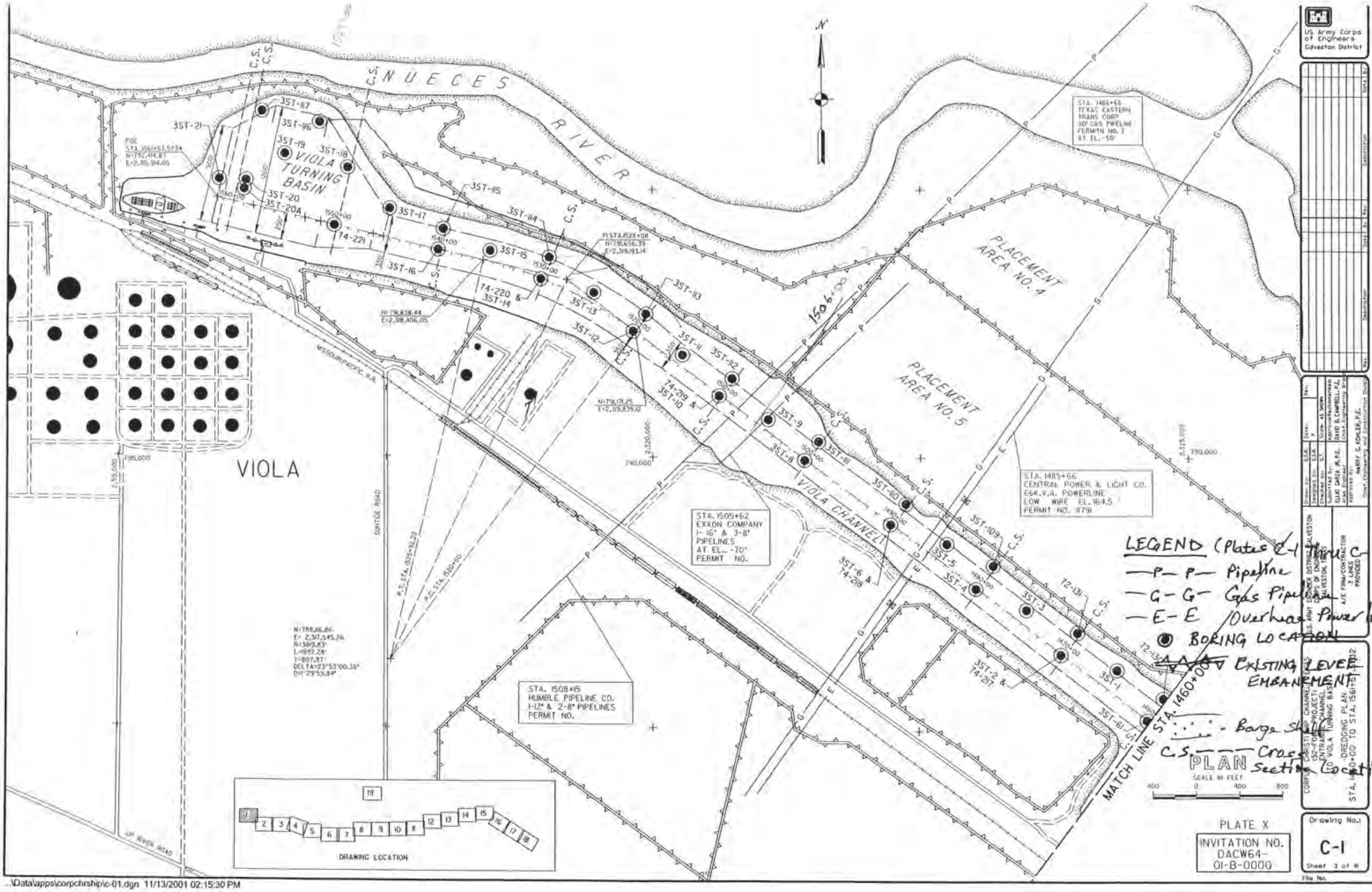
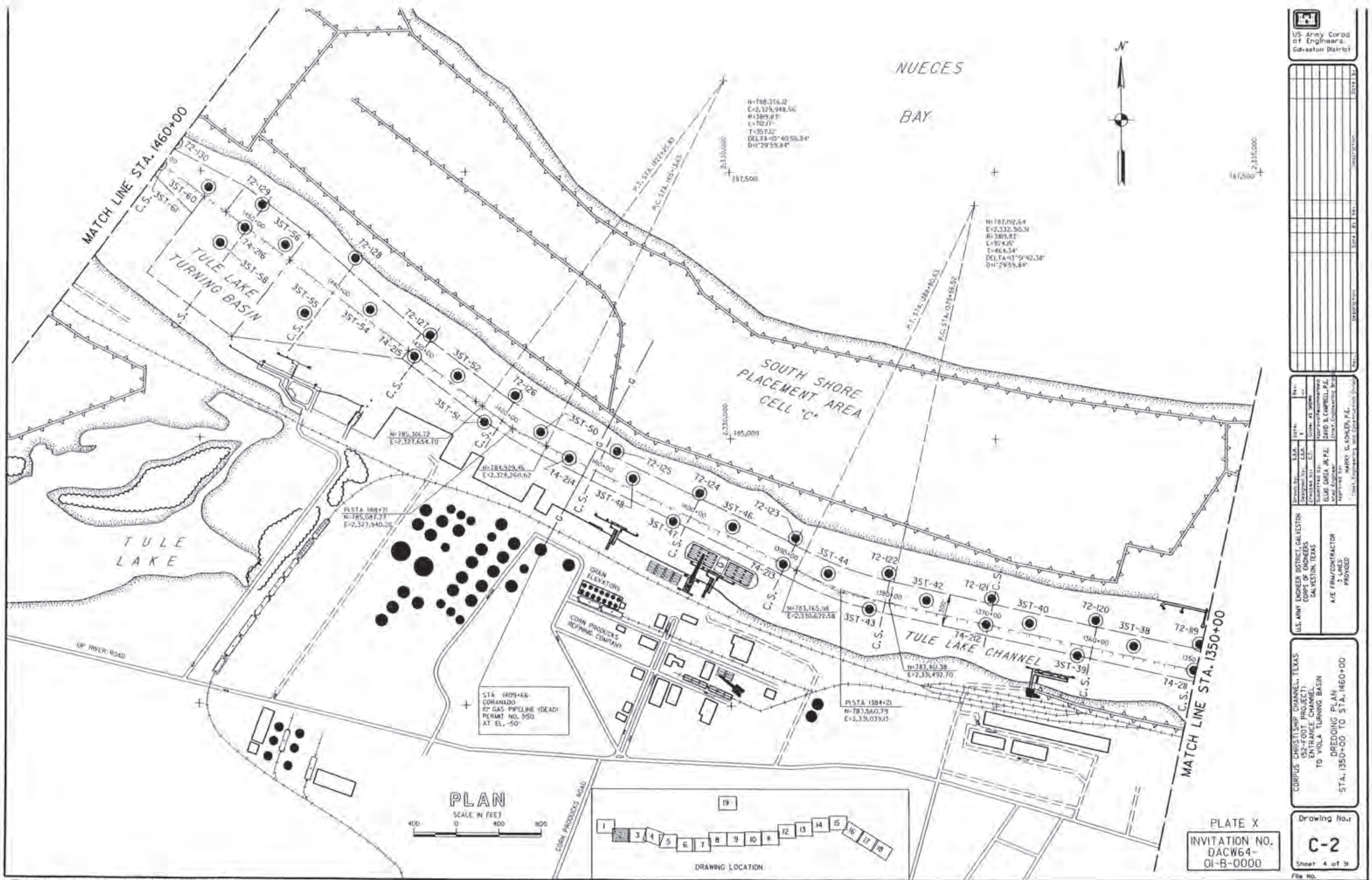
PD: AEC_pdf.pltcfg
DS:

GEO-CHANNEL



US Army Corps of Engineers Galveston District
NUECES RIVER
VIOLA TURNING BASIN
VIOLA CHANNEL
VIOLA
PLACEMENT AREA NO. 4
PLACEMENT AREA NO. 5
STA. 1466+66 TEXAS EASTERN TRANS CORP. 30" GAS PIPELINE PERMIT NO. 7 AT EL. -50'
STA. 1485+66 CENTRAL POWER & LIGHT CO. 66K.V.A. POWERLINE LOW WIRE EL. 164.5 PERMIT NO. 9791
STA. 1505+62 EXXON COMPANY 1-16" & 3-8" PIPELINES AT EL. -70' PERMIT NO.
STA. 1508+15 HUMBLE PIPELINE CO. 1-12" & 2-8" PIPELINES PERMIT NO.
MISSOURI PACIFIC R.R.
SUNTIDE ROAD
UP RIVER ROAD
MATCH LINE STA. 1460+00
LEGEND (Plates C-1 thru C-)
—P— P— Pipeline
—G— G— Gas Pipeline
—E— E Overhead Power line
BORING LOCATION
EXISTING LEVEE EMBANKMENT
Barge Shelf
C.S. Cross Section Location
PLAN
SCALE IN FEET
400 0 400 800
DRAWING LOCATION
PLATE X
INVITATION NO. DACW64-01-B-0000
Drawing No. C-1
CORPUS CHRISTI SHIP CHANNEL (52-FOOT PROJECT) ENTRANCE CHANNEL TO VIOLA TURNING BASIN -DREDGING PLAN STA. 1460+00 TO STA. 1561+32
...\Data\apps\corpchrship\c-01.dgn 11/13/2001 02:15:30 PM



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Appendix E

T&E Species Reports

Last Update: 7/12/2022

NUECES COUNTY

AMPHIBIANS

black-spotted newt *Notophthalmus meridionalis*

Terrestrial and aquatic: Terrestrial habitats used by adults are typically poorly drained clay soils that allow for the formation of ephemeral wetlands. A wide variety of vegetation associations are known to be used, such as thorn scrub and pasture. Aquatic habitats used for reprodution are a variety of ephemeral and permanent water bodies.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

sheep frog *Hypopachus variolosus*

Terrestrial and aquatic: Predominantly grassland and savanna; largely fossorial in areas with moist microclimates.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

South Texas siren (Large Form) *Siren sp. 1*

Aquatic: Mainly found in bodies of quiet water, permanent or temporary, with or without submergent vegetation. Wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: GNRQ	State Rank: S1

Strecker's chorus frog *Pseudacris streckeri*

Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

BIRDS

bald eagle *Haliaeetus leucocephalus*

Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3B,S3N

black rail *Laterallus jamaicensis*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

NUECES COUNTY

BIRDS

black skimmer *Rynchops niger*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S2B

Franklin's gull *Leucophaeus pipixcan*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S2N

lark bunting *Calamospiza melanocorys*

Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S4B

mountain plover *Charadrius montanus*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3 State Rank: S2

northern aplomado falcon *Falco femoralis septentrionalis*

Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species

Federal Status: LE State Status: E SGCN: Y

Endemic: N Global Rank: G4T2T3 State Rank: S1

piping plover *Charadrius melodus*

NUECES COUNTY

BIRDS

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: LT | State Status: T | SGCN: Y
Endemic: N | Global Rank: G3 | State Rank: S2N

reddish egret *Egretta rufescens*

Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: S2B

rufa red knot *Calidris canutus rufa*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.

Federal Status: LT | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4T2 | State Rank: S2N

sooty tern *Onychoprion fuscatus*

Primarily an offshore bird; does nest on sandy beaches and islands, breeding April-July.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S1B

Sprague's pipit *Anthus spragueii*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G3G4 | State Rank: S3N

swallow-tailed kite *Elanoides forficatus*

NUECES COUNTY

BIRDS

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S2B

Texas Botteri's sparrow *Peucaea botterii texana*

Grassland and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca; nests on ground of low clump of grasses

Federal Status: | State Status: T | SGCN: N
Endemic: N | Global Rank: G4T4 | State Rank: S3B

tropical parula *Setophaga pitiayumi*

Semi-tropical evergreen woodland along rivers and resacas. Texas ebony, anacua and other trees with epiphytic plants hanging from them. Dense or open woods, undergrowth, brush, and trees along edges of rivers and resacas; breeding April to July.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S3B

western burrowing owl *Athene cunicularia hypugaea*

Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G4T4 | State Rank: S2

white-faced ibis *Plegadis chihi*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S4B

white-tailed hawk *Buteo albicaudatus*

Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4G5 | State Rank: S4B

NUECES COUNTY

BIRDS

whooping crane *Grus americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S1S2N

wood stork *Mycteria americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: SHB,S2N

FISH

american eel *Anguilla rostrata*

Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S4

fat snook *Centropomus parallelus*

Occupies freshwater, estuarine, and marine areas near mangroves, rocky overhangs or protected riverbanks, but is most commonly found inshore (freshwater). Spawning occurs from March-August in freshwater. After hatching, larvae disperse with the currents to estuarine areas (Gilmore et al. 1983, McMichael and Parsons 1989). Juveniles migrate from freshwater to estuarine areas based on flow and salinity regimes.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3?

oceanic whitetip shark *Carcharhinus longimanus*

Habitat description is not available at this time.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: GNR	State Rank: S2

