DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT

Continuing Authorities Program Section 204

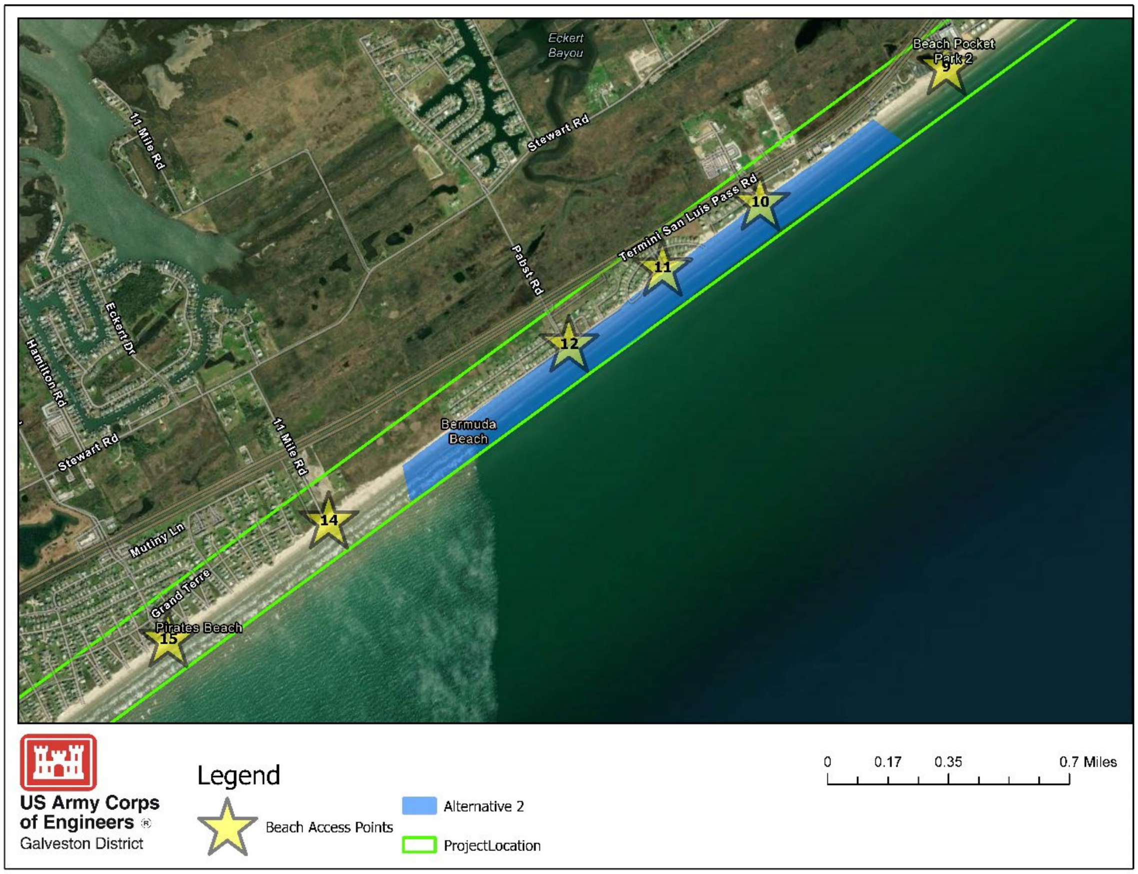
Regional Sediment Management (Beneficial Use of Dredged Material)

For

Galveston Island Coastal Erosion,

City of Galveston, Galveston County, Texas

February 2023



P2: 461161

US Army Corps of Engineers®
Galveston District

(NOTE: This page intentionally left blank.)

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

GALVESTON ISLAND COASTAL EROSION
CITY OF GALVESTON, GALVESTON COUNTY, TEXAS
Detailed Project Report and Environment Assessment
Continuing Authorities Program
Section 204

February 2023

FINAL

P2: 461161

(NOTE: This page intentionally left blank.)

Table of Contents

List of Figures

List of Tables

(NOTE: This page intentionally left blank.)

1 Study Information

This final Detailed Project Report and Environmental Assessment (DPR/EA) contains information relevant for both a Planning and Design Analysis used as a planning document by the U.S. Army Corps of Engineers (USACE) and an EA to satisfy the National Environmental Policy Act (NEPA).

The City of Galveston Park Board of Trustees is the Non-Federal Sponsor for the feasibility study.

1.1 Study Purpose and Authority

November 23, 2020, the Galveston Island Park Board of Trustees, sent a letter to the Galveston District Engineer requesting a study under Section 204 of the Water Resources Development Act of 1992. Sec 204 provides the authority to plan, design, and build projects in connection with dredging of authorized Federal navigation projects. The costs of the Section 204 project are those costs in excess of the costs necessary to carry out the dredging for construction, operation, or maintenance of an authorized Federal water resources project in the most cost-effective way, consistent with economic, engineering, and environmental criteria. The study is conducted at Federal expense. The sponsor understands and agrees with the study and project requirements, including cost sharing. See Attachments 1 and 2.

As the project's incremental federal costs of beach nourishment exceed $300,000 of the cost of dredging Galveston Entrance Channel Reach (a portion of the FNP), the project's incremental costs must be justified by demonstrating that the project benefits are greater than its incremental costs with a benefit-to-cost ratio of 1.0 or greater. The benefits achieved are those that would normally be considered in a coastal storm risk reduction project. All the necessary conditions for federal participation, consistent with its project purpose, are to be met. Federal and state resource agencies must support the selected disposal method. The disposal method is subject to appropriate National Environmental Policy Act requirements.

1.2 Federal Interest

The Federal Interest Determination (FID) approved by the Southwestern Division Commander on January 19, 2021, indicating federal interest for the beneficial use of dredged materials from the Galveston Entrance Channel Reach project on Galveston Island. The material placement study area extends from 8 Mile Road approximately five miles WSW along the Gulf coast to 13 Mile Road. The Federal interest in the project is indicated as the benefits of preventing future coastal storm damages to structures and infrastructure on this section of developed coastline on West Galveston Island would be greater than the incremental cost of placing sand dredged from the Galveston Entrance Channel Reach onto the public beach without adverse environmental impacts.

1.3 Purpose and Need for the Project

The project purpose is to address coastal erosion for the protection of life and property on Galveston Island. Beach erosion between 8 Mile Road and 13 Mile Road risks homes and public infrastructure including roads, utilities, and communication networks. As such, this project would reduce coastal erosion damages and improve human life and safety. The study purpose is to determine whether beneficial use of dredged material is a cost-effective solution.

1.4 Study Scope

The study scope is for placement of dredged material based on the sand quantity from the required operations and maintenance dredging of the Galveston Navigation Channel. The length of beach to be nourished is dependent on the quantity of dredged beach quality sand and the amount of sand required based on the existing and with plan beach profiles. Sand placement is to ameliorate the coastal erosion damages for a segment of the island’s developed area adjacent to the public beaches.

1.5 Study Location and Project Area

Galveston Island is a barrier island between the Gulf of Mexico to the east and the Texas mainland on West Bay 51 miles southeast of Houston. The Galveston Island study area is on the Gulf of Mexico seaward of Texas Highway 3005 from the end of the 10-mile-long Galveston Seawall extending for approximately five miles to 13 Mile Road. The following is a map of the location and the project area. See Figure 1.

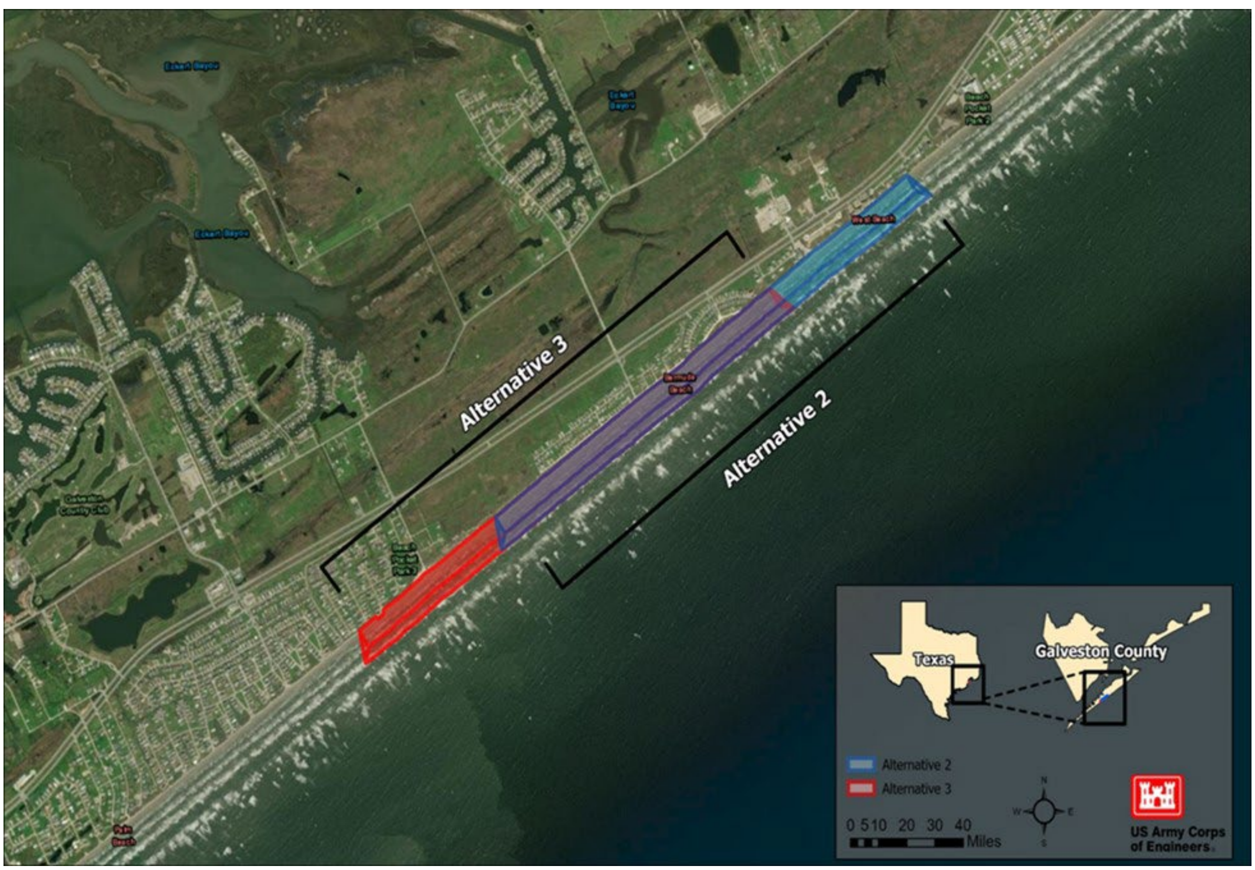


Figure 1 - Study Location

Two alternative project areas are shown in the previous figure. Alternative 2 extends from Sunbather Lane for 1.7 miles west. Alternative 3 extends from Hershey Beach Drive for 1.7 miles west to Ghost Crab Lane.

1.5.1 Congressional Representation

- Senators John Cornyn and Ted Cruz
- Representative Randy Weber (District 14)

1.6 Federal Navigation Project

1.6.1 Existing Navigation

The Galveston Harbor and Channel, the Federal Navigation Project, is maintained by the Federal government for navigation purposes. Federal maintenance dredging of the navigation channel is carried out periodically and generally in odd years using a hopper dredge. There is an estimated 530,000 cubic yards of beach quality sand that could be made available for beach nourishment. The sandy dredge material is to be placed by hopper dredge. Some sand placement has previously been done for beach nourishment on Galveston Island further east (Figure 2).

Figure 2 - Existing Projects

1.6.2 Prior Reports and Existing Water Projects

The municipal Port of Galveston was established by Mexico in 1825. It is on the eastern end of Galveston Island 9.3 miles from the open Gulf. It consists of the Galveston Harbor and Channel, the south side of Pelican Island, the north side of Galveston Island on the Intercoastal Waterway, and the entrance to Galveston Bay. The Houston Ship Channel goes through Galveston Bay with the world's largest number of vessel transits. The Ocean Disposal Material Disposal Site (ODMDS) is shown in Figure 2. Galveston Seawall was constructed in 1902.

The Coastal Texas Protection and Restoration Feasibility Study recommended plan includes a beach and dune system to reduce storm surge impacts (Figure 3). However, construction of the Coastal Texas project isn't expected to start until after 2032 with a completion date estimated by 2043. Construction of this Section 204 is expected to start in 2025 with a design life of eight to ten years, or until 2033 or 2035.

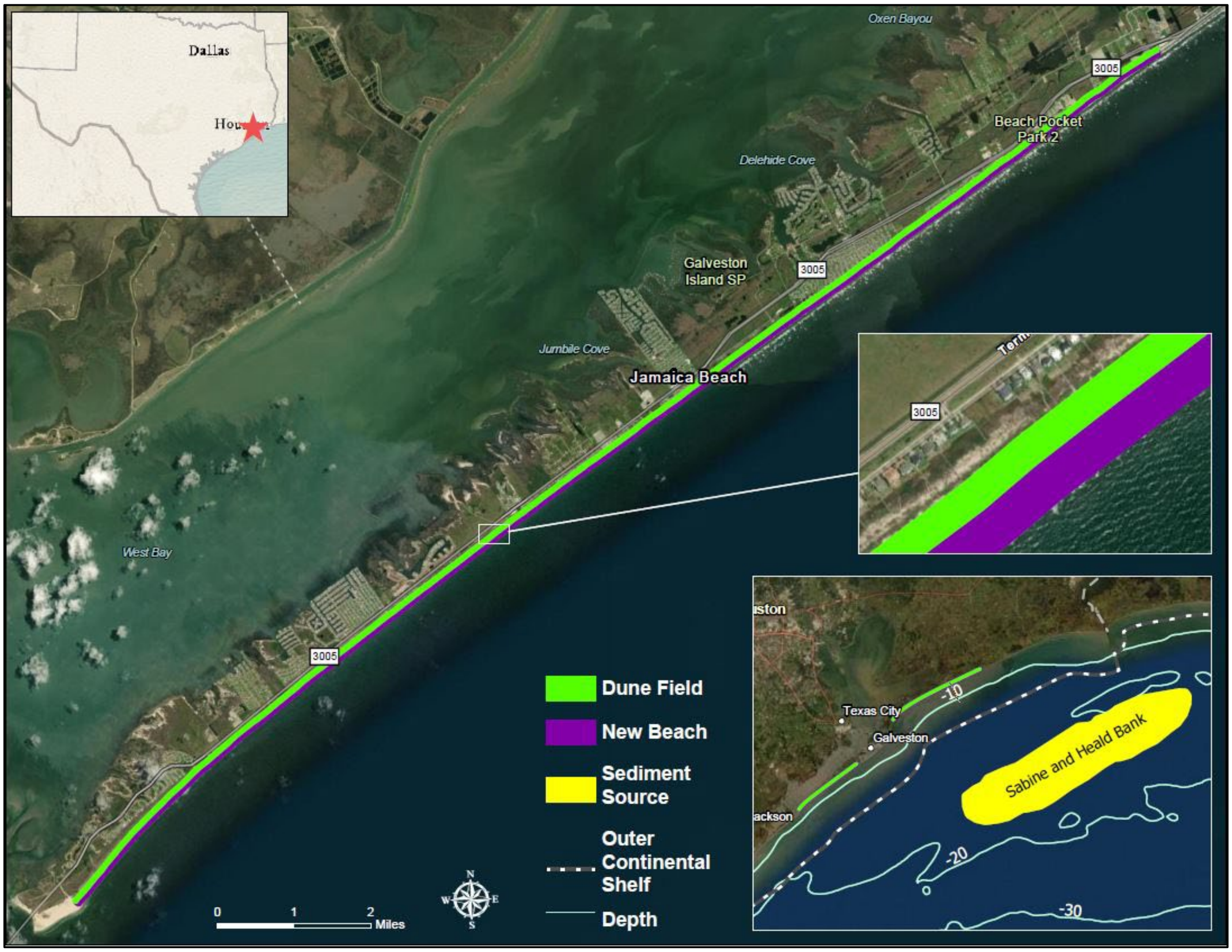


Figure 3 – Coastal Texas Galveston Beach and Dune

The City of Galveston has a Sediment Management Plan for which implementation of this study/project is included. The Section 204 project has the potential to delay erosion towards Highway 3005, an essential evacuation route, and homes prior to the construction of the Coastal Texas project.