NUECES COUNTY

FISH

opossum pipefish *Microphis brachyurus*

Adults are only found in low salinity waters of estuaries or freshwater tributaries within 30 miles of the coast (Gilmore 1992), where they also give birth. Young move or are carried into more saline waters off the coast after birth. Newly released larvae must have conditions near 18 ppt salinity for at least two weeks after birth to survive, indicating a physiology adapted for downstream transport to estuarine and marine environments (Frias-Torres 2002). Juvenile migration toward the ocean depends on water flow regimes, salinity, and vegetation for cover and capturing prey (Frias-Torres 2002). Seawalls, docks, and riprap construction destroy habitat and poor water quality and alteration of flow regimes may prevent migration (NMFS 2009).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S3N

shortfin mako shark *Isurus oxyrinchus*

Habitat description is not available at this time.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: GNR	State Rank: S2

snook *Centropomus undecimalis*

Juvenile common snook are generally restricted to the protection of riverine, salt marshes, seagrass beds, and estuary environments. These environments offer shallow water and an overhanging vegetative shoreline. Juvenile common snook can survive in waters with lower oxygen levels than adults. Adult common snook inhabit many fresh, estuarine, and marine environments including mangrove forests, beaches, river mouths, nearshore reefs, salt marshes, sea grass meadows, and near structure (pilings, artificial reefs, etc.). Adult common snook appear to be less sensitive to cold water temperatures than larvae or small juveniles. The lower lethal limit of water temperature is 48.2°-57.2° F (9°-14° C) for juveniles and 42.8°-53.6° F (6°-12° C) for adults (Hill 2005, Press 2010).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3?

southern flounder *Paralichthys lethostigma*

This is an estuarine-dependent species that inhabits riverine, estuarine and coastal waters, and prefers muddy, sandy, or silty substrates (Reagan and Wingo 1985). Individuals can tolerate wide temperature (~5-35°C) and salinity ranges (0-60 ppt). Southern Flounder spawn in offshore waters of the Gulf of Mexico from October to February (Reagan and Wingo 1985). The oceanic larval stage is pelagic and lasts 30–60 days. Metamorphosing individuals enter estuaries and migrate towards low-salinity headwaters, where settlement occurs (Burke et al. 1991, Walsh et al. 1999). The young fish enter the bays during late winter and early spring, occupying seagrass; some may move further into coastal rivers and bayous. Juveniles remain in estuaries until the onset of sexual maturation (approximately two years), at which time they migrate out of estuaries to join adults on the inner continental shelf. Adult southern flounder leave the bays during the fall for spawning in the Gulf of Mexico. They spawn for the first time when two years old at depths of 50 to 100 feet. Although most of the adults leave the bays and enter the Gulf for spawning during the winter, some remain behind and spend winter in the bays. Those in the Gulf will reenter the bays in the spring. The spring influx is gradual and does not occur with large concentrations that characterize the fall emigration.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

NUECES COUNTY

INSECTS

American bumblebee *Bombus pensylvanicus*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: G3G4 State Rank: SNR

Comanche harvester ant *Pogonomyrmex comanche*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2G3 State Rank: S2

gladiator short-winged katydid *Dichopetala gladiator*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: GNR State Rank: SNR

Manfreda giant-skipper *Stallingsia maculosus*

Most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G1 State Rank: S1

MAMMALS

barrier island Texas pocket gopher *Geomys personatus personatus*

Limited information available. Likely found in sandy soils.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G4TNR State Rank: SNR

big free-tailed bat *Nyctinomops macrotis*

Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3

NUECES COUNTY

MAMMALS

blue whale *Balaenoptera musculus*

Inhabits tropical, subtropical, temperate, and subpolar waters worldwide, but are infrequently sighted in the Gulf of Mexico. They migrate seasonally between summer feeding grounds and winter breeeding grounds, but specifics vary. Commonly observed at the surface in open ocean.

Federal Status: LE | State Status: E | SGCN: Y

Endemic: N | Global Rank: G3G4 | State Rank: SH

cave myotis bat *Myotis velifer*

Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.

Federal Status: | State Status: | SGCN: Y

Endemic: N | Global Rank: G4G5 | State Rank: S2S3

eastern red bat *Lasiurus borealis*

Red bats are migratory bats that are common across Texas. They are most common in the eastern and central parts of the state, due to their requirement of forests for foliage roosting. West Texas specimens are associated with forested areas (cottonwoods). Also common along the coastline. These bats are highly mobile, seasonally migratory, and practice a type of "wandering migration". Associations with specific habitat is difficult unless specific migratory stopover sites or wintering grounds are found. Likely associated with any forested area in East, Central, and North Texas but can occur statewide.

Federal Status: | State Status: | SGCN: Y

Endemic: N | Global Rank: G3G4 | State Rank: S4

eastern spotted skunk *Spilogale putorius*

Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.

Federal Status: | State Status: | SGCN: Y

Endemic: N | Global Rank: G4 | State Rank: S1S3

Gulf of Mexico Bryde's whale *Balaenoptera ricei*

Habitat description is not available at this time.

Federal Status: LE | State Status: E | SGCN: N

Endemic: N | Global Rank: G1 | State Rank: SNR

hoary bat *Lasiurus cinereus*

Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.

Federal Status: | State Status: | SGCN: Y

Endemic: N | Global Rank: G3G4 | State Rank: S4

humpback whale *Megaptera novaeangliae*

NUECES COUNTY

MAMMALS

Inhabits tropical, subtropical, temperate, and subpolar waters world wide. Migrate up to 5,000 miles between colder water (feeding grounds) and warmer water (calving grounds) each year. They will use both open ocean and coastal waters, sometimes including inshore areas such as bays, and are often found near the surface; however, this species is rare in the Gulf of Mexico. The northwest Atlantic/Gulf of Mexico distinct population segment is not considered at risk of extinction and is not listed as Endangered on the Endangered Species Act.

Federal Status: LE	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: SNR

long-tailed weasel *Mustela frenata*

Includes brushlands, fence rows, upland woods and bottomland hardwoods, forest edges & rocky desert scrub. Usually live close to water.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S5

maritime pocket gopher *Geomys personatus maritimus*

Fossorial, in deep sandy soils; feeds mostly from within burrow on roots and other plant parts, especially grasses; ecologically important as prey species and in influencing soils, microtopography, habitat heterogeneity, and plant diversity

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G4T2	State Rank: S2

mountain lion *Puma concolor*

Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains & riparian zones.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S2S3

North Atlantic right whale *Eubalaena glacialis*

Inhabits subtropical and temperate waters in the northern Atlantic. Commonly found in coastal waters or clsoe to the continental shelf near the surface. They migrate from feeding grounds in cooler waters (Canada and New England) to warmer waters of the southeast US (South Carolina, Georgia, and Florida) to give birth in the fall/winter - both areas are identified as critical habitat by NOAA-NMFS. Nursery areas are in shallow, coastal waters. This species is very rare in the Gulf of Mexico and the few reported sightings are likely vagrants (Ward-Geiger etal 2011).

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S1

northern yellow bat *Lasiurus intermedius*

Occurs mainly along the Gulf Coast but inland specimens are not uncommon. Prefers roosting in spanish moss and in the hanging fronds of palm trees. Common where this vegtation occurs. Found near water and forages over grassy, open areas. Males usually roost solitarily, whereas females roost in groups of several individuals.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

NUECES COUNTY

MAMMALS

ocelot *Leopardus pardalis*

Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S1

Padre Island kangaroo rat *Dipodomys compactus compactus*

Dunes and open sandy areas near the coast.

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G4T3	State Rank: S3

sei whale *Balaenoptera borealis*

Habitat description is not available at this time.

Federal Status: LE	State Status: E	SGCN: N
Endemic: N	Global Rank: G3	State Rank: SNR

southern yellow bat *Lasiurus ega*

Relict palm grove is only known Texas habitat. Neotropical species roosting in palms, forages over water; insectivorous; breeding in late winter. Roosts in dead palm fronds in ornamental palms in urban areas.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3S4

sperm whale *Physeter macrocephalus*

Inhabits tropical, subtropical, and temperate waters world wide, avoiding icey waters. Distribution is highly dependent on their food source (squids, sharks, skates, and fish), breeding, and composition of the pod. In general, this species migrates from north to south in the winter and south to north in the summer; however, individuals in tropical and temperate waters don't seem to migrate at all. Routinely dive to catch their prey (2,000-10,000 feet) and generally occupies water at least 3,300 feet deep near ocean trenches.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S1

tricolored bat *Perimyotis subflavus*

Forest, woodland and riparian areas are important. Caves are very important to this species.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S2

NUECES COUNTY

MAMMALS

West Indian manatee *Trichechus manatus*

Large rivers, brackish water bays, coastal waters. Warm waters of the tropics, in rivers and brackish bays but may also survive in salt water habitats. Very sensitive to cold water temperatures. Rarely occurring as far north as Texas.   Gulf and bay system; opportunistic, aquatic herbivore.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G2G3	State Rank: S1

western hog-nosed skunk *Conepatus leuconotus*

Habitats include woodlands, grasslands & deserts, to 7200 feet, most common in rugged, rocky canyon country; little is known about the habitat of the ssp. telmalestes

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S4

white-nosed coati *Nasua narica*

Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S1

MOLLUSKS

No accepted common name *Millerelix gracilis*

Habitat description is not available at this time.

Federal Status:	State Status:	SGCN: Y
Endemic:	Global Rank: G2G3	State Rank: S2?

REPTILES

Atlantic hawksbill sea turtle *Eretmochelys imbricata*

Inhabit tropical and subtropical waters worldwide, in the Gulf of Mexico, especially Texas. Hatchling and juveniles are found in open, pelagic ocean and closely associated with floating lgae/seagrass mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water lmore than 65 feet deep. They feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand. Some migrate, but others stay close to foraging areas - females are philopatric.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

NUECES COUNTY

REPTILES

green sea turtle *Chelonia mydas*

Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September). Adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3B,S3N

Kemp's Ridley sea turtle *Lepidochelys kempii*

Inhabits tropical, subtropical, and temperate waters of the northwestern Atlantic Ocean and Gulf of Mexico. Adults are found in coastal waters with muddy or sandy bottoms. Some males migrate between feeding grounds and breeeding grounds, but some don't. Females migrate between feeding and nesting areas, often returning to the same destinations. Nesting in Texas occurs on a smaller scale compared to other areas (i.e. Mexico). Hatchlings are quickly swept out to open water and are rarely found nearshore. Similarly, juveniles often congregate near floating algae/seagrass mats offshore, and move into nearshore, coastal, neritic areas after 1-2 years and remain until they reach maturity. They feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S3

leatherback sea turtle *Dermochelys coriacea*

Inhabit tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Nesting is not common in Texas (March to July). Most pelagic of the seaturtles with the longest migration (>10,000 miles) between nesting and foraging sites. Are able to dive to depths of 4,000 feet. They are omnivorous, showing a preference for jellyfish.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G2	State Rank: S1S2

loggerhead sea turtle *Caretta caretta*

Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. They migrate from feeding grounds to nesting beaches/barrier islands and some nesting does occur in Texas (April to September). Beaches that are narrow, steeply sloped, with coarse-grain sand are preffered for nesting. Newly hatched individuals depend on floating alage/seaweed for protection and foraging, which eventually transport them offshore and into open ocean. Juveniles and young adults spend their lives in open ocean, offshore before migrating to coastal areas to breed and nest. Foraging areas for adults include shallow continental shelf waters.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S4

Mexican blackhead snake *Tantilla atriceps*

Terrestrial: Shrubland savanna.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S1

NUECES COUNTY

REPTILES

slender glass lizard *Ophisaurus attenuatus*

Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

Tamaulipan spot-tailed earless lizard *Holbrookia subcaudalis*

Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: GNR	State Rank: S2

Texas diamondback terrapin *Malaclemys terrapin littoralis*

Coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive. Bay islands are important habitats. Nests on oyster shell beaches.

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G4T3	State Rank: S2

Texas horned lizard *Phrynosoma cornutum*

Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S3

Texas indigo snake *Drymarchon melanurus erebennus*

Terrestrial: Thornbush-chaparral woodland of south Texas, in particular dense riparian corridors.Can do well in suburban and irrigated croplands. Requires moist microhabitats, such as rodent burrows, for shelter.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5T4	State Rank: S4

Texas scarlet snake *Cemophora lineri*

Terrestrial: Prefers well drained soils with a variety of forest, grassland, and scrub habitats.