1.6.3 Current Projects

Babe's Beach sand nourishment project (Figure 2) provides data to refine project design. Galveston Entrance Channel Reach Operation and Maintenance (O&M)

dredging occurred in 2018 under the Harvey Supplemental Program that provided base plan indications of cost; incremental cost for work done in 2019 was $8M for BUDM placement. The Entrance Channel O&M dredging in 2021 continued into March 2022; the next award, February 2023 includes placement option for Babes Beach. Galveston Park Board and FEMA have a beach restoration project in planning that will renourish the first 0.35 miles of beach from end of the seawall via truck haul. A GLO project is renourishing one mile of shoreline from the end of the seawall approximately down to 8 Mile Road. The Port of Galveston will have a deepened portion of the Galveston Harbor and Channel to accommodate larger vessels throughout the port that increases capacity, while enabling improved operational safety for a nearly $11M cost funded in 2022. City of Galveston has requested a permit to construct bulkheads at the Three Towers condos footprint for protection of the foundations. Also, at Bermuda Beach, they are installing Bumper Blades, an anti-submersion system to resist and reduce the destructive impact of submersion waves. The Coastal Texas Protection and Restoration Feasibility Study (USACE, 2021) proposes a large-scale nourishment project requiring large volumes of sand pumped from offshore sources at a higher cost relative to BU of Galveston Entrance Channel Reach material. Current construction completion is scheduled for year 2043 and proposes an engineered double dune system to provide storm surge protection to reduce flood risk damages to structures. Coastal Texas would not receive benefits from this Section 204 as there would be no overlap of either construction or design life.

1.7 Problems and Opportunities

A problem is an undesirable condition in need of a solution. An opportunity is set of circumstances that makes it possible to address a problem.

Coastal erosion and storm events have caused major damage to Galveston's infrastructure, tax base and economy. Beach erosion between 8 Mile Road and 13 Mile Road poses risks to homes and public infrastructure including roads, utilities, communications, and networks. The opportunity exists to provide beach nourishment to a segment of the public access beaches to alleviate erosion damages to homes and infrastructure of Galveston Island's developed area.

Similar BU nourishment was applied to the nearby Babe's Beach, successfully restoring the once nonexistent beach and preventing costly damage to the Seawall, as seen in the Google Earth aerial imagery below. The imagery shows the beach erosion over time (2006), reaching to the seawall and Texas Highway 3005 (2014) before sand placement in 2016 restored the beach protecting the seawall and highway with resumption of beach erosion in shown in 2018. See Figure 4. Babe's Beach BU Nourishment "Proof of Concept" of the four images taken in 2006, 2014, 2016 and 2018.

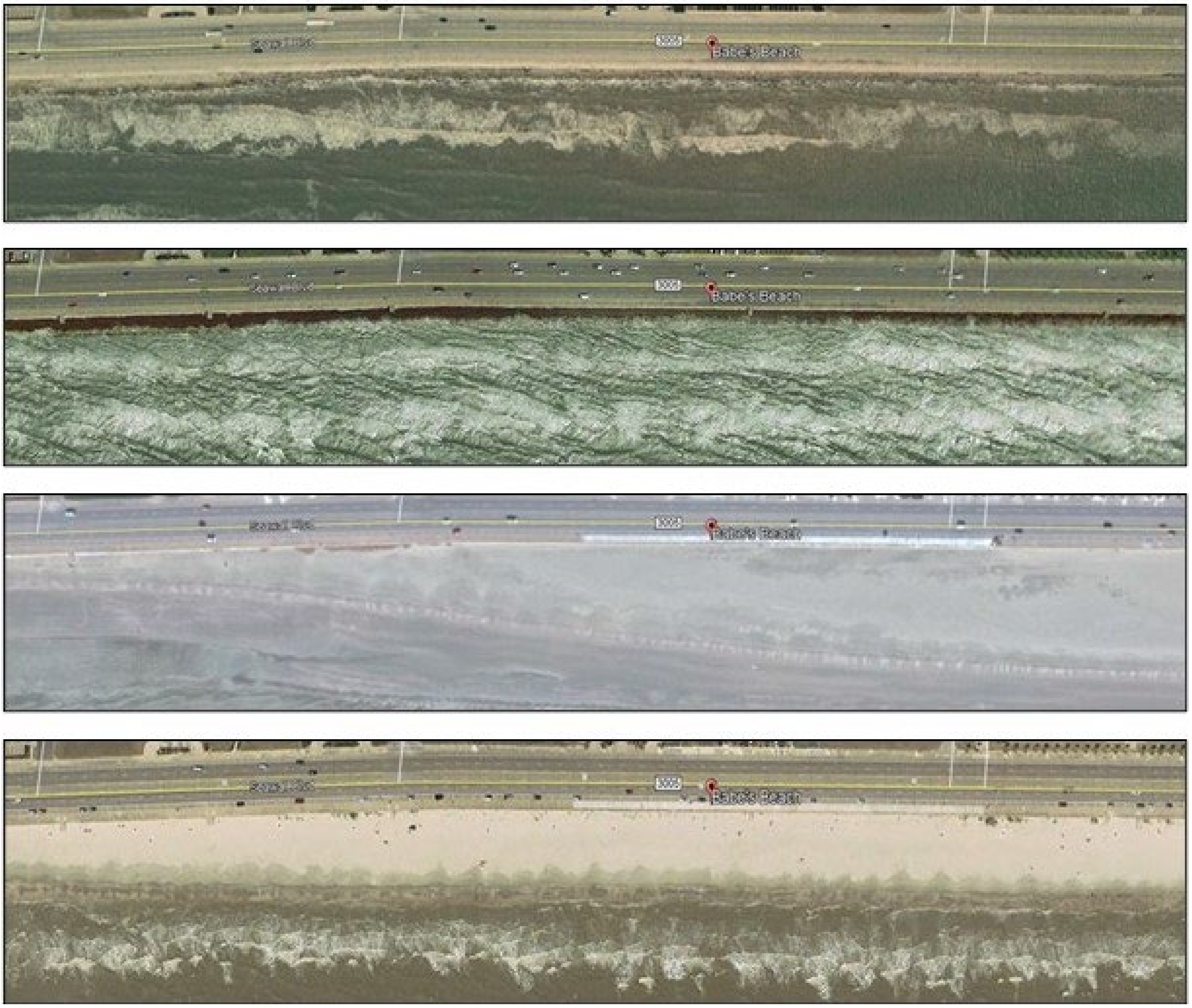


Figure 4 - Babe's Beach BU Nourishment "Proof of Concept"

1.8 Planning Goals and Objectives

1.8.1 Federal Goal

The Federal objective of water and related land resources projects is to contribute to the National Economic Development consistent with protecting the Nation's environment. Congress authorized the US Army Corps of Engineers (USACE) to study and implement projects that restore and protect the shores of the US. Shore projects are designed to reduce damages caused by wind- and tide-generated waves and currents. Federal assistance for periodic nourishment is also an authorized objective of USACE.

1.8.2 Specific Planning Objectives

An objective is a statement of the intended purposes of the project. These are statements of what the recommended plan will try to achieve:

- Reduce the risk of coastal erosion damage to personal property and public infrastructure along Galveston Island between 8 Mile Road and 13 Mile Road.
- Reduce the risk to human life and safety by protecting Highway 3005, which functions as an essential evacuation route.

The Non-Federal Sponsor reconfirmed by email their support for BUDM in the study area on February 17, 2022.

1.9 Planning Constraints

1.9.1 Universal Planning Constraints

These constraints are the legal and policy constraints that need to be included into every USACE planning study but vary by study type.

- The Federal limit of participation in the design and construction is $10,000,000.
- The project must adhere to all relevant federal, state and local laws and regulations. For instance, no alternatives may intentionally adversely affect threatened or endangered species.

1.9.2 Specific Planning Constraints

These constraints are those things unique to this feasibility study that alternatives should avoid or that may limit plan formulation, selection or construction.

- An estimated 530,000 cubic yards of available dredged sand limits the extent of beach nourishment.
- This Sec 204 project cannot increase costs or schedule to existing Federal Navigation Project’s O&M dredging contracts; the Base Plan. Scheduled target for the Base Plan is a production rate of 0.63 days per 10,000 cubic yards.

1.10 Planning Uncertainties and Their Risks

- Proposed project area increases roundtrip sail distance from the ODMDS ~ 30 miles.
- Proposed project area increase the total sail above the current BUDM site (Babe’s Beach) by 10 miles.
  - Risk – Medium. Existing dredging contracts schedules cannot be lengthened.
    - Mitigation – USACE interviewed dredging contractors and asked them if they thought that they could implement alternatives within current contract perimeters.

        - Mitigation – During Design and Implementation, dredging contractors will again be queried prior to project implementation
- Estimated 530,000 cubic yards of available dredged sand
    - Risk – Low. Limits the amounts of dredged material appropriate for beaches.
        - Mitigation – Alternatives analyzed based upon the estimated amount of appropriate dredged materials.

2 Existing Environmental Conditions

2.1 Air Quality

The Clean Air Act (CAA), as amended in 1990, authorizes the Environmental Protection Agency (EPA) to designate areas as nonattainment, attainment, or unclassifiable and to further classify nonattainment areas according to the degree of severity. Classification, in turn, triggers a set of control requirements designed to bring areas into attainment by their specified date.

According to the Texas Commission for Environmental Quality (TCEQ), Galveston County is in the Houston-Galveston-Brazoria (HGB) Air Quality Control Region (AQCR). In 2015, the EPA revised its primary and secondary national ambient air quality standards for ozone to 0.070 ppm (80 FR 65292). In 2020, the EPA retained the 2015 standards without revision (85 FR 87256), thus Galveston County remains classified as a marginal nonattainment area for the eight-hour standard for ozone with an attainment deadline of August 3, 2021, (80 FR 65292). CAA section 107(d)(1)(A)(i) defines a nonattainment area as, “any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant”. The threshold for major source emissions in a marginal nonattainment area is 100 tons per year (tpy). For all other pollutants (i.e., lead, carbon monoxide, nitrogen dioxide, particulate matter, and sulfur dioxide), the HGB is classified as unclassifiable/attainment. CAA section 107(d)(1)(A)(ii) defines an attainment area as, “any area (other than an area identified in clause i) that meets the national primary or secondary ambient air quality standard for the pollutant”, while an unclassifiable designation is defined in CAA section 107(d)(1)(A)(iii) as “any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant”.

2.2 Climate

The climate of the study area is humid subtropical with warm to hot summers and mild winters. The average annual high temperature is about 76 degrees Fahrenheit (°F), with an average summer high of about 91 °F for the months of June, July, and August, and an average annual winter low temperature of 41 °F. Periods of freezing temperatures are infrequent and rainfall averages about 44 inches annually (National Weather Service 2021). Severe weather occurs periodically in the form of thunderstorms, tornadoes, tropical storms and hurricanes. Additional discussion on historic significant storm events is available in the Engineering Appendix (Appendix A).

2.3 Physical Oceanography

2.3.1 Tides, Currents and Circulation

Mean tidal range is 1.17’ (or ~1.2’) and great diurnal range is 1.67’ (MHHW – MLLW), with larger variations dependent upon the wind. During winter, weather fronts out of the northwest are usually accompanied by strong winds that may depress the water surface as much as 4 feet below mean sea level. At other times of the year, predominantly southerly winds, when coupled with higher-than-normal tides (i.e., spring tides), may occasionally and temporarily raise surface water elevations. Large fluctuations in water surface elevation may also occur during tropical storms and hurricanes (USACE 1975).

The predominant wave direction is from the southeast, with the shore-normal direction for waves approaching Galveston Island at approximately 147 degrees azimuth, which is roughly midway between the two most frequent direction. As a result, there is a fairly even split in the directional frequency of wave driven longshore currents. However, seasonal variations in wave magnitude and direction ultimately yield a net longshore transport direction to the southwest. Elevation +4.0 feet (NAVD88) coincides with the approximate (landward) limit of wave runup during typical conditions according to observation of aerial imagery.

Currents are affected by many different factors including wind, waves, thermohalines, tides, and the Coriolis effect. The National Oceanic and Atmospheric Administration’s (NOAA) Atlantic Oceanographic and Meteorological Laboratory records daily geostrophic current fields for the Gulf of Mexico. During non-summer months the current along Galveston moves in the same direction as the net longshore current (southwest) at higher magnitudes than in summer months when it shifts to the opposite direction (Johnson, 2008).

2.3.2 Depth of Closure

The depth of closure (DOC) is intended to define the seaward limit of the active profile, which is the theoretical cross-shore extent of sediment movement, beyond which elevation changes are thought to be negligible. Guidance and wave data from the Coastal Inlets Research program (CIRPA) were utilized to calculate the depth of closure in the project area. DOC values were calculated using Hallermeier’s equations which yielded an inner DOC at 16 feet and outer DOC at 41 feet. The respective depths define the seaward limits of the littoral zone, and the less dynamic shoal zone.

2.3.3 Relative Sea Level Change

The change in ocean height relative to coastal lands, called relative sea level rise, is a combination of three factors: eustatic sea level rise, local variations in sea level rise, and relative land motion. Eustatic sea level rise is the change in global mean ocean height (global mean sea level [GMSL]) and is primarily the result of increasing temperatures that cause thermal expansion and melting glaciers and ice sheets. Scientific research indicates that GMSL has risen by about 7-8 inches (16-21 cm) since 1900 and could rise between 3.6-7.2 inches (9-18 cm) by 2030 and 15-51.6 inches (30-130 cm) by 2100 (Sweet et al. 2017). Local variations are produced by changes in wind patterns and ocean currents and are minor for the Gulf of Mexico (Nielsen-Gammon et al. 2020). Relative land motion in coastal Texas is dominated by coastal subsidence, or the gradual lowering of land-surface elevation, and is the result of the extraction of groundwater, oil, or gas or increasing sediment loading or infrastructure construction.

The USACE Sea Level Change Curve Calculator (Version 2021.12) is used to project three local relative sea level change (RSLC) scenarios in accordance with ER 1100-2-8162 (USACE, 2019). The historic RSLC rate utilized (0.02106 ft/yr) reflects NOAA's regional rate at the Galveston, TX Pier 21 gauge (8771450). RSLC is projected out to year 2038, which is consistent with the FWOP analysis duration of 24-years (2023 to 2046). Projections are summarized for three scenarios (low, medium and high) with station datums (on NAVD88) projected with intermediate RSLC in Figure 5. The mid-epoch analysis year (1992) is used as the starting year of RLSC projections according to the station's tidal datum analysis period.

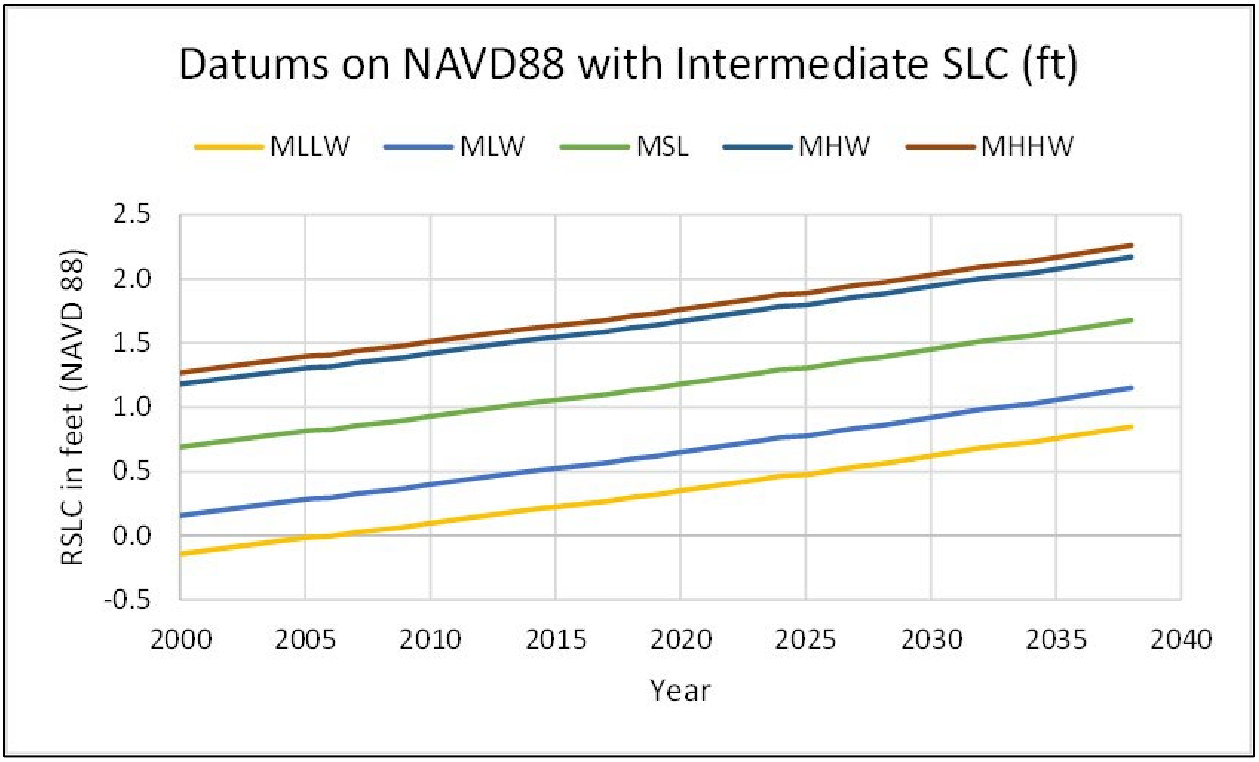


Figure 5 - Pier 21 Datums Adjusted for Intermediate RSLC for MLLW, MLW, MSL, MHW & MHHW.

2.3.4 Flooding

The 1-year AEP total WSE (still water elevation + intermediate sea level rise + 2 percent wave runup) is calculated at +4.6 feet NAVD88 and includes all project areas. Structures located proximal to this elevation contour have historically been subjected to "buy-backs." This is likely because such structures are at immediate risk of exposure to surge and waves during high frequency storms (1 to 5-year AEP storms).

2.3.5 Geomorphology

Galveston Island is in the Quaternary Texas Gulf Coast Plain which formed about 5,500 years ago. After formation, the island advanced seaward by the addition of sand transported from offshore. About 2,600 years ago, the eastern portion of the island became high and wide enough that it ceased to be frequently breached by storms; however, the lower, narrower western portion continued to be periodically over washed. Galveston Island stopped growing about 1,200 years ago. Since then, the island has been diminishing, with relative sea level rise, wash over, erosion from waves, and lack of sand sources contributing to overall erosion and landward migration. The beaches along Galveston Island are extremely dynamic and constantly changing due to daily exposure from wind, waves, and tides. In addition, anthropogenic events such as construction of the Galveston Harbor and Channel and jetties, groin field, and seawall have altered local sediment transportation patterns along the Galveston shoreline. The beaches adjacent to Seawall Boulevard have experienced a net loss of sediments over time. As a result, highest local shoreline retreat (erosion) rates are observed along the beaches immediately adjacent to, and west of, Seawall Boulevard over the historical record. Conversely, net shoreline advance (accretion) is observed on the eastern and western extremities of the island, which is largely a result of local impacts from the Galveston Entrance Channel and San Luis Pass, respectively.

2.3.6 Sediment

Sediment samples from the Texas Coastal Sediment Geodatabase (TxSed), compiled by the Texas Government Land Office (TXGLO), were analyzed to review spatial variation, and estimate median grain size (D50) of native sediment. A total of 42 samples with grain size distribution data from sieve analysis were identified along West Galveston (Figure 10), including 18 beach samples collected by HDR in 2003 and 22 nearshore samples collected by TAMUG in 2005, between depths of 14 and 26 feet (datum unverified) (HDR, 2003; TAMUG, 2005). The calculated average D50 is 0.156 mm for samples collected along the beach, while nearshore samples collected by TAMUG yield an average D50 at 0.094 mm.

According to beach equilibrium profile theory, discussed further in Appendix A - Section 3.4.3, the shape of existing cross-shore (depth of closure) profiles in the project area indicate a theoretical equivalent D50 range of 0.07 - 0.1 mm, in good agreement with TAMUG samples. It should be noted that many past studies have used a coarser D50, consistent with samples collected on the beach, to represent the effective native fill. However, the portion of the active profile that consists of coarser material is relatively small. To represent the entire active profile and to maintain consistency with equilibrium profile concepts, the native beach is assigned an effective D50 = 0.09 mm.

Beach quality sand that meets USACE criteria would be obtained from the Galveston Entrance Channel, an authorized Federal project, during routine maintenance dredging operations.

2.3.7 Shoreline Erosion

The University of Texas BEG (Bureau of Economic Geology) reports shoreline change rates along Galveston Island that range from -16.7 to +81.7 feet per year[1] and a net rate of +3.2 feet per year between 2000 and 2012 (Paine 2020). Long-term historic retreat rates in the project area range from approximately -4.5 to -8.0 feet per year, with erosion rates decreasing from east to west the further from the erosional hotspot located at the end of the seawall (Figure 2). BEG reports a significant reduction to the rate of retreat over the last 19 years in the project area, with local rates being closer to -4.0 to -5.0 feet per year (Figure 4). The rates dropped notably upon the most recent update that accounted for the period between 2012 and 2019, which can be attributed largely to recent nourishments that have effectively reduced the rate of local erosion. It is anticipated that local nourishments will continue biannually into the near future. Historical shoreline change rate estimates account for impacts related to both, nourishment events and storm events.

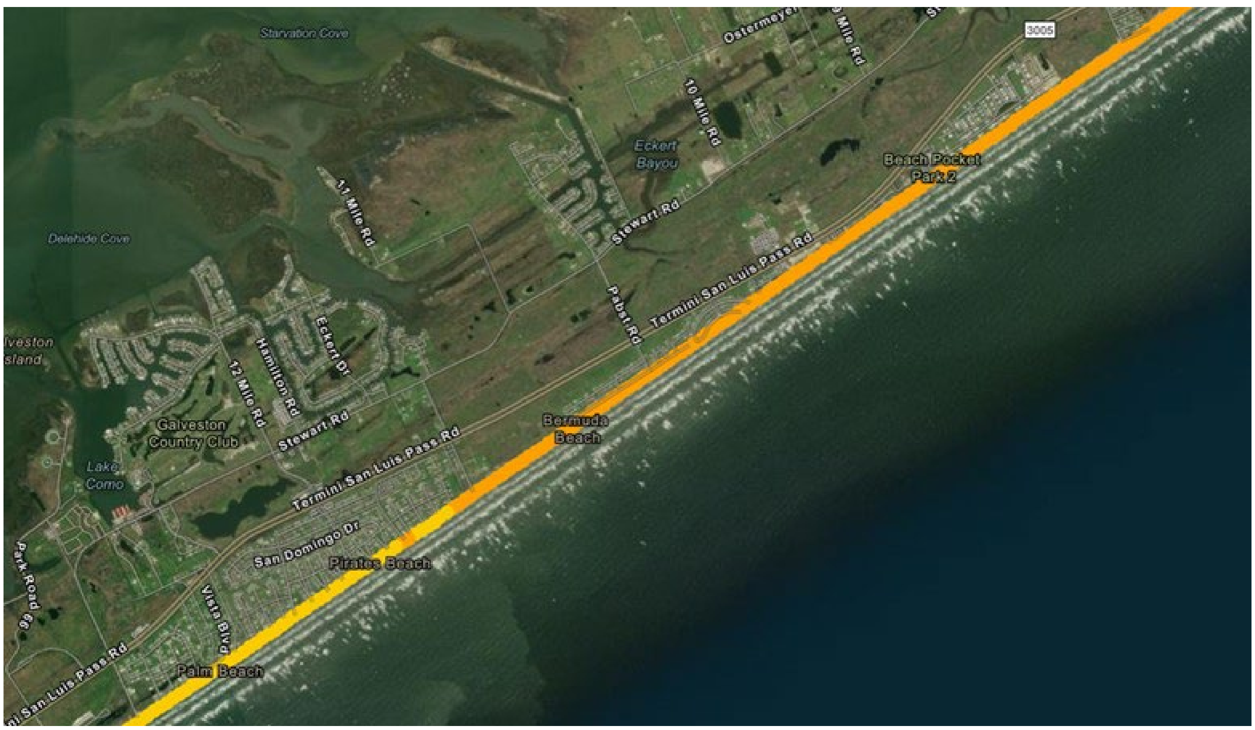


Figure 6 – Shoreline Change in the Project Area from 1930s-2019 (feet/year)

[1] Negative values indicate erosion/loss of shoreline and positive values indicate accretion/gain in shoreline area

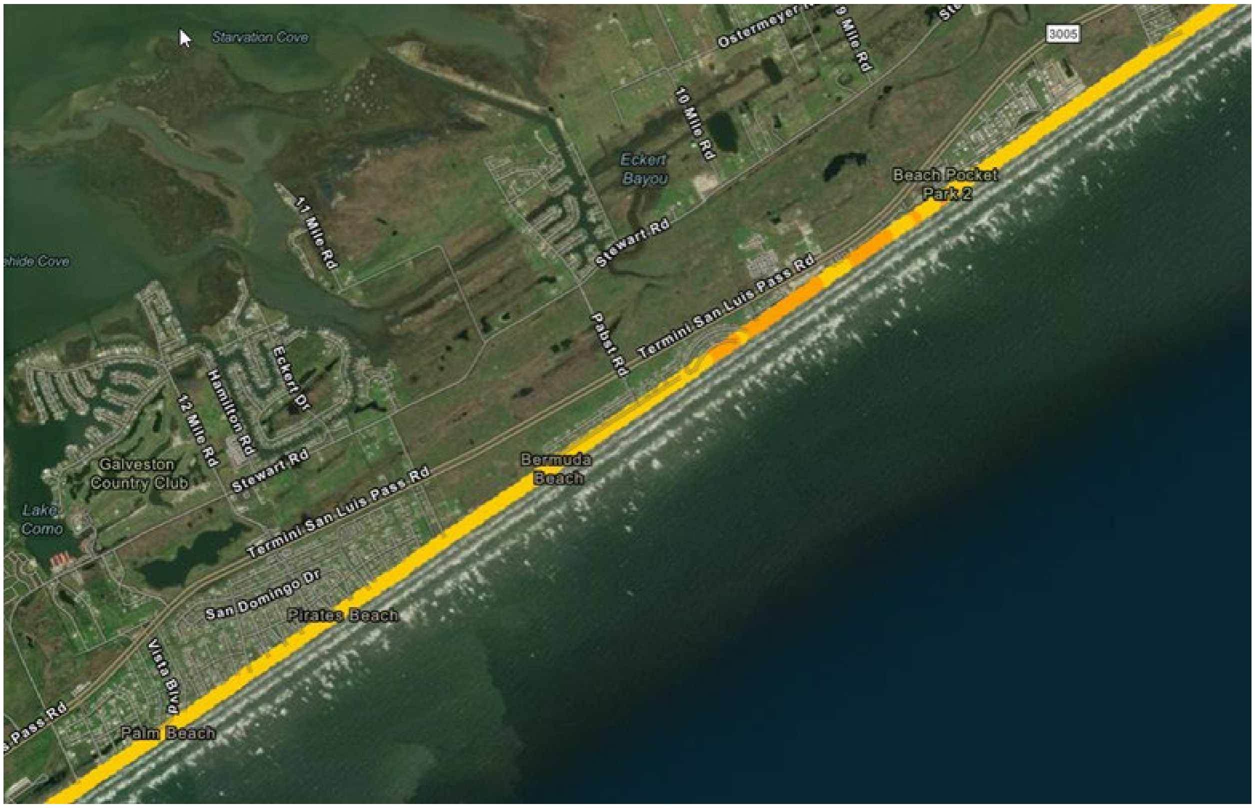


Figure 7 – Shoreline Change in the Project Area from 2000-2019 (feet/year)

2.4 Water Quality

Section 305(b) of the Clean Water Act (CWA) requires states to assess surface and ground water quality and prepare comprehensive reports documenting water quality, which states submit to the US EPA biannually. In addition, Section 303(d) of the CWA requires states to prepare a list of impaired waters based on Total Maximum Daily Loads of pollutants and specify corrective actions. TCEQ enforces state water quality standards and prepares the state's comprehensive report for submittal to US EPA.

Based on the TCEQ's 303(d) list, segment 2501_03, which includes Gulf of Mexico waters from the Gulf shoreline to the limit of Texas jurisdiction between Bolivar Point to San Luis Pass is designated as exceptional for Aquatic Life Use (ALU); however, this segment is impaired for mercury in edible tissue. Segments 2501GW_01 (Spanish Grant/Bermuda Beach [Beach ID TX 163187]) and 2501GW_04 (Pirates Beach [Beach ID TX 751320]) both have a High ALU designation and have no listed impairments. However, this area is regularly monitored for exceedances in state standards for enterococcus (fecal) bacteria, which occur a couple of times per year.

2.5 Biological Communities

The project area lies seaward of the line of vegetation and extends out to the depth of closure in the Gulf of Mexico. This area contains beach habitat that extends to the depth of closure and includes the backshore (berm/dry beach/supratidal), foreshore (extends from the mean low water line to the highest elevation reached by waves at normal high tide/intertidal) and nearshore (area always underwater/subtidal). Beaches are the transition from land to sea.