Federal Status:	State Status: T	SGCN: Y
Endemic: Y	Global Rank: G2	State Rank: S1S2

NUECES COUNTY

REPTILES

Texas tortoise *Gopherus berlandieri*

Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: S2

western box turtle *Terrapene ornata*

Terrestrial: Ornate or western box trutles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

western hognose snake *Heterodon nasicus*

Terrestrial: Shortgrass or mixed grass prairie, with gravel or sandy soils. Often found associated with draws, floodplains, and more mesic habitats within the arid landscape. Frequently occurs in shrub encroached grasslands.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4

western massasauga *Sistrurus tergeminus*

Terrestrial: Shortgrass or mixed grass prairie, with gravel or sandy soils. Often found associated with draws, floodplains, and more mesic habitats within the arid landscape. Frequently occurs in shrub encroached grasslands.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S3

PLANTS

black lace cactus *Echinocereus reichenbachii var. albertii*

Grasslands, thorn shrublands, mesquite woodlands on sandy, somewhat saline soils on coastal prairie, most frequently in naturally open areas sparsely covered with brush of a low stature not resulting from disturbance or along creeks in ecotonal areas between this upland type and lower areas dominated by halophytic grasses and forbs; flowering April-June

Federal Status: LE	State Status: E	SGCN: Y
Endemic: Y	Global Rank: G5T1Q	State Rank: S1

Buckley's spiderwort *Tradescantia buckleyi*

Occurs on sandy loam or clay soils in grasslands or shrublands underlain by the Beaumount Formation.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

NUECES COUNTY

PLANTS

Cory's croton *Croton coryi*

Grasslands and woodland openings on barrier islands and coastal sands of South Texas, inland on South Texas Sand Sheet; Annual; Flowering July-Oct; Fruiting July-Nov

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

crestless onion *Allium canadense var. ecristatum*

Occurs on poorly drained sites on sandy substrates within coastal prairies of the Coastal Bend area (Carr 2015).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G5T3 State Rank: S3

Drummond's rushpea *Hoffmannseggia drummondii*

Open areas on sandy clay; Perennial

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3

Elmendorf's onion *Allium elmendorfii*

Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; Perennial; Flowering March-April, May

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2 State Rank: S2

Greenman's bluet *Houstonia parviflora*

Grass pastures. Feb- Apr. (Correll and Johnston 1970).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

Jones' nailwort *Paronychia jonesii*

Occurs in early successional open areas on deep well-drained sand; Biennial Annual; Flowering March-Nov; Fruiting April-Nov

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3G4 State Rank: S3S4

Jones's rainlilly *Cooperia jonesii*

Hardpan swales and other seasonally moist low areas (Jones 1977). Flowering mid summer--early fall (Jul--Oct) (Flagg, Smith & Flory 2002).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3Q State Rank: S3

NUECES COUNTY

PLANTS

large selenia *Selenia grandis*

Occurs in seasonally wet clayey soils in open areas; Annual; Flowering Jan-April; Fruiting Feb-April

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

lila de los Llanos *Echeandia chandleri*

Most commonly encountered among shrubs or in grassy openings in subtropical thorn shrublands on somewhat saline clays of lomas along Gulf Coast near mouth of Rio Grande; also observed in a few upland coastal prairie remnants on clay soils over the Beaumont Formation at inland sites well to the north and along railroad right-of-ways and cemeteries; flowering (May-) September-December, fruiting October-December

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G2G3 State Rank: S2S3

Mexican mud-plantain *Heteranthera mexicana*

Wet clayey soils of resacas and ephemeral wetlands in South Texas and along margins of playas in the Panhandle; flowering June-December, only after sufficient rainfall

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G2G3 State Rank: S1

plains gumweed *Grindelia oolepis*

Coastal prairies on heavy clay (blackland) soils, often in depressional areas, sometimes persisting in areas where management (mowing) may maintain or mimic natural prairie disturbance regimes; crawfish lands; on nearly level Victoria clay, Edroy clay, claypan, possibly Greta within Orelia fine sandy loam over the Beaumont Formation, and Harlingen clay; roadsides, railroad rights-of-ways, vacant lots in urban areas, cemeteries; flowering April-December

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G2 State Rank: S2

sand Brazos mint *Brazoria arenaria*

Sandy areas in South Texas; Annual; Flowering/Fruiting March-April

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

slender rush-pea *Hoffmannseggia tenella*

Coastal prairie grasslands on level uplands and on gentle slopes along drainages, usually in areas of shorter or sparse vegetation; soils often described as Blackland clay, but at some of these sites soils are coarser textured and lighter in color than the typical heavy clay of the coastal prairies; flowering April-November

Federal Status: LE State Status: E SGCN: Y

Endemic: Y Global Rank: G1 State Rank: S1

NUECES COUNTY

PLANTS

South Texas ambrosia *Ambrosia cheiranthifolia*

Grasslands and mesquite-dominated shrublands on various soils ranging from heavy clays to lighter textured sandy loams, mostly over the Beaumont Formation on the Coastal Plain; in modified unplowed sites such as railroad and highyway right-of-ways, cemeteries, mowed fields, erosional areas along small creeks; Perennial; Flowering July-November

Federal Status: LE State Status: E SGCN: Y

Endemic: N Global Rank: G2 State Rank: S1

South Texas spikesedge *Eleocharis austrotexana*

Occurring in miscellaneous wetlands at scattered locations on the coastal plain; Perennial; Flowering/Fruiting Sept

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

Texas peachbush *Prunus texana*

Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; Perennial; Flowering Feb-Mar; Fruiting Apr-Jun

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3G4 State Rank: S3S4

Texas stonecrop *Lenophyllum texanum*

Found in shrublands on clay dunes (lomas) at the mouth of the Rio Grande and on xeric calcareous rock outcrops at scattered inland sites; Perennial; Flowering/Fruiting Nov-Feb

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3

Texas windmill grass *Chloris texensis*

Sandy to sandy loam soils in relatively bare areas in coastal prairie grassland remnants, often on roadsides where regular mowing may mimic natural prairie fire regimes; flowering in fall

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2 State Rank: S2

Tharp's dropseed *Sporobolus tharpii*

Occurs on barrier islands, shores of lagoons and bays protected by the barrier islands, and on shores of a few near-coastal ponds. Plants occur at the bases of dunes, in interdune swales and sandflats, and on upper beaches. The substrate is of Holocene age.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

NUECES COUNTY

PLANTS

Tharp's rhododon *Rhododon angulatus*

Deep, loose sands in sparsely vegetated areas on stabilized dunes of Pleistocene barrier islands; flowering (May-) June-September, sometimes later with appropriate rainfall

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G1Q	State Rank: S1

tree dodder *Cuscuta exaltata*

Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; Annual; Flowering May-Oct; Fruiting July-Oct

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

velvet spurge *Euphorbia innocua*

Open or brushy areas on coastal sands and the South Texas Sand Sheet; Perennial; Flowering Sept-April; Fruiting Nov-July

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G3	State Rank: S3

Welder machaeranthera *Psilactis heterocarpa*

Grasslands , varying from midgrass coastal prairies, and open mesquite-huisache woodlands on nearly level, gray to dark gray clayey to silty soils; known locations mapped on Victoria clay, Edroy clay, Dacosta sandy clay loam over Beaumont and Lissie formations; flowering September-November

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G2G3	State Rank: S2S3

Wright's trichocoronis *Trichocoronis wrightii var. wrightii*

Most records from Texas are historical, perhaps indicating a decline as a result of alteration of wetland habitats; Annual; Flowering Feb-Oct; Fruiting Feb-Sept

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G4T3	State Rank: S2

Last Update: 7/12/2022

SAN PATRICIO COUNTY

AMPHIBIANS

black-spotted newt *Notophthalmus meridionalis*

Terrestrial and aquatic: Terrestrial habitats used by adults are typically poorly drained clay soils that allow for the formation of ephemeral wetlands. A wide variety of vegetation associations are known to be used, such as thorn scrub and pasture. Aquatic habitats used for reprodution are a variety of ephemeral and permanent water bodies.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3

sheep frog *Hypopachus variolosus*

Terrestrial and aquatic: Predominantly grassland and savanna; largely fossorial in areas with moist microclimates.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G5 State Rank: S4

South Texas siren (Large Form) *Siren sp. 1*

Aquatic: Mainly found in bodies of quiet water, permanent or temporary, with or without submergent vegetation. Wet or sometimes wet areas, such as arroyos, canals, ditches, or even shallow depressions; aestivates in the ground during dry periods, but does require some moisture to remain.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: GNRQ State Rank: S1

Strecker's chorus frog *Pseudacris streckeri*

Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3

BIRDS

bald eagle *Haliaeetus leucocephalus*

Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3B,S3N

black rail *Laterallus jamaicensis*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: LT State Status: T SGCN: Y

Endemic: N Global Rank: G3 State Rank: S2

SAN PATRICIO COUNTY

BIRDS

black skimmer *Rynchops niger*

Habitat description is not available at this time.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S2B

Franklin's gull *Leucophaeus pipixcan*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S2N

lark bunting *Calamospiza melanocorys*

Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S4B

mountain plover *Charadrius montanus*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G3 | State Rank: S2

piping plover *Charadrius melodus*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: LT | State Status: T | SGCN: Y
Endemic: N | Global Rank: G3 | State Rank: S2N

SAN PATRICIO COUNTY

BIRDS

reddish egret *Egretta rufescens*

Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G4 State Rank: S2B

rufa red knot *Calidris canutus rufa*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.

Federal Status: LT State Status: T SGCN: Y

Endemic: N Global Rank: G4T2 State Rank: S2N

Sprague's pipit *Anthus spragueii*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3G4 State Rank: S3N

swallow-tailed kite *Elanoides forficatus*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G5 State Rank: S2B

Texas Botteri's sparrow *Peucaea botterii texana*

Grassland and short-grass plains with scattered bushes or shrubs, sagebrush, mesquite, or yucca; nests on ground of low clump of grasses

Federal Status: State Status: T SGCN: N

Endemic: N Global Rank: G4T4 State Rank: S3B

western burrowing owl *Athene cunicularia hypugaea*

Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4T4 State Rank: S2

white-faced ibis *Plegadis chihi*

SAN PATRICIO COUNTY

BIRDS

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4B

white-tailed hawk *Buteo albicaudatus*

Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S4B

whooping crane *Grus americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S1S2N

wood stork *Mycteria americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: SHB,S2N

FISH

oceanic whitetip shark *Carcharhinus longimanus*

Habitat description is not available at this time.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: GNR	State Rank: S2

SAN PATRICIO COUNTY

FISH

opossum pipefish *Microphis brachyurus*

Adults are only found in low salinity waters of estuaries or freshwater tributaries within 30 miles of the coast (Gilmore 1992), where they also give birth. Young move or are carried into more saline waters off the coast after birth. Newly released larvae must have conditions near 18 ppt salinity for at least two weeks after birth to survive, indicating a physiology adapted for downstream transport to estuarine and marine environments (Frias-Torres 2002). Juvenile migration toward the ocean depends on water flow regimes, salinity, and vegetation for cover and capturing prey (Frias-Torres 2002). Seawalls, docks, and riprap construction destroy habitat and poor water quality and alteration of flow regimes may prevent migration (NMFS 2009).

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4G5 State Rank: S3N

shortfin mako shark *Isurus oxyrinchus*

Habitat description is not available at this time.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: GNR State Rank: S2

snook *Centropomus undecimalis*

Juvenile common snook are generally restricted to the protection of riverine, salt marshes, seagrass beds, and estuary environments. These environments offer shallow water and an overhanging vegetative shoreline. Juvenile common snook can survive in waters with lower oxygen levels than adults. Adult common snook inhabit many fresh, estuarine, and marine environments including mangrove forests, beaches, river mouths, nearshore reefs, salt marshes, sea grass meadows, and near structure (pilings, artificial reefs, etc.). Adult common snook appear to be less sensitive to cold water temperatures than larvae or small juveniles. The lower lethal limit of water temperature is 48.2°-57.2° F (9°-14° C) for juveniles and 42.8°-53.6° F (6°-12° C) for adults (Hill 2005, Press 2010).

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3?

southern flounder *Paralichthys lethostigma*

This is an estuarine-dependent species that inhabits riverine, estuarine and coastal waters, and prefers muddy, sandy, or silty substrates (Reagan and Wingo 1985). Individuals can tolerate wide temperature (~5-35°C) and salinity ranges (0-60 ppt). Southern Flounder spawn in offshore waters of the Gulf of Mexico from October to February (Reagan and Wingo 1985). The oceanic larval stage is pelagic and lasts 30–60 days. Metamorphosing individuals enter estuaries and migrate towards low-salinity headwaters, where settlement occurs (Burke et al. 1991, Walsh et al. 1999). The young fish enter the bays during late winter and early spring, occupying seagrass; some may move further into coastal rivers and bayous. Juveniles remain in estuaries until the onset of sexual maturation (approximately two years), at which time they migrate out of estuaries to join adults on the inner continental shelf. Adult southern flounder leave the bays during the fall for spawning in the Gulf of Mexico. They spawn for the first time when two years old at depths of 50 to 100 feet. Although most of the adults leave the bays and enter the Gulf for spawning during the winter, some remain behind and spend winter in the bays. Those in the Gulf will reenter the bays in the spring. The spring influx is gradual and does not occur with large concentrations that characterize the fall emigration.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S5

SAN PATRICIO COUNTY

INSECTS

American bumblebee *Bombus pensylvanicus*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: G3G4 State Rank: SNR

Manfreda giant-skipper *Stallingsia maculosus*

Most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G1 State Rank: S1

No accepted common name *Disonycha stenosticha*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: GNR State Rank: SNR

No accepted common name *Cenophengus pallidus*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: GNR State Rank: SNR

No accepted common name *Dacoderus steineri*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: GNR State Rank: SNR

No accepted common name *Cryptocephalus downiei*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: G1 State Rank: SH

No accepted common name *Ormiscus albofasciatus*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Global Rank: GNR State Rank: S2

SAN PATRICIO COUNTY

MAMMALS

big free-tailed bat *Nyctinomops macrotis*

Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S3

blue whale *Balaenoptera musculus*

Inhabits tropical, subtropical, temperate, and subpolar waters worldwide, but are infrequently sighted in the Gulf of Mexico. They migrate seasonally between summer feeding grounds and winter breeeding grounds, but specifics vary. Commonly observed at the surface in open ocean.

Federal Status: LE | State Status: E | SGCN: Y
Endemic: N | Global Rank: G3G4 | State Rank: SH

cave myotis bat *Myotis velifer*

Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G4G5 | State Rank: S2S3

eastern red bat *Lasiurus borealis*

Red bats are migratory bats that are common across Texas. They are most common in the eastern and central parts of the state, due to their requirement of forests for foliage roosting. West Texas specimens are associated with forested areas (cottonwoods). Also common along the coastline. These bats are highly mobile, seasonally migratory, and practice a type of "wandering migration". Associations with specific habitat is difficult unless specific migratory stopover sites or wintering grounds are found. Likely associated with any forested area in East, Central, and North Texas but can occur statewide.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G3G4 | State Rank: S4

eastern spotted skunk *Spilogale putorius*

Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.

Federal Status: | State Status: | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: S1S3

Gulf of Mexico Bryde's whale *Balaenoptera ricei*

Habitat description is not available at this time.

Federal Status: LE | State Status: E | SGCN: N
Endemic: N | Global Rank: G1 | State Rank: SNR

hoary bat *Lasiurus cinereus*

SAN PATRICIO COUNTY

MAMMALS

Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.

Federal Status: State Status: SGCN: Y
Endemic: N Global Rank: G3G4 State Rank: S4

humpback whale *Megaptera novaeangliae*

Inhabits tropical, subtropical, temperate, and subpolar waters world wide. Migrate up to 5,000 miles between colder water (feeding grounds) and warmer water (calving grounds) each year. They will use both open ocean and coastal waters, sometimes including inshore areas such as bays, and are often found near the surface; however, this species is rare in the Gulf of Mexico. The northwest Atlantic/Gulf of Mexico distinct population segment is not considered at risk of extinction and is not listed as Endangered on the Endangered Species Act.

Federal Status: LE State Status: SGCN: Y
Endemic: N Global Rank: G4 State Rank: SNR

long-tailed weasel *Mustela frenata*

Includes brushlands, fence rows, upland woods and bottomland hardwoods, forest edges & rocky desert scrub. Usually live close to water.

Federal Status: State Status: SGCN: Y
Endemic: N Global Rank: G5 State Rank: S5

maritime pocket gopher *Geomys personatus maritimus*

Fossorial, in deep sandy soils; feeds mostly from within burrow on roots and other plant parts, especially grasses; ecologically important as prey species and in influencing soils, microtopography, habitat heterogeneity, and plant diversity

Federal Status: State Status: SGCN: Y
Endemic: Y Global Rank: G4T2 State Rank: S2

mountain lion *Puma concolor*

Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains & riparian zones.

Federal Status: State Status: SGCN: Y
Endemic: N Global Rank: G5 State Rank: S2S3

North Atlantic right whale *Eubalaena glacialis*

Inhabits subtropical and temperate waters in the northern Atlantic. Commonly found in coastal waters or clsoe to the continental shelf near the surface. They migrate from feeding grounds in cooler waters (Canada and New England) to warmer waters of the southeast US (South Carolina, Georgia, and Florida) to give birth in the fall/winter - both areas are identified as critical habitat by NOAA-NMFS. Nursery areas are in shallow, coastal waters. This species is very rare in the Gulf of Mexico and the few reported sightings are likely vagrants (Ward-Geiger etal 2011).

Federal Status: LE State Status: E SGCN: Y
Endemic: N Global Rank: G1 State Rank: S1

SAN PATRICIO COUNTY

MAMMALS

northern yellow bat *Lasiurus intermedius*

Occurs mainly along the Gulf Coast but inland specimens are not uncommon. Prefers roosting in spanish moss and in the hanging fronds of palm trees. Common where this vegtation occurs. Found near water and forages over grassy, open areas. Males usually roost solitarily, whereas females roost in groups of several individuals.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S4

ocelot *Leopardus pardalis*

Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.

Federal Status: LE State Status: E SGCN: Y

Endemic: N Global Rank: G4 State Rank: S1

sei whale *Balaenoptera borealis*

Habitat description is not available at this time.

Federal Status: LE State Status: E SGCN: N

Endemic: N Global Rank: G3 State Rank: SNR

southern yellow bat *Lasiurus ega*

Relict palm grove is only known Texas habitat. Neotropical species roosting in palms, forages over water; insectivorous; breeding in late winter. Roosts in dead palm fronds in ornamental palms in urban areas.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3S4

sperm whale *Physeter macrocephalus*

Inhabits tropical, subtropical, and temperate waters world wide, avoiding icey waters. Distribution is highly dependent on their food source (squids, sharks, skates, and fish), breeding, and composition of the pod. In general, this species migrates from north to south in the winter and south to north in the summer; however, individuals in tropical and temperate waters don't seem to migrate at all. Routinely dive to catch their prey (2,000-10,000 feet) and generally occupies water at least 3,300 feet deep near ocean trenches.

Federal Status: LE State Status: E SGCN: Y

Endemic: N Global Rank: G3G4 State Rank: S1

swamp rabbit *Sylvilagus aquaticus*

Primarily found in lowland areas near water including: cypress bogs and marshes, floodplains, creeks and rivers.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S5

SAN PATRICIO COUNTY

MAMMALS

tricolored bat *Perimyotis subflavus*

Forest, woodland and riparian areas are important. Caves are very important to this species.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3G4 State Rank: S2

West Indian manatee *Trichechus manatus*

Large rivers, brackish water bays, coastal waters. Warm waters of the tropics, in rivers and brackish bays but may also survive in salt water habitats. Very sensitive to cold water temperatures. Rarely occurring as far north as Texas.   Gulf and bay system; opportunistic, aquatic herbivore.

Federal Status: LT State Status: T SGCN: Y

Endemic: N Global Rank: G2G3 State Rank: S1

western hog-nosed skunk *Conepatus leuconotus*

Habitats include woodlands, grasslands & deserts, to 7200 feet, most common in rugged, rocky canyon country; little is known about the habitat of the ssp. telmalestes

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4 State Rank: S4

white-nosed coati *Nasua narica*

Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G5 State Rank: S1

MOLLUSKS

No accepted common name *Praticolella candida*

Habitat description is not available at this time.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2 State Rank: S2

REPTILES

Atlantic hawksbill sea turtle *Eretmochelys imbricata*

Inhabit tropical and subtropical waters worldwide, in the Gulf of Mexico, especially Texas. Hatchling and juveniles are found in open, pelagic ocean and closely associated with floating lgae/seagrass mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water lmore than 65 feet deep. They feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand. Some migrate, but others stay close to foraging areas - females are philopatric.

Federal Status: LE State Status: E SGCN: Y

Endemic: N Global Rank: G3 State Rank: S2

SAN PATRICIO COUNTY

REPTILES

green sea turtle *Chelonia mydas*

Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September). Adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds.

Federal Status: LT State Status: T SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3B,S3N

northern scarlet snake *Cemophora coccinea*

Terrestrial: Prefers well drained soils with pine, hardwood, or mixed hardwood scrub in addition to open grassland habitats with appropriate soils.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G5 State Rank: S4

prairie skink *Plestiodon septentrionalis*

The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S2

salt marsh snake *Nerodia clarkii*

This species is generally restricted to the brackish marshes and islands of the mid and upper coastline. It can be found further inland in shallow freshwater marshes.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4 State Rank: S3

slender glass lizard *Ophisaurus attenuatus*

Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5 State Rank: S3

Tamaulipan spot-tailed earless lizard *Holbrookia subcaudalis*

Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: GNR State Rank: S2

SAN PATRICIO COUNTY

REPTILES

Texas diamondback terrapin *Malaclemys terrapin littoralis*

Coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive. Bay islands are important habitats. Nests on oyster shell beaches.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G4T3 State Rank: S2

Texas horned lizard *Phrynosoma cornutum*

Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G4G5 State Rank: S3

Texas indigo snake *Drymarchon melanurus erebennus*

Terrestrial: Thornbush-chaparral woodland of south Texas, in particular dense riparian corridors.Can do well in suburban and irrigated croplands. Requires moist microhabitats, such as rodent burrows, for shelter.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G5T4 State Rank: S4

Texas scarlet snake *Cemophora lineri*

Terrestrial: Prefers well drained soils with a variety of forest, grassland, and scrub habitats.

Federal Status: State Status: T SGCN: Y

Endemic: Y Global Rank: G2 State Rank: S1S2

Texas tortoise *Gopherus berlandieri*

Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.

Federal Status: State Status: T SGCN: Y

Endemic: N Global Rank: G4 State Rank: S2

timber (canebrake) rattlesnake *Crotalus horridus*

Terrestrial: Swamps, floodplains, upland pine and deciduous woodland, riparian zones, abandoned farmland. Limestone bluffs, sandy soil or black clay. Prefers dense ground cover, i.e. grapevines, palmetto.

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4 State Rank: S4

SAN PATRICIO COUNTY

REPTILES

western box turtle *Terrapene ornata*

Terrestrial: Ornate or western box trutles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

western massasauga *Sistrurus tergeminus*

Terrestrial: Shortgrass or mixed grass prairie, with gravel or sandy soils. Often found associated with draws, floodplains, and more mesic habitats within the arid landscape. Frequently occurs in shrub encroached grasslands.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3G4	State Rank: S3

PLANTS

arrowleaf milkvine *Matelea sagittifolia*

Most consistently encountered in thornscrub in South Texas; Perennial; Flowering March-July; Fruiting April-July and Dec?

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

Billie's bitterweed *Tetraneuris turneri*

Grasslands on shallow sandy soils and caliche outcrops (Carr 2015).

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

coastal gay-feather *Liatris bracteata*

Coastal prairie grasslands of various types, from salty prairie on low- lying somewhat saline clay loams to upland prairie on nonsaline clayey to sandy loams; flowering in fall

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G2G3	State Rank: S2S3

crestless onion *Allium canadense var. ecristatum*

Occurs on poorly drained sites on sandy substrates within coastal prairies of the Coastal Bend area (Carr 2015).

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G5T3	State Rank: S3

Croft's bluet *Houstonia croftiae*

Occurs in sparsely vegetated areas in grasslands or among shrubs (Carr 2015).

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G3	State Rank: S3

SAN PATRICIO COUNTY

PLANTS

Drummond's rushpea *Hoffmannseggia drummondii*

Open areas on sandy clay; Perennial

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3

Elmendorf's onion *Allium elmendorfii*

Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; Perennial; Flowering March-April, May

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2 State Rank: S2

Greenman's bluet *Houstonia parviflora*

Grass pastures. Feb- Apr. (Correll and Johnston 1970).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

Indianola beakrush *Rhynchospora indianolensis*

Locally abundant in cattle pastures in some areas (at least during wet years), possibly becoming a management problem in such sites; Perennial; Flowering/Fruiting April-Nov

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3Q State Rank: S3

Jones's rainlilly *Cooperia jonesii*

Hardpan swales and other seasonally moist low areas (Jones 1977). Flowering mid summer--early fall (Jul--Oct) (Flagg, Smith & Flory 2002).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3Q State Rank: S3

large selenia *Selenia grandis*

Occurs in seasonally wet clayey soils in open areas; Annual; Flowering Jan-April; Fruiting Feb-April

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

lila de los Llanos *Echeandia chandleri*

Most commonly encountered among shrubs or in grassy openings in subtropical thorn shrublands on somewhat saline clays of lomas along Gulf Coast near mouth of Rio Grande; also observed in a few upland coastal prairie remnants on clay soils over the Beaumont Formation at inland sites well to the north and along railroad right-of-ways and cemeteries; flowering (May-) September-December, fruiting October-December

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G2G3 State Rank: S2S3

SAN PATRICIO COUNTY

PLANTS

low spurge *Euphorbia peplidion*

Occurs in a variety of vernally-moist situations in a number of natural regions; Annual; Flowering Feb-April; Fruiting March-April

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

net-leaf bundleflower *Desmanthus reticulatus*

Mostly on clay prairies of the coastal plain of central and south Texas; Perennial; Flowering April-July; Fruiting April-Oct

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

plains gumweed *Grindelia oolepis*

Coastal prairies on heavy clay (blackland) soils, often in depressional areas, sometimes persisting in areas where management (mowing) may maintain or mimic natural prairie disturbance regimes; crawfish lands; on nearly level Victoria clay, Edroy clay, claypan, possibly Greta within Orelia fine sandy loam over the Beaumont Formation, and Harlingen clay; roadsides, railroad rights-of-ways, vacant lots in urban areas, cemeteries; flowering April-December

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G2 State Rank: S2

Refugio rainlily *Zephyranthes refugiensis*

Occurs on deep heavy black clay soils or sandy loams in swales or drainages on herbaceous grasslands or shrublands on level to rolling landscapes underlain by the Lissie Formation.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2G3 State Rank: S2S3

roughseed sea-purslane *Sesuvium trianthemoides*

Dunes and perhaps in saline clay of tidal flats or ephemeral ponds within a dune landscape; likely flowering June-August

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: GH State Rank: SH

sand Brazos mint *Brazoria arenaria*

Sandy areas in South Texas; Annual; Flowering/Fruiting March-April

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

seaside beebalm *Monarda maritima*

Occurs in grasslands and pastures on sandy soil near the coast (Carr 2015).

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2Q State Rank: S2

South Texas false cudweed *Pseudognaphalium austrotexanum*

SAN PATRICIO COUNTY

PLANTS

In sandy grasslands on eroded area above saline flats; along edge of sendero through mesquite woodland and shrub mottes on sandy loam; on gravel and silt bars and flats in scour plain of streams (TEX-LL specimens Carr 23682, 29264, 22647, 27206). Oct-Jan, sometimes in spring.

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

South Texas spikesedge *Eleocharis austrotexana*

Occurring in miscellaneous wetlands at scattered locations on the coastal plain; Perennial; Flowering/Fruiting Sept

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G3	State Rank: S3

South Texas yellow clammyweed *Polanisia erosa ssp. breviglandulosa*

Sand plains of south Texas (Iltis 1958). Flowering early spring-mid fall.