Aquatic organisms thrive in foreshore and nearshore zones of the beach where sediments are frequently inundated by water, providing important nursery, and feeding habitat for many fish species. Daily flooding by saltwater and moderate- to high- energy waves prohibit plant growth aside from inconspicuous algae in these zones. Backshore areas, those at or just above the high tide zone, are exposed to harsh conditions including fluctuations in temperature and salinity, which preclude habitation by few animals and no plants. The wrack zone, transition between dry beach and surf zone, provides a reservoir of water and food for cryptic nocturnal feeders or species that feed during high tide (e.g., crabs, spiders, beetles), and is characterized by an abundance of arthropods and worms. The wrack zone is also a prime foraging habitat for shorebirds.

2.5.1 Threatened and Endangered Species

Section (7)(a)(2) of the Endangered Species Act (ESA), 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 (CH), if applicable. The NFS was issued a biological opinion (BO) dated June 17, 2019 (Consultation No. 02ETTX00-2018-F-2491) that addressed effects of beach nourishment to U.S. Fish and Wildlife Services (USFWS) listed species along Galveston Island. This study's project area falls within the area addressed in the 2019 BO, as such, the USACE requested the USFWS to grant this proposed action ESA compliance with the guarantee the USACE would adhere to the conservation measures and conditions written in the Parks Board BO and accompanying permit.

There are eleven ESA-listed, candidate, or proposed for listing species identified in the USFWS Official Species List dated August 2, 2022 (Project code: 2022-0070276), and four NMFS protected species (Table 1). Critical habitat (CH) has been proposed for Rufa red knot (*Calidris canutus rufa*) and is expected to occur in the action area if official designation is made (79 FR 73706.

Table 1 - ESA-listed species identified by USFWS and NMFS as potentially occurring in the action area

Common Name	Species Name	Jurisdiction	Status
Birds			
Piping plover	*Charadrius melodus*	USFWS	T
Rufa red knot	*Calidris canutus rufa*	USFWS	T
Whooping crane	*Grus americana*	USFWS	E
Eastern black rail	*Laterallus jamaicensis*	USFWS	T
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	USFWS	E
Mammals			
West Indian Manatee	*Trichechus manatus*	USFWS	T
Sperm whale	*Physeter macrocephalus*	NMFS	E
Rice's whale	*Balaenoptera ricei*	NMFS	E
Reptiles			
Green sea turtle	*Chelonia mydas*	USFWS/NMFS	T
Hawksbill sea turtle	*Eretmochelys imbricata*	USFWS/NMFS	E
Kemp's Ridley sea turtle	*Lepidochelys kempii*	USFWS/NMFS	E
Leatherback sea turtle	*Dermochelys coriacea*	USFWS/NMFS	E
Loggerhead sea turtle	*Caretta*	USFWS/NMFS	T
Fish			
Oceanic whitetip shark	*Carcharhinus longimanus*	NMFS	T
Giant manta ray	*Mobula birostris*	NMFS	T

Seven species have no potential to occur in any of the action areas because no suitable habitat exists and/or the action area is outside of their known range(s). These include the endangered whooping crane, Attwater's greater prairie chicken, sperm whale, Rice's whale, leatherback sea turtle; and threatened oceanic whitetip shark and giant manta ray.

Eight federally listed species are known to occur or potentially occur in the project area including the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*) and hawksbill sea turtle (*Eretmochelys imbricata*); and the threatened West Indian manatee (*Trichechus manatus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), piping plover (*Charadrius melodus*), Rufa red knot, and Eastern black rail (*Laterallus jamaicensis jamaicensis*).

Proposed CH for Rufa red knot encompasses the action area in Unit TX-2 (79 FR 73706). Unit TX-2 consists of approximately 590 ac (238 ha) of occupied habitat in

Galveston County, along the Gulf of Mexico, with boundaries from the mean low-low water (MLLW) up to the vegetation line, including emergent lands and intertidal area characterized as highly dynamic beach/seashore that is covered at high tide and uncovered at low tide. The northeastern boundary is the end of the Seawall Boulevard (end of the seawall), and the southwestern boundary is San Luis Pass. Specific habitat types within this unit include marine sandy coastline beach that is irregularly or regularly inundated by tides, depending upon the location.

For a more detailed discussion on the habitat requirements, historic and current occurrence, and threats to each species and CH, refer to the Galveston Parks Board BO (Appendix C).

2.5.2 Migratory Birds

The Texas Gulf coast is an important seasonal pathway for migratory birds and has plentiful habitat for migratory shorebirds and waterfowl. The Galveston beach area is not forested, and therefore is not an optimum habitat for passerine birds. Rather, it is more suited for wading birds, waterfowl, and shorebirds.

According to the eBird database managed by the Cornell Lab of Ornithology (ebird.org) the most abundant species observed at Bermuda Beach and Galveston Island State Park, the two birding hotspots in or near the project area include:

- Gulls: laughing (*Leucophaeus atricilla*), Bonaparte’s (*Chroicocephalus philadelphia*), ring billed (*Larus delawarensis*), and herring (*L. argentatus*)
- Terns: Caspian (*Hydroprogne caspia*), sandwich (*Thalasseus sandvicensis*), royal (*T. maximus*), least (*Sterna antillarum*), Forster’s (*S. forsteri*), and black (*Chlidonias niger*)
- Skimmers: black (*Rynchops niger*)
- Plovers: black-bellied (*Pluvialis squatarola*), snowy (*Charadrius alexandrines*), and Wilson’s (*C. wilsonia*)
- Sandpipers (Waders): willet (*Tringa semipalmata*), western (*Calidris mauri*), sanderling (*C. alba*), and ruddy turnstone (*Arenaria interpres*)

Less common but significant species include the federally listed piping plover and red knot, de-listed brown pelican (*Pelecanus occidentalis*), and state listed white-faced ibis (*Plegadis chihi*).

2.5.3 Essential Fish Habitat

The project area is located in Ecoregion 4 nearshore habitat (60 feet or less in depth and not inside a barrier island or estuary) and includes EFH designated by the Gulf of Mexico Fishery Management Council (GMFMC) for all life stages of cobia (*Rachycentron canadum*) and red drum (*Sciaenops ocellatus*); larvae and juvenile lane snapper (*Lutjanus synagris*); juvenile and adult king mackerel (*Scomberomorus cavalla*); adult gray snapper (*Lutjanus griseus*); larval/pre-settlement post-larvae, late post-larvae/juvenile sub-adult, and adult white shrimp (*Litopenaeus setiferus*); and larval/pre-settlement post-larvae and sub-adult brown shrimp (*Farfantepenaeus aztecus*).

The project area also includes EFH for highly migratory species managed by the National Marine Fisheries Service (NMFS) including scalloped hammerhead sharks (*Sphyrna lewini*), blacktip sharks (*Carcharhinus limbatus*), bull sharks (*Carcharhinus leucas*), lemon sharks (*Negaprion brevirostris*), spinner sharks (*Carcharhinus brevipinna*), bonnethead sharks (*Sphyrna tiburo*), Atlantic sharpnose sharks (*Rizoprionodon terraenovae*), and finetooth sharks (*Carcharhinus isodon*). EFH in the project vicinity includes sand and shell substrates and water column.

The Gulf of Mexico also supports commercial and recreational fisheries. Commercially landed finfish include black drum (*Pogonias cromis*), southern flounder (*Paralichthys lethostigma*), striped mullet (*Mugil cephalus*), and sheepshead (*Archosargus probatocephalus*). The main commercially harvested shellfish species around Galveston are brown and white shrimp, and blue crabs (*Callinectes sapidus*).

Other commercial and recreational species in the project vicinity may include Atlantic croaker (*Micropogonias undulatus*), spot croaker (*Leiostomus xanthurus*), sea trout (*Cynoscion nebulosus*), and sand trout (*Cynoscion arenerius*). These species are ubiquitous along the Texas coast with seasonal differences in abundance.

2.5.4 Marine Mammals

The common bottle nosed dolphin (*Tursiops truncatus*) is the most likely marine mammal occurring in the nearshore. Other species of dolphins and whales are primarily restricted to deeper offshore waters; therefore, it is unlikely that any of these species would occur in or near the project area.

2.6 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to consider the effects of their undertakings on historic properties. A preliminary assessment of the cultural resources within one kilometer of the project area was conducted using a desktop review of the databases maintained by the Texas Historical Commission and the Texas Archeological Research Laboratory for terrestrial and marine cultural resources as well as the shipwreck and obstruction databases of the National Oceanic and Atmospheric Administration and the Bureau of Ocean Energy Management. There are no recorded cultural resources and no previous cultural resources investigations within the project footprint. The nearest recorded terrestrial archeological site is 41GV71, which is located approximately 800 meters from the project area and will not be affected by the current undertaking. Site 41GV71 is the late 19th Century remains of the town of Nottingham, the Nottingham Lace Factory and the Galveston and Western Railway. Additionally, four possible shipwrecks (S.W. Perry, Sabine, Matagorda, and 41GV168) have been identified between 650 and 1,700 meters of the project area but are not directly offshore from the project area.

2.7 Socioeconomics

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population, demographics, economic status, and development. Demographics entail population characteristics and include data pertaining to race, gender, income, housing, poverty status, and education. Economic development or activity typically includes employment, wages, business patterns, an area's industrial base, and its economic growth.

Major industries that support Galveston Island's economic prosperity include education, healthcare, maritime, and tourism and hospitality. Three institutions contribute to the education and thousands of jobs in Galveston included Texas A&M University at Galveston (higher education), University of Texas Medical Branch (UTMB; higher education), and Galveston Independent School District. In addition to providing education, UTMB provides exceptional healthcare services including 24-hour emergency, specialty care, and is a Level-1 trauma center. The Port of Galveston is the fourth busiest port in the country, providing $2.3 billion economic impact for the State and $869.6 million in income in 2018 (Galveston Economy 2020). Direct spending from tourism had an impact of $913 million and generated a total economic impact of $1.2 billion in Galveston in 2021 (Tourism Economics 2022).

Median household income in Galveston is $51,280 (ACS 2020b), while median household income for Census block 1, tract 7260 in Galveston is $99,803 (ACS 2020a). There are no natural barriers to interchange between cities and other areas, and to some extent natural geographic features have benefited economic growth through access to Galveston Bay and the Galveston State Park.

The smallest census designation that contains the study area is census block 1, tract 7260 (Figure). Based on aerial imagery, the residential structures, and hence concentration of population, lies along the southeastern portion of the census block nearest the beachfront. Much of the census block is comprised of vegetated areas, beach, and Sweetwater Lake.

All data were obtained from the American Community Survey (ACS) 5-year report, generated using information gathered from the U.S. Census Bureau of Statistics.

2.7.1 Population, Housing, and Community

Galveston Island has an estimated population of 50,307 individuals, comprising less than 1% of the State's population. Approximately 50.1% of residents are male and 49.9% are female, the inverse of the State. Census block group 1, Tract 7260 has a population of 871 individuals across 3.7 square miles, forming a population density of 234.6 people per square mile. The distribution of men and women is nearly identical to the State (Table 2).

Table 2 - Population by sex. Data were gathered from ACS (2020 a-c)

Sex	Texas	Galveston Island	Census Block 1, Tract 7260
Total Population	28,635,442	50,307	871
Male	49.7%	50.1%	49.6%
Female	50.3%	49.9%	50.4%

The majority of people in Galveston are between 20-39 and 50-69 years of age, with the median age being 40 (ACS 2020b). This age demographic is older than most of the State where the greatest proportion of the population is less than 49 years of age, with the median age being 35 (ACS 2020c). Conversely, the majority of people residing in the census block are over the age of 40, with a median age of 54 (Table 3).

Table 3 - Population by age group. Data were gathered from ACS (2020 a-c)

Age Group (years)	Texas	Galveston Island	Census Block 1, Tract 7260
Total Population	28,635,442	50,307	871
0-9	14.0%	8.8%	7.7%
10-19	14.6%	10.4%	10.8%
20-29	14.4%	17.4%	6.0%
30-39	14.3%	13.5%	8.4%
40-49	13.0%	11.0%	14.0%
50-59	11.9%	13.8%	12.6%
60-69	9.6%	14.7%	24.9%
70-79	5.4%	6.8%	10.2%
80+	2.8%	3.5%	5.4%

In all instances, most of the population was comprised of white individuals followed by Hispanic or Latinos. For Galveston Island and the State, blacks/African Americans comprised the third largest percentage of residents, while two or more races ranked third for the census block. There were no Native Americans, Asians, or Pacific Islanders reported in the census block (Table 4).

Table 4 - Population by race. Data were gathered from ACS (2020 a-c)

Race	Texas	Galveston Island	Census Block 1, Tract 7260
Total Population	28,635,442	50,307	871
White alone	41.4%	49.4%	78.4%
Hispanic or Latino	39.4%	30.1%	18.7%
Black/African American	11.8%	15.9%	1.4%

Race	Texas	Galveston Island	Census Block 1, Tract 7260
American Indian/Alaska Native	0.2%	0.3%	0.0%
Asian	4.9%	2.8%	0.0%
Native Hawaiian/Pacific Islander	0.1%	0.0%	0.0%
Other	0.2%	0.1%	0.0%
Two or more races	2.0%	1.5%	1.5%

2.7.2 Environmental Justice

Executive Order 12898 directs federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. CEQ guidance states that minority populations should be identified where either: a) the minority population of the affected area exceeds 50% or b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

The EPA maintains an environmental justice mapping and screening tool (EJSCREEN) that provides users with a nationally consistent dataset and approach for combining environmental and demographic indicators. EJSCREEN can be used as a first-level screening tool to help determine the level of analysis needed. This analysis used two of the six demographic indicators available in the tool:

- Percent Low-Income: percent of individuals whose ratio of household income to poverty level in the past 12 months was less than 2.
- Percent Minority: percent minority as a fraction of population, where minority is defined as all but Non-Hispanic or White alone.

Additionally, the tool estimates a Demographic Index, based on the average of the two demographic indicators used for the analysis.

Census block group 1, Tract 7260, in Galveston, TX is the smallest geographical census boundary that included the study area and was used to evaluate environmental justice with EJSCREEN (Figure 8). The demographic index of the census block group relative to the U.S. is 18%, falling in the “less than 50th percentile” classification. Less than 50% indicates the concentration of minority and low-income populations were small compared to the region and would not be adversely impacted to a greater degree than the general population.

Minority percentiles show similar results, with 28% of the census group being minority as compared to the State at 58%. Data showed the census block is in the 19th percentile when compared to the State. For there to be environmental justice concerns, the census block would need to be in the 50th percentile or greater.