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G5T3T4	State Rank: S3S4

Texas peachbush *Prunus texana*

Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; Perennial; Flowering Feb-Mar; Fruiting Apr-Jun

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G3G4	State Rank: S3S4

Texas stonecrop *Lenophyllum texanum*

Found in shrublands on clay dunes (lomas) at the mouth of the Rio Grande and on xeric calcareous rock outcrops at scattered inland sites; Perennial; Flowering/Fruiting Nov-Feb

Federal Status:	State Status:	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S3

Texas willkommia *Willkommia texana var. texana*

Mostly in sparsely vegetated shortgrass patches within taller prairies on alkaline or saline soils on the Coastal Plain (Carr 2015).

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G3G4T3	State Rank: S3

Texas windmill grass *Chloris texensis*

Sandy to sandy loam soils in relatively bare areas in coastal prairie grassland remnants, often on roadsides where regular mowing may mimic natural prairie fire regimes; flowering in fall

Federal Status:	State Status:	SGCN: Y
Endemic: Y	Global Rank: G2	State Rank: S2

SAN PATRICIO COUNTY

PLANTS

Tharp's dropseed *Sporobolus tharpii*

Occurs on barrier islands, shores of lagoons and bays protected by the barrier islands, and on shores of a few near-coastal ponds. Plants occur at the bases of dunes, in interdune swales and sandflats, and on upper beaches. The substrate is of Holocene age.

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

threeflower broomweed *Thurovia triflora*

Near coast in sparse, low vegetation on a veneer of light colored silt or fine sand over saline clay along drier upper margins of ecotone between between salty prairies and tidal flats; further inland associated with vegetated slick spots on prairie mima mounds; flowering September-November

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2G3 State Rank: S2S3

tree dodder *Cuscuta exaltata*

Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; Annual; Flowering May-Oct; Fruiting July-Oct

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G3 State Rank: S3

velvet spurge *Euphorbia innocua*

Open or brushy areas on coastal sands and the South Texas Sand Sheet; Perennial; Flowering Sept-April; Fruiting Nov-July

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G3 State Rank: S3

Welder machaeranthera *Psilactis heterocarpa*

Grasslands , varying from midgrass coastal prairies, and open mesquite-huisache woodlands on nearly level, gray to dark gray clayey to silty soils; known locations mapped on Victoria clay, Edroy clay, Dacosta sandy clay loam over Beaumont and Lissie formations; flowering September-November

Federal Status: State Status: SGCN: Y

Endemic: Y Global Rank: G2G3 State Rank: S2S3

Wright's trichocoronis *Trichocoronis wrightii var. wrightii*

Most records from Texas are historical, perhaps indicating a decline as a result of alteration of wetland habitats; Annual; Flowering Feb-Oct; Fruiting Feb-Sept

Federal Status: State Status: SGCN: Y

Endemic: N Global Rank: G4T3 State Rank: S2

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411
Phone: (281) 286-8282 Fax: (281) 488-5882

In Reply Refer To: September 09, 2022
Project Code: 2022-0084130
Project Name: CCSC BU

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The U.S. Fish and Wildlife Service (Service) field offices in Clear Lake, Tx, and Corpus Christi, Tx, have combined administratively to form the Texas Coastal Ecological Services Field Office. A map of the Texas Coastal Ecological Services Field Office area of responsibility can be found at: http://www.fws.gov/southwest/es/TexasCoastal/Map.html. All project related correspondence should be sent to the field office responsible for the area in which your project occurs. For projects located in southeast Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; 17629 El Camino Real Ste. 211; Houston, Texas 77058. For projects located in southern Texas please write to: Field Supervisor; U.S. Fish and Wildlife Service; P.O. Box 81468; Corpus Christi, Texas 78468-1468. For projects located in six counties in southern Texas (Cameron, Hidalgo, Starr, Webb, Willacy, and Zapata) please write: Santa Ana NWR, ATTN: Ecological Services Sub Office, 3325 Green Jay Road, Alamo, Texas 78516.

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.
A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF
Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Marine Mammals
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, TX 78411
(281) 286-8282

Project Summary

Project Code: 2022-0084130
Project Name: CCSC BU
Project Type: Disposal - Beneficial Use
Project Description: Placement of Beneficial Use material within degraded Nueces estuary habitats.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@27.8568258,-97.51102110393055,14z

Counties: Nueces and San Patricio counties, Texas

Endangered Species Act Species

There is a total of 15 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. The location of the critical habitat is not available. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.*** Species profile: https://ecos.fws.gov/ecp/species/4469	Threatened

Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Northern Aplomado Falcon *Falco femoralis septentrionalis* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1923	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle *Lepidochelys kempii* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Black Lace Cactus *Echinocereus reichenbachii var. albertii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5560	Endangered
Slender Rush-pea *Hoffmannseggia tenella* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5298	Endangered
South Texas Ambrosia *Ambrosia cheiranthifolia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3331	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
American Oystercatcher *Haematopus palliatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8935	Breeds Apr 15 to Aug 31
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15

NAME	BREEDING SEASON
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Dickcissel *Spiza americana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 5 to Aug 31
Gull-billed Tern *Gelochelidon nilotica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9501	Breeds May 1 to Jul 31
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
King Rail *Rallus elegans* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8936	Breeds May 1 to Sep 5
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds elsewhere
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Mountain Plover *Charadrius montanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3638	Breeds elsewhere
Painted Bunting *Passerina ciris* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 25 to Aug 15
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31

NAME	BREEDING SEASON
Reddish Egret *Egretta rufescens* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7617	Breeds Mar 1 to Sep 15
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Sandwich Tern *Thalasseus sandvicensis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 25 to Aug 31
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds elsewhere
Swallow-tailed Kite *Elanoides forficatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8938	Breeds Mar 10 to Jun 30
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wilson's Plover *Charadrius wilsonia* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Aug 20

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

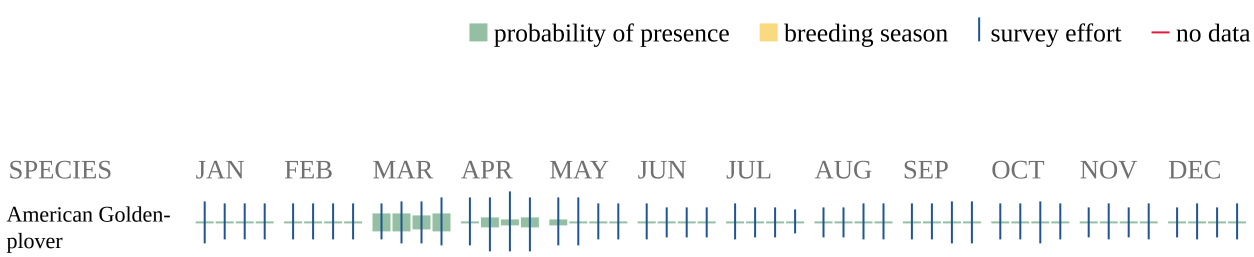
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



BCC Rangewide
(CON)

American Oystercatcher
BCC Rangewide
(CON)

Black Skimmer
BCC Rangewide
(CON)

Chimney Swift
BCC Rangewide
(CON)

Dickcissel
BCC - BCR

Gull-billed Tern
BCC Rangewide
(CON)

Hudsonian Godwit
BCC Rangewide
(CON)

King Rail
BCC Rangewide
(CON)

Lesser Yellowlegs
BCC Rangewide
(CON)

Long-billed Curlew
BCC - BCR

Marbled Godwit
BCC Rangewide
(CON)

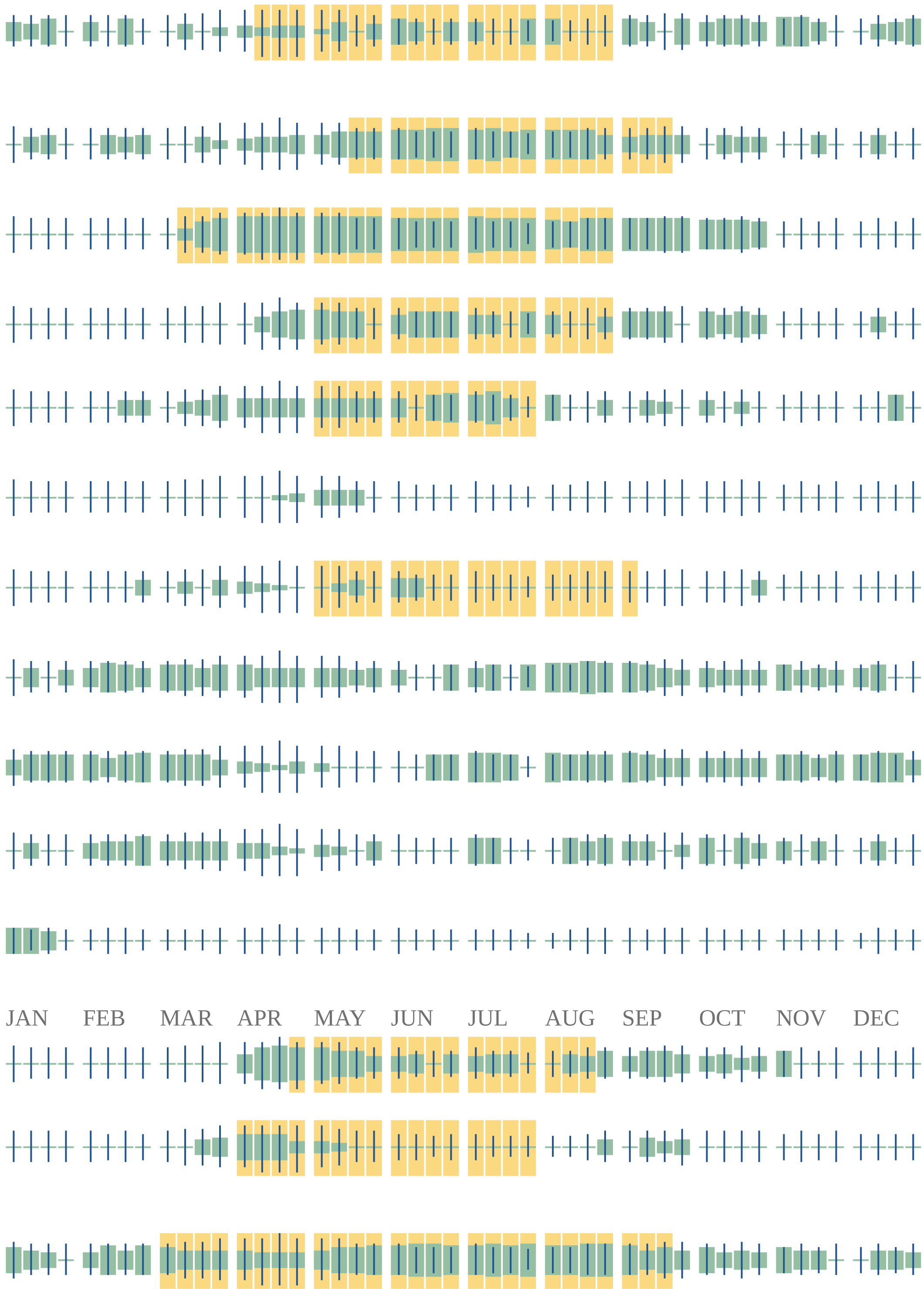
Mountain Plover
BCC Rangewide
(CON)

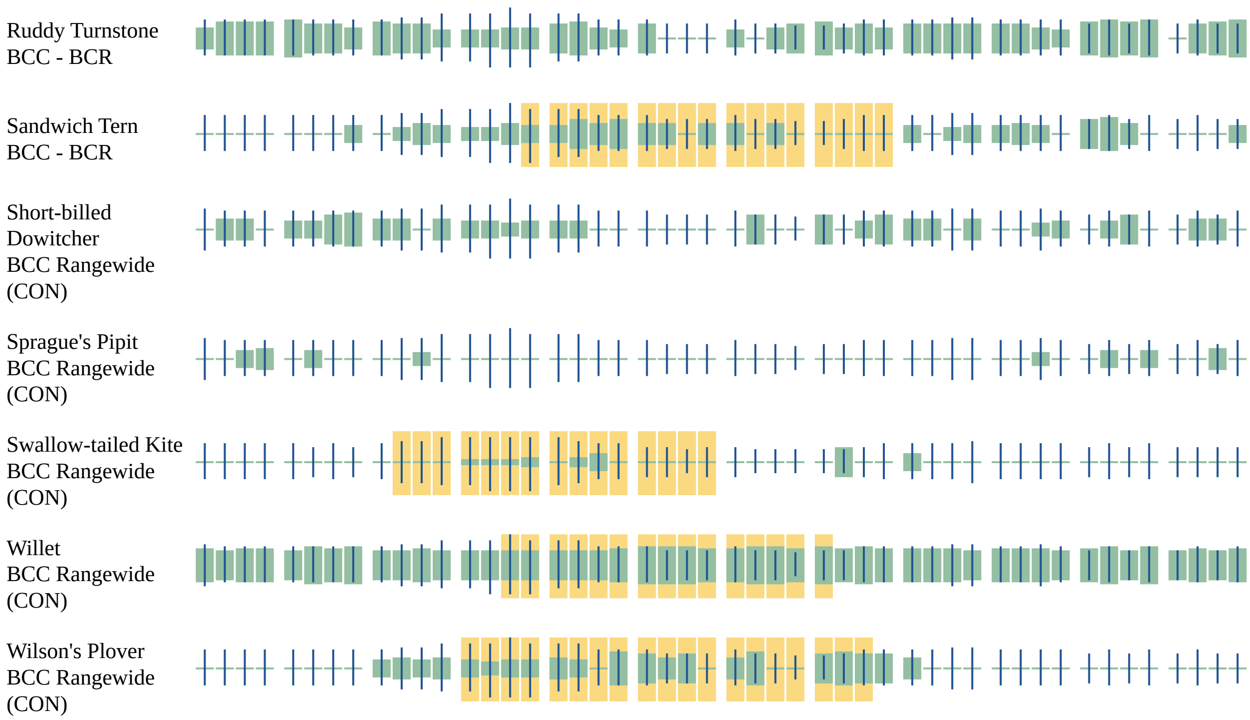
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Painted Bunting
BCC - BCR