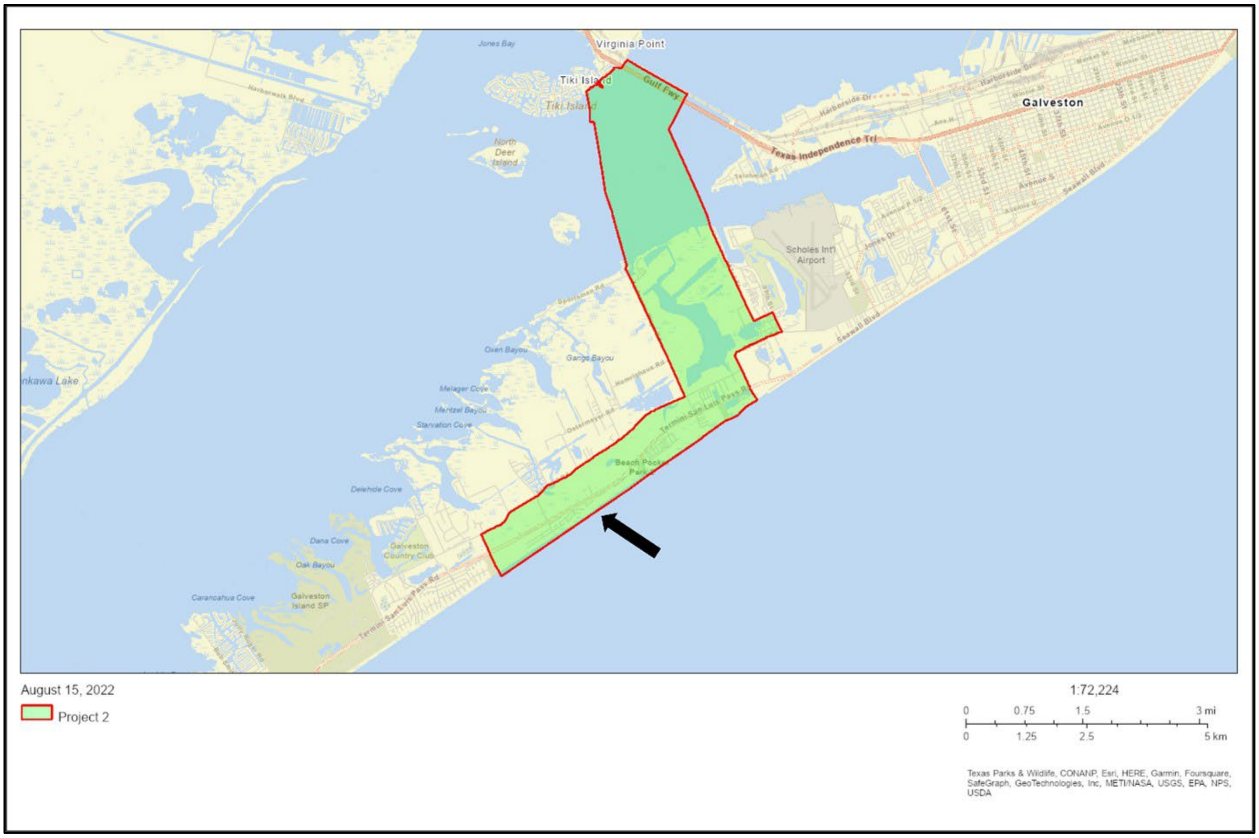


Figure 8 - Census block group from EJSCREEN used for the environmental justice analysis, including the location for proposed nourishment (black arrow)

2.8 Noise, Aesthetics and Recreation

The project area possesses generally good aesthetic values along much of the beachfront area. There is mostly residential development behind the narrow-vegetated dune, where it still exists. A couple of resorts and restaurants are also along the beach in the project area. Interspersed amongst existing development are large open oceanfront lots which improves aesthetics in those areas; however, many of the lots could be developed at any time.

The project area experiences local, state and national recreational use throughout most of the year on beaches locally known as Sunny Beach, West Beach, Bermuda Beach, and Pirates Beach. The back beach and nearshore waters are used by sunbathers, beachcombers, fisherman, swimmers, snorkelers, surfers, birders, and various types of boaters. Six public access points to the beach are available in the project area.

2.9 Hazardous, Toxic or Radioactive Waste

To complete a feasibility level Hazardous, Toxic and Radioactive Waste (HTRW) evaluation, a report was completed following the rules and guidance of ER 1165-2-132: HTRW Guidance for Civil Works Projects and ASTM E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. The purpose of this search was to identify any sites with recognized environmental conditions (RECs) where hazardous substances or petroleum products have been released or are likely to have been released to soil, groundwater, or surface water in the proposed project area.

A desktop records review was conducted using various sources to determine the presence of HTRW sites on or near the project footprint. This search was focused on active cleanup sites and sites with a reasonable risk of HTRW release. Several databases were searched manually to narrow down the search area. These databases included the Environmental Protection Agency (EPA) Cleanups in my Community database, the EPA Envirofacts database, the TCEQ web map of UST/AST's, TCEQ Central Registry, and the Texas Railroad Commission's (RRC) oil and gas well Public GIS Viewer. The information collected from this desktop records review was analyzed for recognized environmental conditions (RECs) that would affect the proposed project or need further investigation, given the proposed project measures. No Recognized Environmental Conditions were identified within one mile of the project area that could be reasonably expected to affect the project area.

Although not classified as HTRW under USACE regulations, several oil and gas infrastructure sites were identified within the surrounding area. As a result of these findings, pipelines and wells within the project vicinity and along potential site access routes should be precisely located during PED to ensure no unintended interaction occurs with the existing oil and gas facilities.

3 Future Without Project Condition

Future without Project Conditions forecast the conditions expected during the period of analysis if no beneficial use beach fill project is constructed. The future without project condition also provides the basis from which alternative plans are formulated and damages are assessed. This study will forecast the conditions expected at the Galveston Island Beach study area over the twenty four-year period of analysis, 2023 to 2046.

Future Without Project Plan (FWOP): Dredged material is deposited in open water (the base plan; has no Federal action for beach nourishment). Beach Erosion and damage to homes and infrastructures is unabated. FWOP plan does not provide BUDM. FWOP does not prevent or delay coastal erosion damages and/or risks to life and property at Galveston Island. The FWOP is compared to Future With Project Plans (FWPP) to determine if there is an economic justification of a FWPP. FWOP is shown below with the estimated annual shoreline retreat of the +4-foot (NAVD88) contour with yellow to red color progression from 2023 to 2046. The FWOP analysis utilizes historically derived shoreline change rates from 2014 – 2019 surveys (supplemented with limited survey from 2006) to estimate future shoreline change between 2023 and 2046. The local average rate of shoreline retreat ranges from 2.7 to 5.75 ft/yr. (landward) based on a comparative analysis of historic surveys. Details of these surveys and the resulting retreat calculations are provided in Appendix A – Engineering Appendix, Hydrology and Hydraulics. See the following Figure 9.

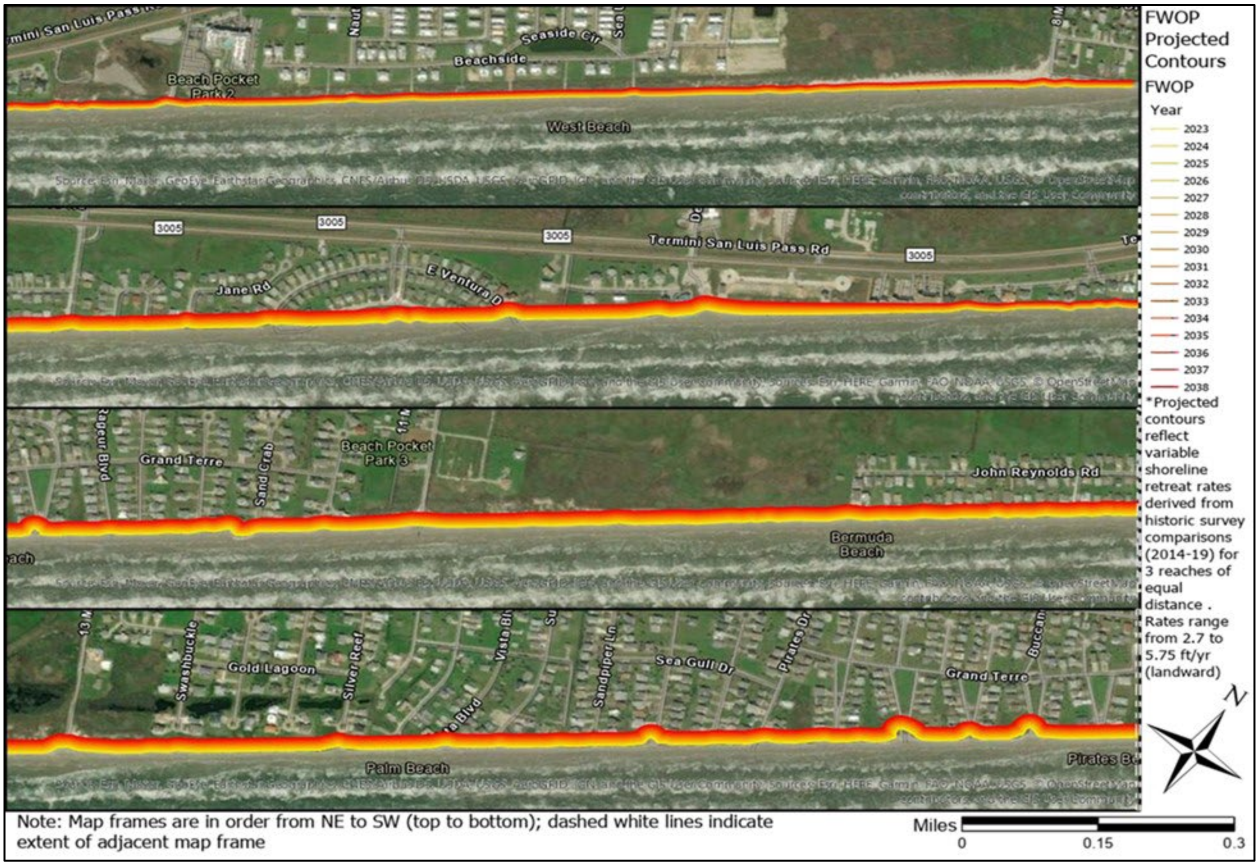


Figure 9 – FWOP

Shown above are four contiguous segments of the Galveston Island study area in order from east to west (top to bottom) with shoreline change projections superimposed. Yellow depicts the shoreline in 2023 and the estimated shoreline for 2038 is shown as the red line. Contrary to long-term trends, the eastern ~one-third of the study area has seen a reduction to shoreline retreat, which is largely attributed to recent and ongoing nourishment projects (Babe's Beach, Dellanera, etc.).

4 Alternative Plans Formulation

Management measures developed to alleviate coastal erosion in the study area were Beach Nourishment and Seawalls. The alternatives were developed to meet the goals, objectives, and avoid the constraints. Following is the array of alternatives with their descriptions. Screening resulted in two plans which were costed for comparison, Alternatives 2 and 3.

4.1 First Array of Alternative Plans

4.1.1 No Action / FWOP – Alternative 1

Dredged material is currently deposited in opened water (the base plan; has no Federal action for beach nourishment). Beach Erosion and damage to homes and infrastructures is unabated. FWOP plan does not provide BUDM. FWOP does not delay coastal erosion damages and risks to life and property at Galveston Island; thus, does not achieve erosion/storm damage reduction goals.

4.1.2 Beach Nourishment Alone – Alternatives 2 and 3

Alternatives 2 & 3 are differentiated only by their respective location, which amounts to a 3,000-foot shift (along the shore) of the construction template. These two alternatives were developed following the consideration of the beach erosion between 8 Mile and Thirteen Mile Roads. This approximately 5-mile beach length was subdivided into four segments. The two segments with the most development were selected for further analysis. Based on the existing beach profile and estimated available beach quality sand, it was determined that 1.7 miles of beach could be nourished. Alternatives 2 & 3 were then sited to maximize erosion protection benefits for detailed analysis. The dimensions include a 300-foot added berm width, followed by a 1:20 slope to tie into the existing profile. A three-dimensional version (DEM) of this template is created in GIS, extending the entire length of the project area, which is used to determine total fill requirements by comparing the construction template DEM with the 2019 DEM, using GIS cut/fill operations. The calculations revealed that approximately 1/3 of the total project area length could be covered by 530K cubic yards of fill material, which is on the lower end of the range of anticipated borrow fill. There is risk that a dredging requirement could arise out of sequence with different quantity availability.

Shoreline change projections estimate movement of the +4-foot (NAVD88) contour, were projected annually from 2023 to 2046. The shoreline change curves account for cross-shore equilibration of the construction template profile, statistically derived background erosion, and longshore diffusion of each beach fill alternative. The one-line shoreline retreat results indicate losses inside the original placement area (construction template) at approximately 80 percent by year 5, and 100 percent loss between years 8 and 10, which varies alongshore based on relative proximity to the nourishment location and the background erosion rate.

The sand placement design goal is a contiguous, uniform shoreline to avoid end loses and induced rip currents to provide benefits to privately owned developed property. Thus, there is a limited placement of material in front of privately owned vacant land to provide project performance at the developed property and to alleviate safety concerns.

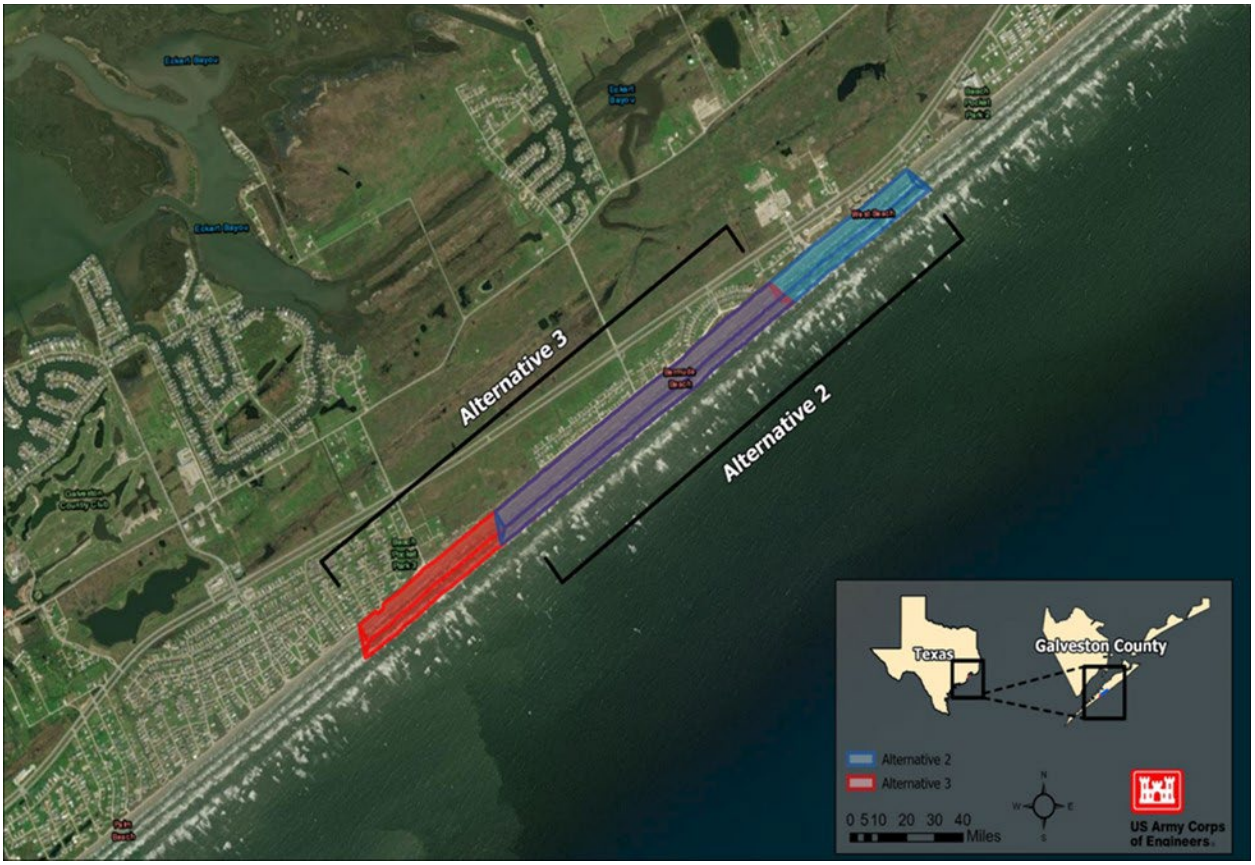


Figure 10 - Alternatives 2 and 3

4.1.3 Seawall Extension / FWP – Alternatives 4 and 5

Seawall extensions are not considered feasible for the purposes of this study due to economic and engineering concerns. A seawall extension would provide robust defense against storm surge and erosion but is costly and erosion would continue in the study area. The costs of a seawall, with- or without including beneficial use of dredged material would almost certainly have a benefit to cost ratio of less than 1.0 (Figure 11).