Prothonotary Warbler
BCC Rangewide
(CON)

Reddish Egret
BCC Rangewide
(CON)





Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Marine Mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

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1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

NAME

West Indian Manatee *Trichechus manatus*
Species profile: https://ecos.fws.gov/ecp/species/4469

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE

- Lacustrine

RIVERINE

- Riverine

FRESHWATER EMERGENT WETLAND

- Palustrine

ESTUARINE AND MARINE DEEPWATER

- Estuarine

IPaC User Contact Information

Agency: Army Corps of Engineers
Name: Courtney Gerken
Address: 6565 West Loop S
City: Bellaire
State: TX
Zip: 77401
Email courtney@lloydeng.com
Phone: 7134137342

Appendix F

Agency Coordination

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, Texas 78411
PHONE: 361/994-9004
FAX: 361/994-8262

In Reply Refer To:
02ETTX00-2022-0072394

August 10, 2022

Ms. Lisa Finn
Environmental Project Manager
U.S. Army Corps of Engineers,
Galveston District
P.O. Box 1229
Galveston, Texas 77553-1229

Dear Ms. Finn:

The U.S. Fish and Wildlife Service (Service) received your August 4, 2022, letter requesting comments relative to the U.S. Army Corps of Engineers (Corps) proposed beneficial use of approximately 5 million cubic yards of dredged material from the Corpus Christi Ship Channel Deepening and Widening Project. Service staff also attended agency meetings on April 5 and May 25, 2022, to discuss beneficial use options. The proposed projects would include multiple sites in Nueces Bay, located within Nueces and San Patricio counties, Texas. The Corps proposes placement of material in two locations of the Coastal Bend Bays & Estuaries Program's Nueces Delta Preserve, construction of 2,000 feet of breakwaters in western Nueces Bay, development of a living shoreline along the southern shoreline of Nueces Bay, and construction of a 200-acre upland for industrial use along the southern shoreline of the bay. The placement of material would protect eroding shorelines in Nueces Bay, restore wetland marsh elevations in multiple deteriorating intertidal wetland areas, and provide fill for an industrial use area for the Port of Corpus Christi Authority.

The revised Department of the Interior Manual Instructions (503 DM 1), dated August 3, 1973, assign responsibility for Department of the Interior coordination and review of Corps permit applications to the Service. Our comments are provided in accordance with these instructions, the Fish and Wildlife Coordination Act (16 U.S.C. 661-667(e)), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA) and the National Environmental Policy Act (42 U.S.C. 4321-4347).

Comments

- Material intended for beneficial use and habitat restoration should not contain hazardous substances as found in Volume 40 of the Code of Federal Regulations, Part 302.4. According to the May 25, 2022, meeting notes, the Tule Lake Turning Basin contains relatively higher zinc concentrations. The Corps proposes to place material with relatively higher zinc concentrations in the contained 200-acre industrial site. However, according to Figure 1 in the August 4, 2022, letter, material from the Tule Lake Turning Basin would be used for the living shoreline. The Service recommends that the Corps avoid placing material with elevated concentrations of zinc in the marsh placement areas or the living shoreline areas because those areas are used by wildlife, fisheries, and for recreation, and placement in those areas could further exacerbate contaminant loads already present in Nueces Bay from historic sources.
- The Service recommends including grain size analyses in the Environmental Assessment to help determine best options for placement relative to sediment settling, habitat restoration, and potential contaminants load.
- A map of the habitats within the project areas would be helpful. For example, are there sand flats, wind tidal flats, or algal mats in the proposed project areas that could be used by shorebirds?
- According to the August 4, 2022, letter, material would be hydraulically pumped overland to the identified open water areas within existing marshes and strategically placed within historical marsh areas that are now open water. It is unclear whether the strategic placement can avoid filling existing marsh areas. Will there be unavoidable permanent impacts to adjacent existing marshes, and if so, is mitigation proposed? Does the Corps plan to plant marsh vegetation in the renourishment areas or in the proposed living shoreline?
- The Service requests information in the forthcoming Environmental Assessment about how temporary impacts will be minimized and how wetlands will be restored from pipeline delivery, equipment staging, and access route impacts.
- The proposed project area contains a variety of habitats and man-made structures used by nesting birds. In addition to colonial waterbirds nesting on islands in the bay, many species such as black-necked stilts, least terns, snowy plovers, killdeer, seaside sparrows, and common nighthawks use bare ground, disturbed sites, low marsh, or shrubs along the Nueces Bay shoreline. Cave swallows often nest under bridges and overpasses. To avoid or minimize impacts to these and other species of birds protected by the MBTA, the Service recommends avoiding peak nesting season. Colonial waterbirds nest between February 14 and September 1. Other birds nest primarily between March 15 and September 15. If peak nesting season cannot be avoided, the Service recommends conducting bird surveys no more than five days prior to ground-disturbing activities, mechanical clearing of brush and trees, or modifications of existing bridge or overpass structures. Surveys should look for birds, nests, and eggs. If active nests are found, the Service recommends leaving a buffer of vegetation at least 100 feet around nests until young have fledged or the nest is abandoned. However, nesting raptors need larger

buffers of at least 0.5 miles and the recommended equipment set back distance for colonial waterbird rookery islands is 1,000 feet.

Threatened and Endangered Species
Below is the list of threatened and endangered species and critical habitat for Nueces and San Patricio counties, followed by additional technical assistance information:

Black lace cactus	(E)	*Echinocereus reichenbachii* var. *albertii*
Eastern black rail	(T)	*Laterallus jamaicensis* ssp. *jamaicensis*
Green sea turtle	(T)	*Chelonia mydas*
Hawksbill sea turtle	(E w/CHI)	*Eretmochelys imbricata*
Kemp's ridley sea turtle	(E)	*Lepidochelys kempii*
Leatherback sea turtle	(E w/CHI)	*Dermochelys coriacea*
Loggerhead sea turtle	(T)	*Caretta caretta*
Monarch butterfly	(C)	*Danaus plexippus*
Northern aplomado falcon	(E)	*Falco femoralis septentrionalis*
Ocelot	(E)	*Leopardus pardalis*
Piping plover	(T w/CH)	*Charadrius melodus*
Red knot	(T w/pCH)	*Calidris canutus* ssp. *rufa*
Slender rush-pea	(E)	*Hoffmannseggia tenella*
South Texas ambrosia	(E)	*Ambrosia cheiranthifolia*
West Indian manatee	(T)	*Trichechus manatus*
Whooping crane	(E w/CH)	*Grus americana*

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E	=	Species in danger of extinction throughout all or a significant portion of its range.
T	=	Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
C	=	Species for which the Service has on file enough substantial information to warrant listing as threatened or endangered.
CH	=	Critical Habitat (in Texas unless annotated I)
p	=	Proposed
I	=	CH designated (or proposed) outside Texas

- West Indian manatees occur occasionally in Texas coastal waters and a manatee was recently sighted in the Inner Harbor of the Corpus Christi Ship Channel on June 26, 2022. If a manatee is observed, contact the Service at 361-533-6765 and the Texas Marine Mammal Stranding Network hotline at 800-962-6625. Siltation barriers and other structures must be made of material that will not entangle manatees, be properly secured, and are regularly monitored during construction to avoid entrapment. If a manatee is seen within 100 yards of the active work zone or vessel movements, all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions include no operation of any moving equipment within 50 feet of a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Activities will not resume until the manatee(s) has departed the project areas of its own volition. Do not feed or water the manatee.

- Eastern black rails may be present in Nueces and San Patricio counties year-round and are known to occur in the Nueces Delta Preserve and near Tule Lake. The species is most vulnerable during breeding, chick rearing, and the flightless molt period. Where black rail presence is possible, avoid disturbance activities March 1 through September 30 in suitable habitat (e.g., dense herbaceous groundcover, moist soils that can be occasionally dry, interspersed with or adjacent to shallow water, of depths ranging from 0 to 6 centimeters). If this timing restriction cannot be achieved, then the Service recommends eastern black rail surveys prior to the start of the proposed action to assess breeding activity within the planned project area. Or project proponents may assume presence of the eastern black rails within suitable habitat. For survey recommendations, please coordinate with the Texas Coastal Ecological Services Office.
- Whooping cranes occur in Nueces and San Patricio counties during their wintering season, November 1 through April 30. If construction is necessary during the whooping crane wintering season, all work crews should be trained in whooping crane identification prior to the start of construction. If a whooping crane is identified within 1,000 feet of an active project area, all work should immediately stop. When the crane has left the 1,000-foot area on its own accord, work may continue. During the wintering season, all equipment (permanent or construction) greater than 15 feet high should be laid down at dusk and overnight, to avoid whooping crane strikes during times of low visibility. If equipment cannot be laid down at dusk or overnight, then such equipment will be marked using surveyors flagging tape, red plastic balls or other suitable marking devices and lighted during inclement weather conditions when low light and/or fog is present. Report all whooping crane sightings to the Texas Coastal Ecological Services Field Office at 361-533-6765.
- Piping plovers and red knots occur throughout coastal Texas on beaches, sandflats, tidal flats, and algal flats. If habitat for these shorebirds occurs within the project area, piping plovers may be present from July 15 to April 1, and red knots could be present from July 25 to May 15. Piping plovers and red knots are especially vulnerable during periods of cold temperature, inclement weather, and when roosting. Avoid working in shorebird habitats when winter winds exceed 20 miles per hour and temperatures drop below 40 degrees. These conditions cause the birds to roost, often in vehicle ruts or next to debris, to conserve energy. Prior to moving parked vehicles or equipment in shorebird habitats, search the ground around the equipment to avoid crushing shorebirds that may be roosting underneath. Mud or wind tidal flats compress under the weight of vehicles and heavy equipment, and the resulting depressions or ruts may remain for years. These ruts act as dams, depriving the upper reaches of wind tidal flats from salt water, thereby reducing survival of benthic infauna that the birds feed on. After the project is completed, the mud or wind tidal flats should be restored to preconstruction slope and contours, and all ruts should be leveled.
- The Service recommends that the Applicant recognize the potential for sea turtles to be present in the water and to contact the National Marine Fisheries Service for best

management practices and/or consultation if needed. If dead, injured, or cold-stunned sea turtles are encountered in the project area, immediately report them to the Texas Sea Turtle Stranding and Salvage Network, Padre Island National Seashore at 361-949-8173 ext. 226, or the Texas Sea Turtle Hotline at 866-887-8535 (866-TURTLE-5).

The Service appreciates the opportunity to review the proposed project. If you have questions regarding these comments, please contact Mary Kay Skoruppa at 361-225-7314, or by email at mary_kay_skoruppa@fws.gov.

Sincerely,

E. Dawn Gardiner

Dawn Gardiner
for Charles Ardizzone
Field Supervisor

cc: Environmental Protection Agency, Region 6, Dallas, TX
Texas Parks and Wildlife Department, Corpus Christi, TX
National Marine Fisheries Service, Galveston, TX
Texas Commission on Environmental Quality, Austin, TX

Jason Seitz

From: Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil>
Sent: Tuesday, August 23, 2022 7:11 PM
To: Justin Wiedeman
Cc: Marisa Weber; Courtney Gerken
Subject: FW: [Non-DoD Source] Re: FW: CCSC CIP BU of dredged material

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From: charrish stevens - NOAA Federal <charrish.stevens@noaa.gov>
Sent: Tuesday, August 23, 2022 3:26 PM
To: Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil>; _NMFS ser HCDconsultations <nmfs.ser.hcdconsultations@noaa.gov>
Cc: Swafford, Rusty <rusty.swafford@noaa.gov>
Subject: [Non-DoD Source] Re: FW: CCSC CIP BU of dredged material

Hello Lisa,

The National Marine Fishery Service (NMFS) Habitat Conservation District (HCD) has received your email dated April 5, 2022, requesting early coordination for Essential Fish Habitat (EFH) regarding placement of dredged material from the Corpus Christi Ship Channel (CCSC) Channel Improvement Project - Contract 4 - Beneficial Use (BU) Project. The dredging and widening will take place within the Inner Harbor and Channel of the CCSC and BU placement would take place at five sites within the Nueces Bay system in Nueces and San Patricio Counties, Texas.

We had early coordination with the U.S. Army Corps of Engineers (USACE) back in May of 2022, to discuss the project plans in detail, selected BU sites and placement plans, and to provide technical assistance, which provided guidelines on breakwater designs and the need to incorporate fish gaps to allow for adequate fish passage. We recommended the overall length of each breakwater segment not exceed 500 linear feet without incorporating, at a minimum, a 20 foot gap to allow for fish passage and water movement. We also discussed if fish gaps need to be armored, then the overall height of the dips should not exceed 12 inches in height from the mud line in waters greater than 2.5 feet deep at Mean Low Low Water (MLLW). If water depths are less than 2.5 feet, then dip height should not exceed eight inches at MLLW and in waters less than 18 inches at MLLW should not exceed six inches in height at mud line. This ensures adequate ingress and egress of all fisheries during MLLA and allows for use of existing EFH located behind proposed breakwater structures.