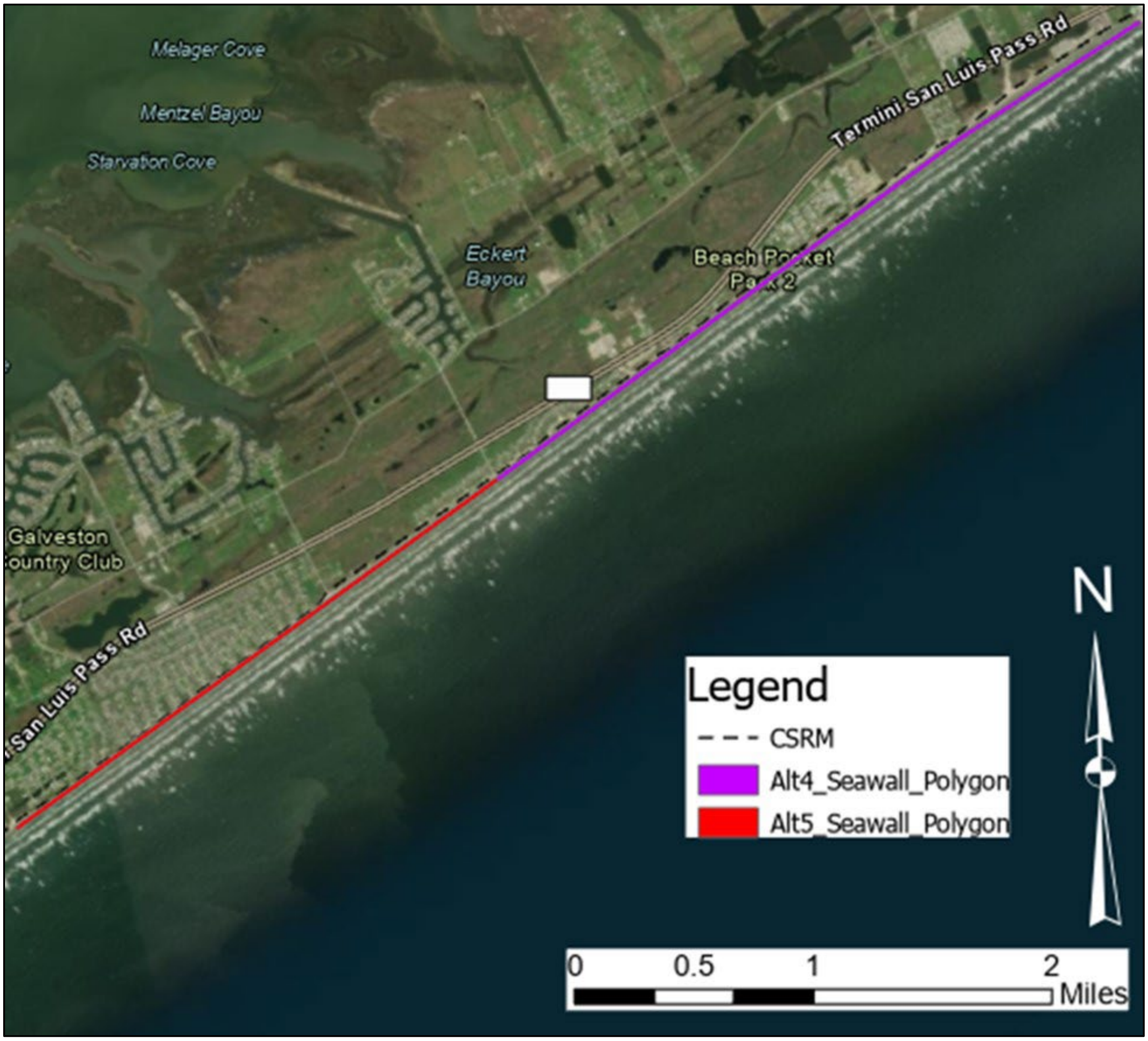


Figure 11 - FWP for Alternatives 4 & 5 - Seawall Extensions

4.1.4 Beach Nourishment West of Existing Seawall / FWP – Alternative 6

This alternative considered delaying erosion by way of westward littoral drift of sand placed seaward of the existing seawall's west end with a short placement duration to avoid/reduce dredging delays of the Galveston Navigation Channel. This alternative was screened out as analysis indicated that it would not reduce erosion for the most vulnerable developed properties in the study area (8-Mile to 13-Mile Roads) (Figure 12). The one mile of beachfront development from seawall end to 8 Mile Road that would most benefit by littoral drift from this alternative is already scheduled for direct sand placement. Thus, Alternative 6 would not generate positive net benefits for the Sec 204 project.

Figure 12 - Alternative 6

4.2 Evaluation and Comparison of Alternative Plans

The risks and uncertainties are similar among alternatives and include, but are not limited to, subsidence, erosion, impacts from climate change such as increased storm frequency and sea level rise, and availability of compatible sediment.

4.2.1 Alternative 2 – Beach Nourishment

Dredged material is brought to the west end of Galveston Beach by Hopper dredge and pipelined to beach for placement beginning at Sunbather Lane and extending approximately 1.7 miles west. Alternative 2 at its eastern end would have direct placement for the most vulnerable developed properties in the study area (Figure 13).

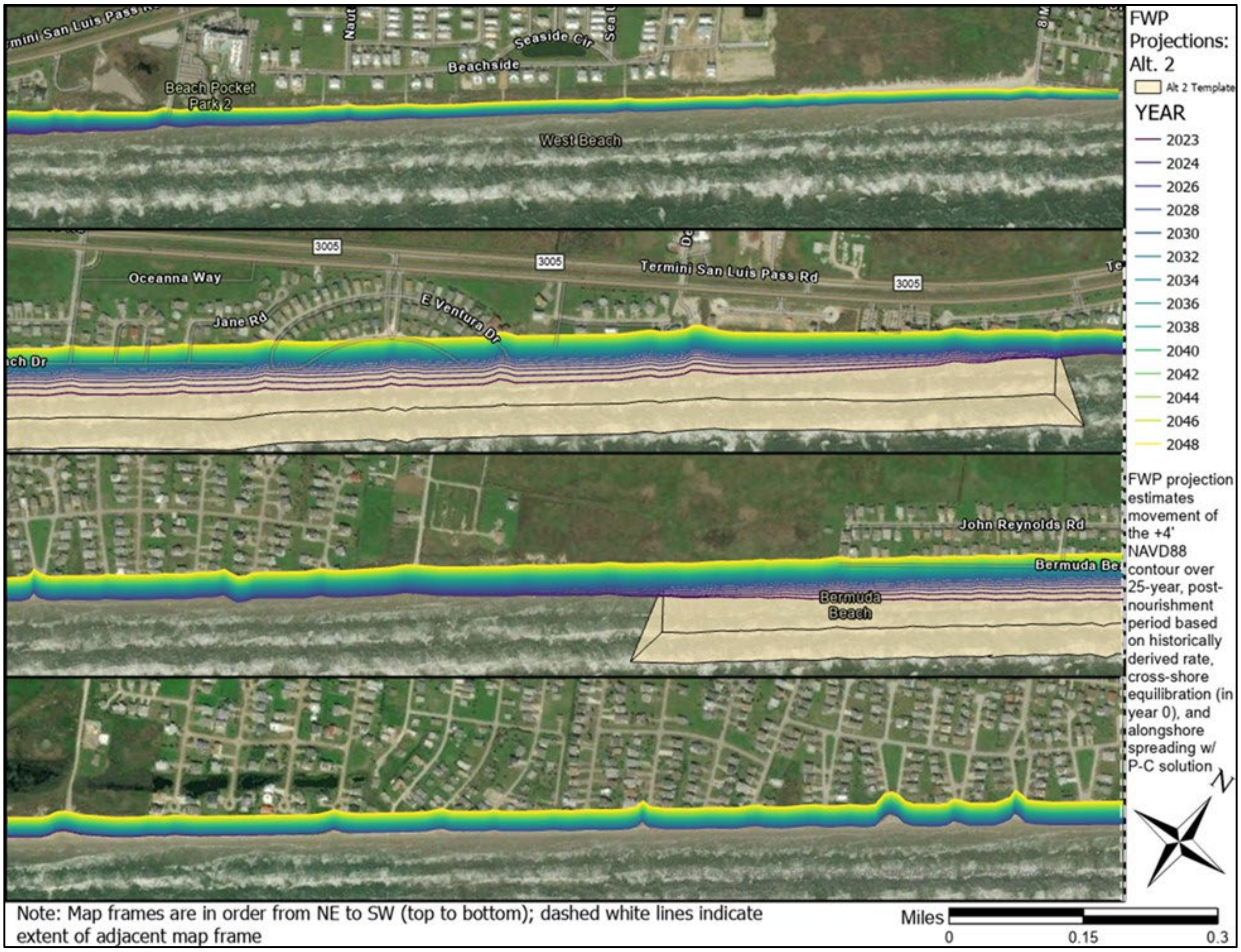


Figure 13 – FWP Alternative 2 Beach Nourishment

4.2.2 Alternative 3 – Beach Nourishment

Dredged material is brought to the west end of Galveston Beach by hopper dredge using a pipeline for beach placement beginning at Hershey Beach Drive and extending approximately 1.7 miles west to Ghost Crab Lane.

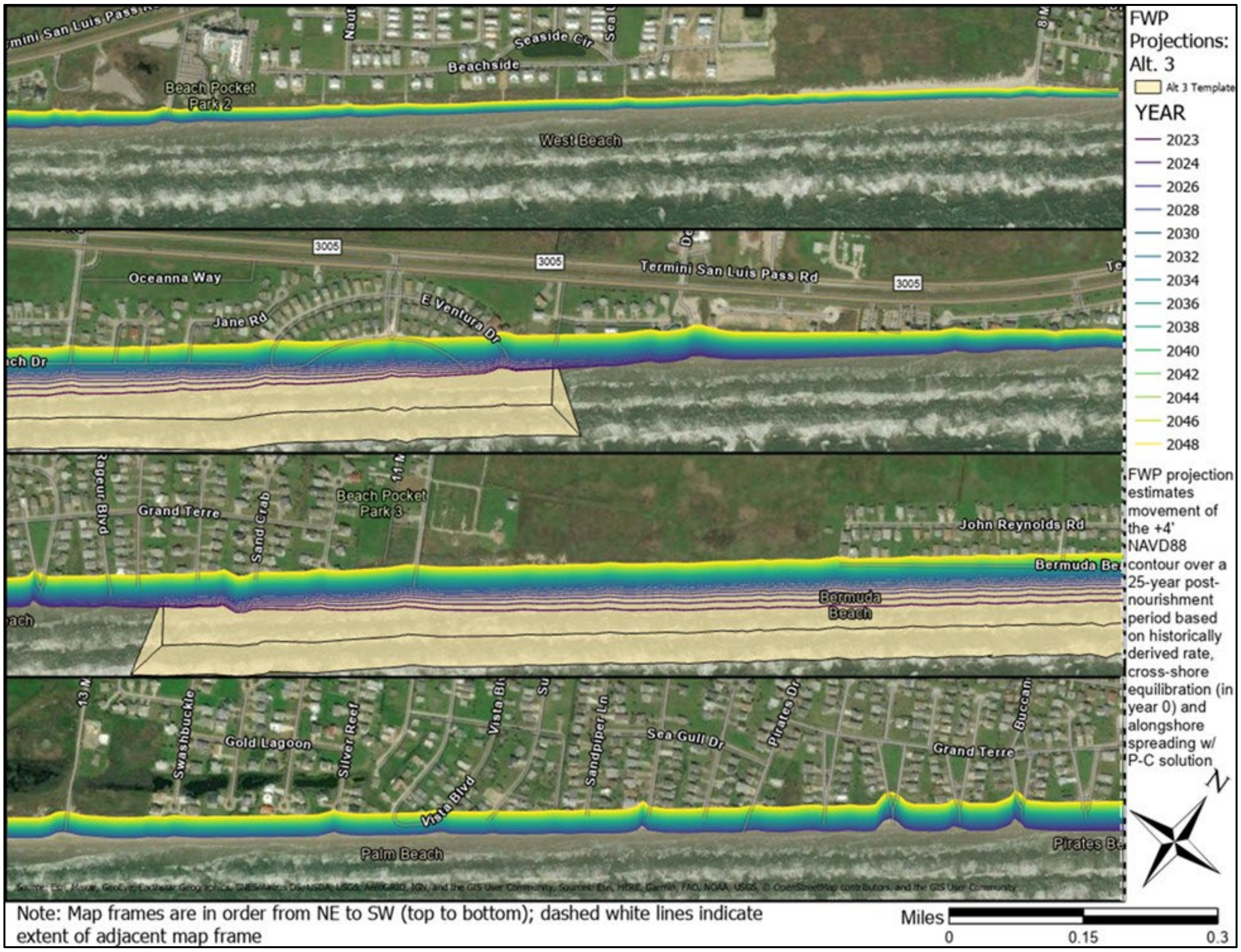


Figure 14 - FWP Alternative 3 Beach Nourishment

4.3 Costs and Benefits of Alternatives 2 and 3

Both the focused alternatives meet the criteria of only one placement on public access beaches, have BUDM benefits, and avoid impacts to sea turtles and shore birds to qualify for the final comparison of the National Economic Development Objective of benefits over cost. Both Alternatives 2 and 3 meet the criteria of economic justification, environmental factors, completeness, and effectiveness to be constructed under the authority of Section 204. As Alternative 2 has the greatest excess benefits over cost as well as providing direct erosion protection to the most vulnerable development within the study area including Highway 3005, an essential evacuation route, It is the most effective and acceptable plan. Alternative 2 is the NFS's preferred plan and also the Tentatively Selected Plan.

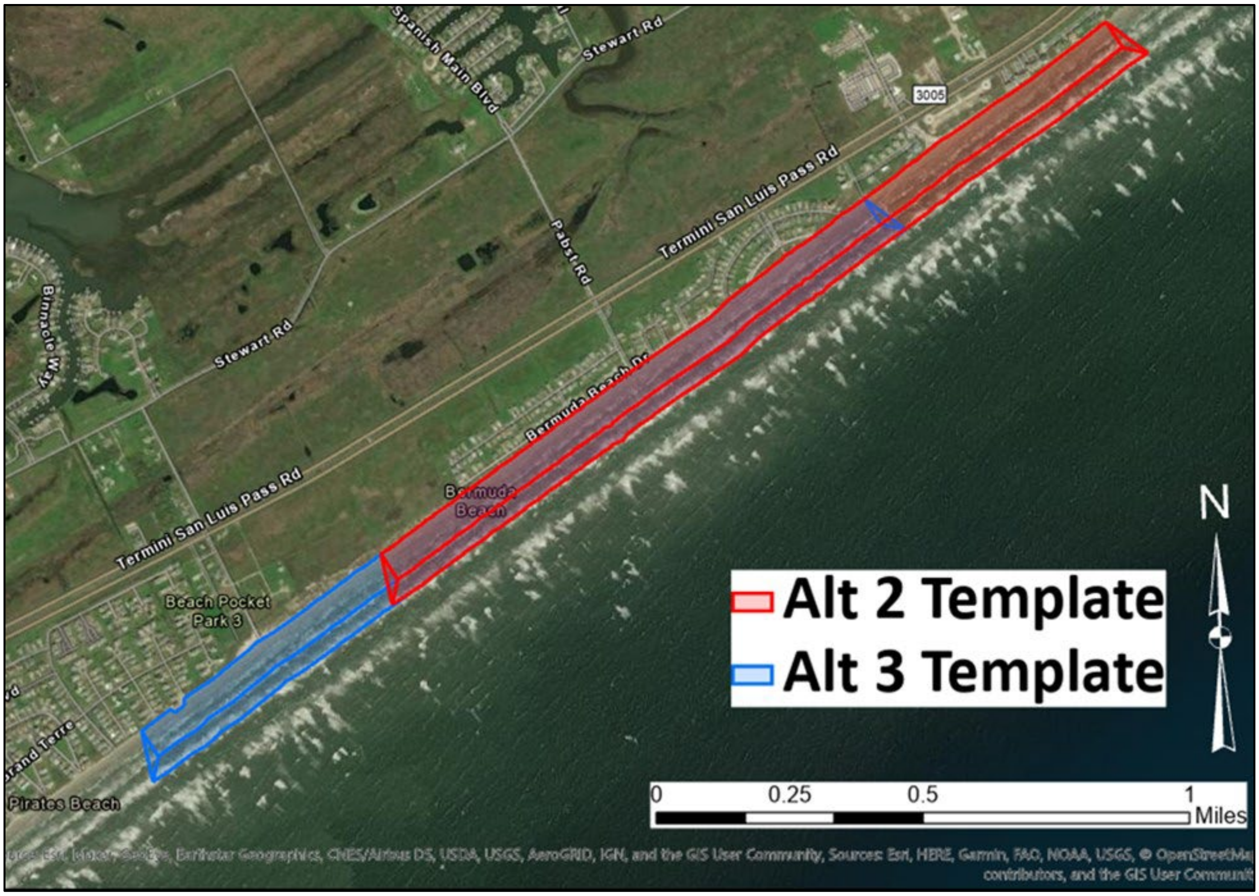


Figure 15 - Alternatives 2 and 3 Template

Alternative 2 is the TSP as it has the greatest CSRM benefits over cost making it the plan meeting the National Economic Development (NED) Objective. Life safety benefits would be similar for both Alternatives 2 and 3 as would Environmental Quality (EQ), Regional Economic Development (RED), Other Social Effects (OSE), monetary and non-monetary benefits, and primary versus incidental benefits. See Appendix E for economic benefits and additional economic information. OSE of the BUDM benefits delays erosion's life safety concerns (non-monetary) of undermining the evacuation route and homes, which also provides continued social interaction (non-monetary) as well as continued beach recreation that provides economic vitality to Galveston. Both alternatives have EQ of equal lengths of sand placement along and extending the beach seaward that temporary provides habitat such as for sea turtles, crabs and shore birds. Primary Federal Interest benefits are Coastal Storm Risk Management with incidental benefits for land losses and recreation.

Table 5 – First Costs for Alternative Plans (rounded)

Project First Costs	Alt 1 - FWOP	Alt 2 - BUDM	Alt 3 - BUDM
Construction Cost			
01 Real Estate		$77,000	$77,000
12 Navigation	$6,539,000	$18,912,000	19,553,000
30 Eng. & Design	$654,000	$1,888,000	$1,911,000
31 Const Mgmt.	$391,000	$1,134,000	$881,000
Project First Cost, rounded	$7,584,000	$22,011,000	$22,422,000
INCREASED PROJ COST		$14,427,000	$14,838,000

FY22 Price Levels, 25% Contingency (Appendix B – Cost)

Table 6 - Benefit-Cost Comparison Between Alternatives 2 and 3

	Alternative 2	Alternative 3
FY2022 Project First Cost	$14,427,000	$14,838,200
IDC - @ 2.50%	$29,700	$30,600
2022 Total Investment	**$14,446,800**	**$14,858,500**
Capital Recovery Factor **-** 24 years	0.0559	0.0559
FY2022 Annual Costs **for** 24-Year Period of Analysis	$808,300	$831,400
Annual Land Loss Avoided	$245,200	$245,200
Annual Recreation Benefits	$51,900	$51,900
Annual **Structure** Benefits	$875,600	$633,900
Total Annual Benefits **for 24-Year Period of Analysis**	$1,172,700	$931,000
Net Annual Benefits	$364,400	$99,600
Benefit-Cost Ratio	**1.45**	**1.12**

(Appendix E - Economics)

4.3.1 Planning Criteria

Criteria for comparing alternatives includes Costs, Benefits, Objectives, Constraints, Completeness, Effectiveness, Efficiency, Acceptability, and Environmental Impacts (Table 7).

Table 7 - Planning Criteria Alternative Evaluation

	No Action	Alternative 2	Alternative 3
Completeness – Does the alternative provide and account for all required investments to meet planning objectives?	NO	YES	YES
Effectiveness – Does the alternative contribute to meeting the planning objectives?	NO	YES	YES
Efficiency – Is the alternative the most effective way of meeting the planning objectives?	NO	YES	NO
Acceptability – Does the alternative meet all applicable laws, regulations and public policies?	NO	YES	YES

4.3.2 Qualitative Comprehensive Benefits Analysis

In January of 2021, USACE PDTs were directed to identify and analyze benefits in total and equally across a full array of benefit categories. Because this study was done under CAP, which relies heavily on best professional judgement and existing information, as opposed to the gathering of new information and models such as Cost Effective – Incremental Cost Analyses, this Comprehensive Benefits Analysis was performed qualitatively in order to keep costs down and to stay as close as possible to the statutory Federal participation limit.

Table 8 - Qualitative Comprehensive Benefits Analysis

Account	No Action	Alt 2	Alt 3
NED – Does the alternative increase the net value of the national output of goods and services, expressed in monetary units?	NO	YES – This alternative has positive net benefits of $364K.	YES – This alternative has positive net benefits of $100K.
RED – Does the alternative positively increase regional economic activities for income, employment, output or population?	NO	YES – This alternative would provide regional, temporary employment during construction and possibly for O&M.	YES – This alternative would provide regional, temporary employment during construction and possibly for O&M.
OSE – Does the alternative positively affect social aspects such as health and safety, displacement, energy conservation, etc.?	NO – This stretch of beach would continue to erode possibly putting the emergency evacuation route in danger of closing.	YES – Those who use beaches for exercise and recreation would be more likely to use this stretch of beach after construction.	YES – Those who use beaches for exercise and recreation would be more likely to use this stretch of beach after construction.
EQ – Does the alternative have positive effects on ecological and cultural resources?	NO – FWOP conditions will continue to be poor for aquatic species due to high sediment loads from bank sloughing.	YES – While not an objective of the study, animals who use beaches are more likely to use this stretch of beach after construction.	YES – While not an objective of the study, animals who use beaches are more likely to use this stretch of beach after construction.

5 Tentatively Selected Plan / Recommended Plan Description

Alternative 2**:** Dredged material is brought to the west end of the public use Galveston Beach by hopper dredge and pumped by a pipeline for beach placement beginning at Sunbather Lane and extending for 1.7 miles west. This is a measure for beach erosion control for the purpose of hurricane and storm damage reduction.

Costs for the Section 204 beneficial use project are measured as the increase in cost for direct beach placement of the dredged sand above the cost of the Federal Base Plan for ocean placement. The increased cost for construction of the beach nourishment plan is estimated at $15,115,000 fully funded. The 35 percent non-Federal share of the Section 204 project is estimated at $5,290,000. The 65 percent Federal share would be $9,825,000 for the purpose of coastal storm damage reduction. With the $450,000 Federal expenditure for the project study, the total Federal cost expenditure of $10,275,000 exceeds the $10,000,000 per project Federal expenditure limit. Sponsor must pay an additional $275,000 for a total share of $5,565,000.

Benefits for the increased beach fill include reducing the loss and damage to protected private developed properties of land loss, structural damages and recreation activities for the 24-year period of analysis without providing a specific level of service. The incremental construction first cost of beach nourishment for Alternative 2, the Recommended Plan is $14,427,000 or $808,300 (annualized). Net annual benefits amount to $364,400 yielding a Benefit-to-Cost Ratio of 1.45 to one. These benefits indicate a positive National Economic Development plan for beneficial use of dredged material to provide coastal storm damage risk reduction in the City of Galveston, Texas. See Figure 13 below of the graphic exhibiting existing, design, and post construction profiles based on beach equilibrium concepts.

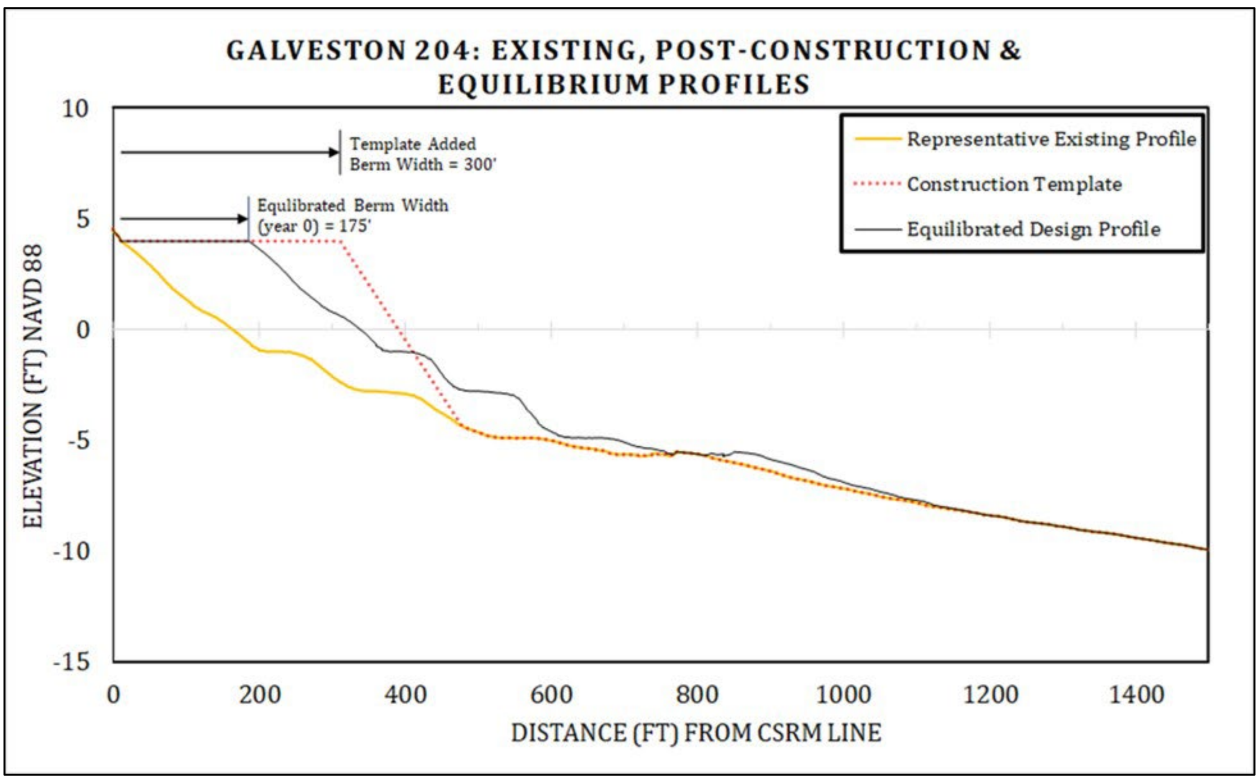


Figure 16 - CSRM - Coastal Storm Risk Management Line

The selected plan has been identified as the least environmentally damaging alternative, as such, the analysis indicates beach nourishment for Galveston Island is feasible, environmentally acceptable, and economically justified. This report concludes that there is Federal interest in proceeding with implementation of a project for the beneficial use of dredged material from Galveston Navigation Channel under the authority of Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326), as amended. The tentatively selected plan is to bring dredged material to the west end of Galveston Beach transferred to a pipeline dredge for beach placement beginning at Sunbather Lane and extending 1.7 miles west.

6 Future With-Project Condition

Future with project conditions forecasts the most likely conditions expected during the periodof analysis if the selected beneficial-use project, direct placement of sand at Galveston Island is constructed. The future with project condition provides the basis from which benefits resulting from the construction project are calculated. The primary account used to calculate benefits from a storm damage reduction project is national economic development (NED).

This study forecasts the conditions expected through 2046 if the 530,000 cubic yards of available material is placed on the beach rather than in the ocean disposal area during the upcoming maintenance dredging of Galveston Entrance Channel Reach for 2025 or outyears. The analysis evaluated how the project would reduce coastal erosion damages to structures and infrastructure over the 24-year (2023-2046) period of analysis. The one-line shoreline retreat results compare well with volumetric loss projections, indicating losses inside the original placement area (construction template) at over half of the original beach fill in year one, approximately 80% by year 5, and 100% loss between years 8 and 10. While statistically derived background erosion rates mitigate some uncertainty inherent in the analytical solutions, analytical projections which form the basis of design here should not be considered representative of actual shoreline evolution (Figure 9 and Figure 17).