At this time, NMFS HCD does not have any outstanding issues with the project moving forward provided USACE ensures the fish passages are constructed adequately as mentioned above. The project has been reviewed under the provisions of the Magnuson-Stevens Fishery Conservation and Management Act. We concur the project will not have substantial adverse impacts on EFH or managed species. We anticipate any adverse effects, which might occur to marine fishery resources and EFH would be temporary in nature and will have a net benefit to these resources by raising marsh elevations with BU to re-establish lost marsh, stabilizing the shorelines, and protecting EFH from further erosion loss. Therefore, we have no objections to the issuance of this permit. This concludes the EFH consultation with NMFS and no further information is required.

We appreciate your coordination with our office on this project. If you have any additional questions or require additional information, please feel free to contact me via email.

Thank you for your coordination,

Charrish Stevens
Fishery Biologist
Habitat Conservation Division
NOAA National Marine Fisheries Service
4700 Ave U, Galveston, TX 77551

Currently Teleworking contact at
Mobile Number: 713-715-9613

Office Ph: (409) 766-3699
Fax: (409) 766-3575
Email: charrish.stevens@noaa.gov

On Tue, Aug 23, 2022 at 11:53 AM Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil> wrote:

From: Finn, Lisa M CIV USARMY CESWG (USA)
Sent: Friday, August 5, 2022 10:53 AM
To: charrish stevens - NOAA Federal <charrish.stevens@noaa.gov>
Cc: Swafford, Rusty <rusty.swafford@noaa.gov>
Subject: CCSC CIP BU of dredged material

Charrish-

Wanted to send you an email copy of the coordination letter mailed out for Corpus Christi Ship Channel Chanel Improvement Project BU of dredged material. We are developing the Environmental Assessment and look forward to hearing from you.

Thanks-

Lisa Finn
USACE - Operations

P.O. Box 1229, Galveston, TX 77553
Office (409) 766-3949 / BB (409) 974-0362

August 22, 2022

Ms. Lisa Finn
Operations Division-Navigation Section
Galveston District, Corps of Engineers
P.O. Box 1229
Galveston, TX 77553-1229

Re: Corpus Christi Ship Channel – Beneficial Use of Dredged Material

Dear Ms. Finn:

This correspondence is in response to your request for comments, received by letter dated August 3, 2022, pursuant to the Fish and Wildlife Coordination Act. It is our understanding that the U.S. Army Corps of Engineers (USAE), Galveston District (CESWG), is preparing an Environmental Assessment (EA) to evaluate the potential environmental effects associated with placement of dredged material from the Corpus Christi Ship Channel (CCSC) Deepening and Widening Project for Beneficial Use (BU). The proposed project would use dredged material from the CCSC Deepening and Widening Project within five BU placement areas within Nueces Bay in Nueces and San Patricio counties. Texas.

The placement of approximately 5 million cubic yards of material is proposed to be used beneficially to protect the eroding shorelines in Nueces Bay, restore wetland marsh elevations in multiple deteriorating intertidal wetland areas, and for use as beneficial fill for an industrial use area for the Port of Corpus Christi.

As described by the Nueces River and Corpus Christi and Baffin Bays Basin and Bay Expert Science Team (BBEST, 2011), TPWD recognizes the adverse effects that upstream and downstream hydrological alterations have had in the Nueces Estuary. These modifications have contributed to significant habitat degradation primarily by limiting the frequency, magnitude, duration and timing of freshwater and sediment inflows. These conditions have led to subsidence and erosion of the historic Nueces Delta. In addition, these conditions have increased salinity levels which exceed that of bay waters, resulting in the formation of a negative estuary. Despite these adverse effects, the historic Nueces Delta currently provides a mosaic of essential emergent marsh, submerged aquatic vegetation (*Ruppia maritima*), oyster, unvegetated shallow water and open bay habitats for fish and wildlife resources within the Nueces Estuary.

This suite of aquatic features function as nursery and forage habitat for ecologically and economically important shrimps, crabs, and fishes, including those classified as gamefish, recreationally important, or species of greatest conservation need [e.g., red drum (*Sciaenops ocellatus*), southern flounder (*Paralichthys lethostigma*), Atlantic tarpon (*Megalops atlanticus*) and spotted seatrout (*Cynoscion nebulosus*)] as well as ecologically important species, such as forage fish. The historic Nueces Delta is also utilized by the Texas diamondback terrapin (*Malaclemys terrapin littoralis*), which TPWD considers a Species of Greatest Conservation Need (SGCN), and numerous resident and migratory birds that utilize these habitats for forage, cover, roosting, and nesting. By implementing freshwater inflow recommendations, steps have been taken to improve ecosystem functions in the Nueces Estuary. However, TPWD is concerned that the existing hydrology may be unable to fully support the BU goals for habitat establishment and re-establishment as described. For example, the large mitigation project located within the Alison Diversion Channel (or Mitigation Channel), does not receive adequate fresh water to fully support emergent marsh functions.

Delta Marsh Placement Areas and Elbow Marsh Placement Areas

As described in the coordination letter, new work dredged material from CCSC would be hydraulically pumped overland to the identified open water areas within existing marshes and strategically placed within historical marsh areas that have subsided to open water in an effort to sufficiently raise the substrate elevation to allow and encourage the reestablishment of marsh vegetation. During coordination meetings, CESWG has indicated that the proposed project methodology will not include thin layer placement, moving the dredge pipe to create marsh mounds, reworking dredged material, or planting vegetation. Instead, as described in coordination meetings, dredged material would be placed within existing open bay areas of the marsh complex to a uniform elevation.

The proposed placement methodology has the potential to convert existing special aquatic sites to uplands or continuous expanses of lower functioning high marsh, to physically smother or displace fish and wildlife, and to impound interior marsh complexes by impairing hydrological connectivity. Loss of hydrological connectivity would reduce or eliminate recreational access by the public, reduce or eliminate ingress and egress of aquatic life, and further increase residence time within the historic Nueces Delta and degrading water quality. Temporal impacts from hydrological impoundments would be exacerbated during severe drought when environmental pass throughs are suspended due to low water levels in the reservoirs and when infrequent pulse events are unable to provide the hydraulic head necessary to restore hydrological connections through the restoration of existing tidal channels or the creation new tidal channels. TPWD also anticipates that the loss of hydrological connections will result in fish kills or wildlife mortalities due to degradation of water quality.

> **Recommendation:** To avoid and minimize impacts to fish and wildlife resources, the EA should consider alternative placement methods (e.g., thin layer placement, mound creation, recontouring, etc.) as well as alternative

placement areas (e.g., the re-establishment of eroded areas located outside existing marsh complexes as described below).

The proposed project includes placing dredged materials through the use of an overland pipeline route. TPWD has concern for impacts to navigation and aquatic resource functions associated with the overland pipeline route which would require crossing the Nueces River Tidal, existing marsh complexes, and other shallow water habitats.

Recommendation: The EA should describe how impacts to navigation and aquatic resource functions resulting from the overland pipeline route will be avoided and minimized to the extent practicable. Best management practices should address methods, timing, duration, location, and post-construction restoration activities within wetland and waterbody crossings.

Additional Breakwater

The proposed BU project would also include the proposed construction of 2,000 additional feet of breakwater that would extend the previously authorized 3,600-linear-foot Coastal Bend Bays & Estuaries Program (CBBEP) breakwater project at the Nueces Delta. Dredged material would be beneficially used as sacrificial erosion protection on either side of these breakwater structures.

TPWD appreciates efforts to consider the inclusion and extension of the previously authorized breakwaters into the proposed project design. Additional placement of material bayward of the existing marsh complex of the historic Nueces Delta, rather than within the existing marsh complex, has the potential to alleviate concerns for impacts to hydrology that would be associated with the Delta Marsh Placement Areas and Elbow Marsh Placement Areas as described above. The extent to which CESWG has considered the alignment of breakwaters and BU placement with that of the historical marsh edge as identified in Figure 1 is not clear. Such an alignment has the potential to expand opportunities to re-establish marsh elevations while avoiding impacts to sensitive habitats. The extent to which CESWG will model the fate of sacrificial placement material to inform optimal placement and to avoid and minimize adverse effects is also not clear.

Recommendation: In an effort to avoid and minimize impacts, CESWG should consider alternative designs which extend placement areas to the historic marsh edge of the delta for the re-establishment of marsh elevations. The extent to which proposed breakwaters can support this effort should also be considered. Hydrological models should be used, if practicable, to determine the fate of sacrificial material in order to inform optimal placement areas while also assessing potential adverse effects.

Living Shoreline

The proposed living shoreline would be created approximately 300 feet from the Nueces Bay mean high tide mark and would use dredged material to provide elevation and substrate for the establishment of oyster reef, seagrass, or intertidal marsh habitat and protect the shoreline from further erosion. As described, there is insufficient information provided about this project to fully evaluate potential impacts to fish and wildlife resources.

> **Comment:** TPWD looks forward to receiving additional details about the living shoreline project in order to provide substantive recommendations for the avoidance and minimization of fish and wildlife impacts. If the living shoreline includes efforts to plant aquatic vegetation or to seed oysters, an permit to introduce fish, shellfish and aquatic plants would be required to authorize such activities in public water of the state.

Industrial Port Uplands

Representative material sampling has identified higher concentrations of certain metals in the eastern section of the channel area proposed to be dredged. Therefore, dredged material from this channel section would be used beneficially to create an industrial area along the southern shoreline of Nueces Bay. The Nueces Bay is closed to oyster harvest due to elevated levels of zinc and copper found in oyster tissues. It is not clear what assurances will, or can, be made to protect water quality. In addition, the purpose of and need for the industrial area is not clear. TPWD has concern for the conversion of functioning aquatic habitats to uplands for non-water dependent purposes.

> **Recommendation:** The EA should evaluate the potential risk for the release of dredged material with higher concentrations of certain metals into Nueces Bay. To avoid and minimize impacts to fish and wildlife resources, aquatic habitats should not be filled for non-water dependent uses.

Overall, TPWD recognizes that upstream impoundments have adversely affected the sediment budget of the Nueces Estuary, which has contributed to erosion and has exacerbated the effects of subsidence and relative sea level rise. However, TPWD also recognizes that these impoundments and channel modifications have also adversely affected the hydrology of the Nueces Estuary. To successfully re-establish emergent marsh in the historic Nueces Delta, both sediment and hydrology should be considered when developing re-establishment projects within the Nueces Estuary.

> **Recommendations:** In general, the EA should identify the following for each placement area for BU material:
>
> - the location and extent of special aquatic sites within the project areas derived from comprehensive habitat surveys;
> - the location and extent of features that will be avoided during placement activities (e.g., access channels, SAV, etc.);

- best practices that will be implemented to avoid and minimize impacts to water quality and fish and wildlife resources;
- models that will be used to compare the condition before placement with the condition after placement
- success criteria metrics and post-construction monitoring efforts that will be used, if any, to demonstrate a net gain in aquatic resource functions;
- target elevations and reference sites for each habitat type to be established or re-established;
- detailed descriptions of methods or techniques that will be used to place dredged materials, including means and methods that will be implemented to maintain hydrological connectivity within and between existing marsh complexes;
- considerations made for timing activities (e.g., nesting seasons, oyster spawning season, growing season for emergent and submerged aquatic vegetation, etc.); and
- coordination efforts with TPWD Kills and Spills Team to avoid, minimize, and report fish kills or wildlife mortalities that may occur during the project.

TPWD appreciates opportunities provided to coordinate with CESWG and to provide comments and recommendations for the proposed BU project. We look forward to additional opportunities to provide comments and recommendations as project details become more clearly defined. Questions can be directed to Alex Nunez or Jackie Robinson in Corpus Christi by email at Alex.nunez@TPWD.Texas.gov or Jackie.Robinson@TPWD.Texas.gov, or by phone at (361) 431-6003.

Sincerely,

Emma Clarkson, PhD
Regional Director, Ecosystem Resources Program
Coastal Fisheries Division
Science and Policy Branch

EC:JR

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Jason Seitz

From: Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil>
Sent: Monday, August 22, 2022 9:10 AM
To: Justin Wiedeman
Cc: Marisa Weber; Courtney Gerken
Subject: FW: CCSC Inner Harbor BU EA

From: Jenna Lueg <Jenna.Lueg@tceq.texas.gov>
Sent: Friday, August 19, 2022 4:06 PM
To: Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil>
Cc: Peter Schaefer <peter.schaefer@tceq.texas.gov>
Subject: [Non-DoD Source] RE: CCSC Inner Harbor BU EA

Dear Ms. Finn,

After preliminary review of this project for an Environmental Assessment (EA), the Texas Commission on Environmental Quality (TCEQ) has no comments or objections to the Corpus Christi Ship Channel Deepening and Widening Project for Beneficial Use. The TCEQ looks forward to receiving and evaluating the Final EA.

Thank you,

Jenna R. Lueg
Aquatic Scientist
Standards Implementation Team
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087
(512) 239-4590
Jenna.lueg@tceq.texas.gov

From: Finn, Lisa M CIV USARMY CESWG (USA) <Lisa.M.Finn@usace.army.mil>
Sent: Thursday, August 18, 2022 1:42 PM
To: Jenna Lueg <Jenna.Lueg@tceq.texas.gov>
Cc: Peter Schaefer <peter.schaefer@tceq.texas.gov>
Subject: CCSC Inner Harbor BU EA

Jenna-

Thanks for calling. Here is the letter I had sent over to Peter. And this is my email.
Wanted to incorporate any comments into the working EA. Sounds like we're lined up.
We're trying to get public notice out end up September.

Let me know if you need anything and thanks
Lisa

Lisa Finn
USACE - Operations
P.O. Box 1229, Galveston, TX 77553
Office (409) 766-3949 / BB (409) 974-0362

Protecting our bays and estuaries
615 N Upper Broadway, Suite 1200 • Corpus Christi, Texas 78401 • 361-336-0304 • 361-400-5326 (fax)

August 18, 2022

Lisa Finn
Environmental Project Manager, Navigation
Lisa.M.Finn@usace.army.mil

RE: Corpus Christi Ship Channel – Beneficial Use of Dredged Material

Dear Ms. Finn,

The Coastal Bend Bays & Estuaries Program (CBBEP) appreciates the opportunity to collaborate with the Army Corps of Engineers (ACOE) on the beneficial placement of dredged material from the Corpus Christi Ship Channel Deepening and Widening Project. CBBEP's goal for beneficial placement of dredged material at the Nueces Delta Preserve is to (1) restore marsh habitat that has been lost due to ongoing wind and wave erosion along the bay shoreline and (2) restore marsh that been lost within the Nueces Delta marsh complex due to subsidence, reductions in sediment supply, and breaching of the shoreline. While we are supportive of this project, we would like to provide the comments below based on recent conversations with ACOE staff and the information provided in the coordination letter:

- CBBEP is highly supportive of beneficially using material as sacrificial erosion protection on either side of the approximately 4,000 linear feet of breakwater being constructed by CBBEP. As the project moves forward, we would like to have additional discussions with the ACOE about how to maximize the benefit of the material being placed in front of the breakwater.
- Within the Nueces Delta marsh complex, CBBEP would like to see material placed in large open water areas, ideally maintaining 30% open water, and placing little to no sediment in the existing healthy marsh (i.e., using the existing marsh habitat as containment berms for the open water areas). The ACOE previously provided CBBEP with a map of targeted polygons (see enclosed) that would employ this approach – we are supportive of using these targeted polygons, assuming the parameters listed above are met.
- CBBEP would like to see the ACOE use a final (settled) elevation of +1.5 ft MSL, on average, with a range of +0.0 ft MSL to +2.0 ft MSL. We feel this elevation is needed to create a mosaic of marsh elevations and habitats that is key to the project's success.
- We would request that channels be sculpted into the new marsh to ensure hydrologic connectivity - this is particularly important for any material placed near the mouth of the Nueces River.
- We would also request that ditch plugs or berms be constructed where existing access channels and tidal sloughs are directly adjacent to or in close proximity to target placement areas – this is particularly important for the channels connecting to the Rincon Bayou and South Lake areas. CBBEP can provide additional information about these channels, upon request.
- Previous studies have shown Texas Diamondback Terrapin nesting sites near the mouth of the Nueces River. We would ask the ACOE to review the enclosed report and consider avoiding the placement of material in the "Elbow Marsh Placement Area" during terrapin nesting season (May-

July). We would also ask that the ACOE work with the CBBEP and other partners to identify opportunities to utilize this project to create additional terrapin nesting habitat.

- Recreational and commercial (i.e., crabbing, fishing) activities occur within and near the project area. CBBEP would encourage the ACOE to consider strategies for maintaining access to and from the Nueces River and channels leading into marsh areas.
- As the project moves forward, CBBEP would request the development of a formal agreement with the ACOE that will outline the project scope and roles and responsibilities of the parties involved.

If you would like to discuss any of the comments provided above, please feel free to contact me.

Thank you,

Kiersten Stanzel
Executive Director Designee
361-336-0315
kstanzel@cbbep.org

Enclosed: Targeted Polygons Map, Terrapin Nesting Report

Appendix G

Evaluation of Section 404(b)(1) Guidelines (Short Form)

EVALUATION OF SECTION 404(b)(1) GUIDELINES (SHORT FORM)

PROPOSED PROJECT: CCSC Beneficial Use of Dredged Material, Nueces and San Patricio Counties, October 2022

	Yes	No*
1. Review of Compliance (230.10(a)-(d))		
A review of the proposed project indicates that:		
a. The placement represents the least environmentally damaging practicable alternative and, if in a special aquatic site, the activity associated with the placement must have direct access or proximity to, or be located in the aquatic ecosystem, to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative).	X	
b. The activity does not appear to:		
1) Violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act;	X	
2) Jeopardize the existence of Federally-listed endangered or threatened species or their habitat; and	X	
3) Violate requirements of any Federally-designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies).	X	
c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, an economic values (if no, see values, Section 2)	X	
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see Section 5)	X	

	Not Applicable	Not Significant	Significant*
2. Technical Evaluation Factors (Subparts C-F) (where a 'Significant' category is checked, add explanation below.)			
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)			
1) Substrate impacts		X	
2) Suspended particulates/turbidity impacts		X	
3) Water column impacts		X	
4) Alteration of current patterns and water circulation		X	
5) Alteration of normal water fluctuation/hydroperiod		X	

	Not Applicable	Not Significant	Significant*
6) Alteration of salinity gradients		X	
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)			
1) Effect on threatened/endangered species and their habitat		X	
2) Effect on the aquatic food web		X	
3) Effect on other wildlife (mammals, birds, reptiles and amphibians)		X	
c. Special Aquatic Sites (Subpart E)			
1) Sanctuaries and refuges	X		
2) Wetlands		X	
3) Mud flats		X	
4) Vegetated shallows	X		
5) Coral reefs	X		
6) Riffle and pool complexes	X		
d. Human Use Characteristics (Subpart F)			
1) Effects on municipal and private water supplies	X		
2) Recreational and Commercial fisheries impacts		X	
3) Effects on water-related recreation		X	
4) Aesthetic impacts		X	
5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	X		

	Yes
3. Evaluation of Dredged or Fill Material (Subpart G)	
a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material (check only those appropriate)	
1) Physical characteristics	X
2) Hydrography in relation to known or anticipated sources of contaminants	X
3) Results from previous testing of the material or similar material in the vicinity of the project	X
4) Known, significant sources of persistent pesticides from land runoff or percolation	
5) Spill records for petroleum products or designated (Section 311 of Clean Water Act) hazardous substances	

6) Other public records of significant introduction of contaminants from industries, municipalities or other sources	X
7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	

	Yes	No
b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredged or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and placement sites and not likely to degrade the placement sites, or the material meets the testing exclusion criteria.	X	

List appropriate references:

	Yes
4. Placement Site Delineation (230.11(f))	
a. The following factors as appropriate, have been considered in evaluating the placement site:	
1) Depth of water at placement site	X
2) Current velocity, direction, and variability at placement site	X
3) Degree of turbulence	X
4) Water column stratification	X
5) Discharge vessel speed and direction	X
6) Rate of discharge	X
7) Fill material characteristics (constituents, amount, and type of material, settling velocities)	X
8) Number of discharges per unit of time	X
9) Other factors affecting rates and patterns of mixing (specify)	

List appropriate references:

	Yes	No
b. An evaluation of the appropriate factors in 4a above indicates that the placement site and/or size of mixing zone are acceptable.	X	

	Yes	No
5. Actions to Minimize Adverse Effects (Subpart H)		
All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.	X	

List actions taken:

	Yes	No*
6. Factual Determination (230.11)		
A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:		
a. Physical substrate at the placement site (review Sections 2a. 3, 4, and 5 above)	X	
b. Water circulation, fluctuation and salinity (review Sections 2a. 3, 4, and 5)	X	
c. Suspended particulates/turbidity (review Sections 2a. 3, 4, and 5)	X	
d. Contaminant availability (review Sections 2a. 3, and 4)	X	
e. Aquatic ecosystem structure and function (review Sections 2b and c, 3, and 5)	X	
f. Placement site (review Sections 2, 4, and 5)	X	
g. Cumulative impacts on the aquatic ecosystem	X	
h. Secondary impacts on the aquatic ecosystem	X	

7. Evaluation Responsibility	
a. This evaluation was prepared by:	Lisa Finn
Position:	Environmental Program Manager – Navigation

8. Findings	Yes
a. The proposed placement site for discharge of or fill material complies with the Section 404(b)(1) Guidelines.	X
b. The proposed placement site for discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines with the inclusion of the following conditions:	

List of conditions:

c. The proposed placement site for discharge of dredged or fill material does not comply with the Section 404(b)(1) Guidelines for the following reason(s):	
1) There is a less damaging practicable alternative	
2) The proposed discharge will result in significant degradation of the aquatic ecosystem	
3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem	

10/6/22 Date	Lisa Finn Environmental Program Manager SWD/SWG/ODN

NOTES:

* A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

Negative responses to three or more of the compliance criteria at the preliminary stage indicate that the proposed projects may not be evaluated using this "short form" procedure. Care should be used in assessing pertinent portions of the technical information of items 2a-e before completing the final review of compliance.

Negative response to one of the compliance criteria at the final stage indicates that the proposed project does not comply with the Guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form" evaluation process is inappropriate.

Appendix H

Draft FONSI

DRAFT FINDING OF NO SIGNIFICANT IMPACT
ENVIRONMENTAL ASSESSMENT FOR BENEFICIAL USE OF MATERIAL
CORPUS CHRISTI SHIP CHANNEL IMPROVEMENT PROJECT
CORPUS CHRISTI, TEXAS

The U.S. Army Corps of Engineers, Galveston District (Corps) has conducted an Environmental Assessment in accordance with the National Environmental Policy Act of 1969, as amended. The Environmental Assessment (EA) for the Corpus Christi Ship Channel Improvement Project (CCSCIP) addresses potential impacts associated with the beneficial placement of dredged material from the authorized dredging of the Inner Harbor segment of the Corpus Christi Ship Channel (CCSC) for the CCSCIP, notified in the Federal Register / Vol. 65, No. 151// Friday, August 4, 2000.

The EA, incorporated herein by reference, evaluates the impacts from the beneficial use of dredged material that was not previously evaluated in the 2003 Final Environmental Impact Statement (FEIS). The FEIS for the CCSCIP included several upland confined placement areas evaluated for dredged material disposal whereas the EA provides dredge material management strategies for improvement of future maintenance dredging projects and provides a benefit to the surrounding environment.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan is listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant Negative Effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☐	☐	☒
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☒	☐	☐
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Land use	☒	☐	☐
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Public infrastructure	☐	☐	☒
Socio-economics	☒	☐	☐
Environmental justice	☐	☐	☒
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the DEA will be implemented, if appropriate, to minimize impacts where necessary.

No compensatory mitigation is required as part of the recommended plan.

There will be a public review of the Draft EA and FONSI. All comments submitted during the public review period will be responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will not affect the continued existence of the following federally listed species or their designated critical habitat: Northern Aplomado Falcon (*Falco femoralis septentrionalis)* (E), piping plover (*Charadrius melodus*) (T), rufa red knot (*Calidris canutus rufa*) (T), whooping crane (Grus americana) (E), eastern black rail (*Laterallus jamaicensis jamaicensis*) (T), West Indian manatee (T), loggerhead sea turtle (*Caretta caretta*) (T), Kemp's ridley sea turtle (*Lepidochelys kempii*) (E), green sea turtle (*Chelonia mydas*) (T), leatherback sea turtle (*Dermochelys coriacea*) (E), and hawksbill sea turtle (*Eretmochelys imbricate*) (E), and monarch butterfly (*Danaus plexippus*) (C). Conservation measures described in the EA will be implemented to ensure the effects of the supplemental work will not adversely affect the species listed above.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan does not affect historic properties through coordination with and concurrence by the Texas Historical Commission.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) Guidelines (40 CFR 230).

A water quality certification pursuant to section 401 of the Clean Water Act was obtained from the Texas Commission on Environmental Quality prior to dredging. All terms and conditions of the water quality certification shall be implemented to minimize adverse impacts on water quality.

The project is consistent with the Texas Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972. All conditions of the consistency determination shall be implemented to minimize adverse impacts on the coastal zone.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 <u>Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies</u> during the development of the FEIS. The EA was developed in cooperation with federal and state agencies and follows all applicable laws, executive orders, regulations, and local government plans considered in evaluating alternatives.

The Galveston District has taken every reasonable measure to evaluate environmental, social, and economic impacts of the selected plan as described in the DEA. Based on the information presented in the DEA and coordination with Federal, State, and local agencies, it has been determined that the placement of dredged material into the project area will have no significant negative impact on the environment. There are no significant adverse impacts on historic properties, land, water quality, wildlife, fisheries, and/or the surrounding human population. No hazardous, toxic, or radioactive wastes will be generated by the proposed action. The project has been reviewed for consistency with the goals and policies of the Texas Coastal Management Program. A Clean Water Act (CWA) Section 404(b)(1)

Evaluation (short form) of project impacts on water quality indicates the project will not adversely affect water quality, and CWA Section 401 certification has been received.

Therefore, preparation of an Environmental Impact Statement (EIS) is not required. As a result, I have determined that an EIS is not required under the provisions of NEPA, Section 102, and other applicable regulations of the Corps of Engineers and Council on Environmental Quality. All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. No concerns were raised, and no agencies objected to the project.

______________________________	____
Date	COMMANDER Col. Rhett A. Blackmon Colonel, Corps of Engineers District Commander