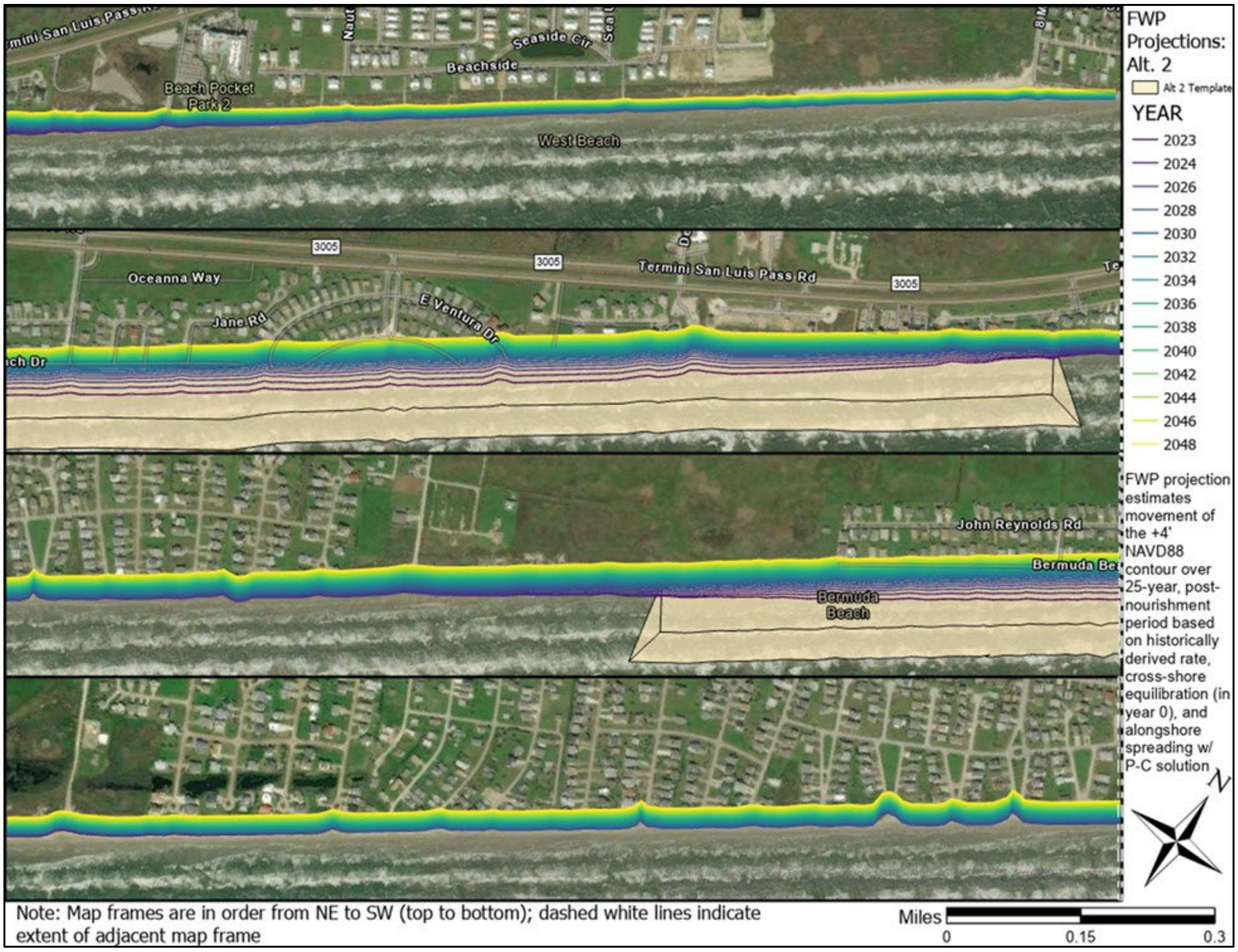


Figure 17 - Alternative 2 FWP

6.1 Environmental Consequences of Alternatives

Described are the probable effects or impacts of implementing the No Action/Future Without Project (FWOP) and the action alternative (i.e., the Future with Project condition or FWP). Effects can be either beneficial or adverse and are considered over a 24-year period of analysis (2023-2046).

The No Action Alternative is the most likely condition expected to occur over the 24-year planning horizon in the absence of the action alternative. In this case, the No Action Alternative means that dredged material would not be beneficially used to nourish the beach between Sunbather and Ghost Crab Lanes. Federal Operations and Maintenance dredging of the Galveston Entrance Channel Reach would occur according to the Federal Standard and placement of material following would be in an offshore disposal site. The ODMDS is shown in Figure 2.

The No Action Analysis includes a brief impact analysis of reasonably likely projects (e.g., projects funded for construction or for which a decision document is available but is awaiting funding) that are expected to modify the existing conditions of the project area. It is assumed that all other projects that are ongoing in the study area would continue as planned but would not directly affect the project area and are therefore not discussed in the No Action analysis.

The Action Alternative is the TSP (Alternative 2), which involves beneficially using dredged material to nourish approximately 1.7 miles of beach. It is assumed all sediment needs for implementation of Alternative 2 would come from material dredged from the Galveston Entrance Channel Reach. The sediment needs would be met using existing operations and maintenance dredging and would not induce additional dredging beyond the Federal Standard.

Unless otherwise indicated, the impacts of dredging material are assumed to be identical under the No Action and Alternative 2 and will not be discussed herein. The impacts of O&M dredging and material have been accounted in its NEPA documentation and are incorporated by reference. This analysis will focus on the transportation and placement of dredged material to the Federal Standard location (No Action) or onto the beach (Alternative 2).

When considering impacts, it was assumed that, at a minimum, best management practices (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:

- Use of silt fencing to limit soil migration and water quality degradation;
- 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.

If, for some reason, the BMPs are not implemented, the impacts of any of the action alternatives would only minimally increase from those described in this chapter. The increase in impacts would not be substantial enough to cause an adverse insignificant impact to become significant.

6.1.1 Air Quality

No Action

Under the Federal Standard, transport of dredged material to the ODMDS would result in direct, short term adverse impacts to ambient air quality from construction activities associated with dredging, transport, and placement of material into the site. Dredged material would be transported by the dredge vessel approximately 5 miles. Dredging operations are not below *de minimus* and as a result have received a General Conformity Determination.

Alternative 2

The action would have direct, short term adverse impacts to ambient air quality from construction activities; however, no long-term adverse or beneficial impacts are expected because the project does not involve construction of permanent emission-emitting structures. Short-term air emissions would be mobile in nature, temporary, and localized to the nourishment area being worked at that time and any required booster pump locations and cease upon completion of construction actions. Operation of booster pumps, heavy equipment, support vehicles, vessels, and other motorized machinery for construction would result in combustion of fossil fuels and the release of volatile organic compounds (VOCs), nitrogen oxides (NOx), carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), and particulates (PM_{10} and $PM_{2.5}$).

In addition to BMPs already listed at the beginning of the chapter, the following BMPs would further reduce air quality impacts and should be incorporated when developing contract specifications: use non-road diesel-powered equipment which meets stringent Tier 3 and Tier 4 emissions standards; maintain and tune engines per manufacture's specifications to perform at EPA certification levels, prevent tampering, and conduct inspections to ensure these measures are followed; and consider alternative fuel and energy sources (e.g. natural gas, electricity, etc.) when and where appropriate. Using higher tiered equipment can reduce emissions and should be considered when possible; however, it is recognized that using this equipment may contribute to higher costs or limited availability of such equipment.

Existing beach nourishment actions along Galveston Island (DA Permit #SWG-2000-02888) were analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. For that project, it was determined that approximately 10.5 miles of beach nourishment and associated activities, including dredging in offshore and upland borrow locations, would not exceed *de minimis* levels of direct or indirect emissions of any criteria pollutant or its precursors. In comparison, Alternative 2 is significantly smaller in scope and does not involve any new dredging; therefore, it is also anticipated that direct and indirect emissions of the action would not exceed de minimis for any criteria pollutants or its precursors and is exempt from General Conformity Regulations.

Alternative 2 would result in higher emission rates than the FWOP/No Action due to longer transport vessel distances for the beach placement but would be within conformity regulations.

6.1.2 Climate

Climate impacts are analyzed from two perspectives: impact of implementing any of the action alternatives on climate and climate change and the impact of climate change on the performance of any of the action alternatives.

NEPA does not specify significance thresholds that may be used to evaluate the effects of a proposed action on global climate. The appropriate approach to evaluating a project's impact on global climate under NEPA is in a state of flux. Current guidance is to follow the Council on Environmental Quality (CEQ) guidance released in August 2016, which recommends 25,000 metric tons CO_2 equivalent ($MTCO_2e$) of direct emissions per year be used as a presumptive threshold for analysis and disclosure within NEPA documents. The guidance suggests that if a proposed action would result in direct emissions below this threshold, the emissions would not be relevant to and would not need to be discussed within a NEPA analysis.

At the state level, GHGs are a regulated pollutant under the PSD program when emissions exceed the thresholds set in 30 TAC 116.164(a)(1) or (a)(2). The threshold for new source emissions is the project emissions are above the major source threshold for a regulated pollutant that is not GHGs and will emit or have the potential to emit 75,000 tons per year (tpy) or more CO_2e. Emissions of GHGs are regulated and require authorization only when the project emission increases are above this threshold. None of the alternatives would exceed any non-GHG thresholds and would emit far fewer tpy CO_2e than the regulated amount.

No Action

Construction Activities

Under the No Action, no construction activities are anticipated in the project area, so there would be no emission of greenhouse gasses (GHGs).

Alternative 2

During construction, combustion of fossil fuels while operating on- and off-road mobile sources would result in the emission of GHGs. The primary GHGs generated during construction are CO_2, CH_4, and N_2O. The other GHGs such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are typically associated with specific industrial sources and processes and would not be emitted during construction. After construction is complete, all GHG emissions would cease, and the area would return to baseline conditions. There are no apparent carbon sequestration impacts that would result from implementation; thus, the total direct and indirect impacts would be constrained to very small increases in GHG emissions to the atmosphere from operation of on- and off-road mobile sources. Performance under RSLC is discussed in Physical Oceanography, Relative Sea Level Change below for Alternative 2].

6.1.3 Physical Oceanography

6.1.3.1 Tides Currents and Circulation Patterns

No Action

Under the No Action, currents and circulation patterns would not be expected to change. As the beach narrows and shoreline loss occurs, the high tide line is expected to move further landward than where it is under the existing condition.

Alternative 2

Under Alternative 2, a wider beach will cause waves to break further from the shoreline, weakening their force before they reach the shoreline itself, thereby helping to protect the existing dune and properties from erosion, decreasing flooding potential and limiting how far ashore storm surge will go. Since CAP Section 204 limits Federal participation to $10 million, this is a one-time placement, the changes to wave breaking would be temporary and return to the existing condition at the end of the project life (about 10 years). Placing dredged material into the nearshore over a large area would not be expected to change the currents, circulation patterns, or tides due to the relatively minimal change in bathymetry (~2 percent slopes and less than a 5-foot max elevation increase).

Beach nourishment would not impact regional hydrology. The placement of sediments on the beach may have very localized effects on where rainfall runoff flows but would not block or interfere with any existing stream channels or other permanent inland waterbodies. No long-term or spatially extensive impacts to watershed hydrology are anticipated.

6.1.3.2 Relative Sea Level Rise

No Action

The impact of RSLC in the project area is discussed throughout the environmental consequences section of this DIFR-EA. In general, RSLC is anticipated to continue increasing at 0.02096 feet/year. At the end of the assumed maximum project benefit period, the water levels are projected to rise 0.82, 1.01 and 1.60 feet relative to NAVD88 for the low, intermediate, and high scenarios, respectively.

Alternative 2

Sea level rise is accounted for in the advance fill volume, which also includes contributions from background erosion, end loss and overfill. Because this action is a one-time nourishment in the near future and a relatively short project life, any beneficial impacts of nourishing the beach to combat sea level rise are unlikely to be realized.

6.1.3.3 Flooding

No Action

Storms represent the extremes in flooding risk and potential damage to the project area under the existing condition and into the future. As erosion continues to encroach on any dunes and degrade it, storm surge events are more likely to overtop dunes in more frequent events. At some point in the future, the narrow beach and degraded dune may not prevent tidal flooding during high-tide resulting in nuisance flooding occurring more frequently on a bi-monthly or even daily basis in lower-lying areas. As sea levels rise, the concern with more frequent flooding will only increase. It is reasonably likely that a hardened structure would be proposed to combat the problem at some point in the future.

Alternative 2

Executive Order 11988 requires evaluation the proposed project's potential effects on a floodplain. The project is located on a "developed" barrier island and it has not been designated as a protected area. The nourishment of the beach will not create any new structures that will be threatened by flooding, nor will it result in increased development or threats to human safety, health and welfare. Slowing coastal erosion through renourishment of the beach will provide a more stable beach, reduce the impacts of erosion on any dune, and assist in preventing damage to existing infrastructure behind dunes from storm events.

The project is in the base floodplain (100-year floodplain) and has been evaluated in accordance with Executive Order 11988. Relocation of the project outside the floodplain would not be responsive to the purpose and need of the study and was not considered further. The risk of inducement is normally associated with structural projects such as levels and floodwalls where vacant parcels are no long subject to frequent flooding, lowering the cost of potential development and providing economic incentive for the addition of inventory to the floodplain. Potential floodplain development as a result of implementing Alternative 2 would be negligible and not likely a factor in deciding to build or rebuild, especially since this would be a one-time nourishment, only provide benefits for up to 24 years, and would not protect against higher storm surge events. The 24-year period of analysis was based upon engineering and economics demonstrating that 24 years was the period over which benefits accrue and effects can be measured.

Beach nourishment would have temporary beneficial impacts to natural floodplain values by increasing the width of the beach and attenuating wave energies further from the development. No loss of natural and beneficial floodplain values is anticipated, and the project is not expected to measurably change the base floodplain.

6.1.3.4 Geomorphology

No Action

Under the No Action, current longshore sediment deficits would likely continue to increase at the observed rate resulting in associated shoreline loss similar to losses experienced over the last decade. Areas outside the project footprint where beach nourishment is ongoing is expected to continue similar to historic rates or that which has been approved through the regulatory permit issued to the Galveston Island Parks Board.

Sediments dredged from the Galveston Harbor and Channel (GHC) would be placed into an ODMDS beyond the depth of closure. As a result, approximately 530,000 cubic yards of sediment would be permanently removed from the sediment budget along the coast.

No changes to geology or soil is anticipated under the no action.

Alternative 2

Implementation of Alternative 2, would reintroduce sediments into the system through placement of dredged material directly on the beach and in the nearshore area. After placement, the sediments would behave as the existing substrate and would be seasonally transported on and off the beach as long as it remains in the littoral cell. A wider beach would increase the available sacrificial land which would allow for wave attenuation and a temporary reduction in erosion and shoreline loss. After all sacrificial lands have been removed (between year 8 and 10 post-construction), shoreline erosion and sediment movement would return to the existing condition of eroding at four to five feet per year.

Given the limited availability of naturally sourced sand, it is important to utilize any locally sourced (dredged) beach-quality borrow fill for nourishment purposes. Beneficially using the material retains the sediments in the sediment budget and over the long-term is more cost-effective than extracting sediments from an ODMDS and returning them to the system such as proposed under other projects (e.g., Coastal Texas Protection and Ecosystem Restoration Study).

No significant effect on the geology or soils in the region are anticipated. Sediments dredged from the Galveston Harbor and Channel have been tested for contaminants and to date there is no indication of concern.

Best management practices which apply to beach nourishment activities include:

- use of beach quality sand consistent in grain size, color, and composition as the existing beach and free of hazardous contaminants
- placement of a gradual slope to minimize scarping; and
- restoration of all project sites to pre-construction slope or contours and all ruts leveled.

6.1.4 Water Quality

No Action

Soils in the study area are highly susceptible to erosion leading to shoreline instability and excessive amounts of sediment inputs into the nearshore, which increases turbidity and can have an adverse effect aquatic life and fisheries and restrict light penetration necessary for photosynthesis by aquatic plants. The nearshore environment in the project area is subject to periodic increases in turbidity resulting from storms and wave activity and often exceeds the State water quality standards of 300 milligrams per liter of total suspended solids (TSS). As a result, the biological communities found in the nearshore are comprised of stress tolerant species. Turbidity levels in the project area are not expected to change under the No Action since most of the turbidity is related to wave activity and erosion of the shoreline.

Warmer temperatures would contribute to reduced dissolved oxygen and increased frequency of algal blooms, which can create toxic conditions for aquatic species. Summer droughts may amplify these effects, while periods of extreme rainfall can further degrade water quality through increased sedimentation, erosion, turbidity, nutrient loading and pollutant-laden run-off (EPA 2016).

Alternative 2

Changes to water quality parameters such as temperature, salinity, and dissolved oxygen from the proposed action are not expected to occur as a result of beach placement or pipeline installation or removal.

Construction activities may cause temporary increases in turbidity in the immediate vicinity of the discharge location. These conditions will cause temporary increases in TSS but is not expected to differ significantly from normal TSS levels in the surf zone during discharge and would return to baseline conditions after discharge at the site is complete. The USACE intends to request a waiver from the Texas Commission on Environmental Quality (TCEQ) standard threshold of dredged effluent having less than 300 milligrams per liter of TSS in areas where nourishment activities are ongoing.

In 2017, a contaminant assessment report was completed for the Galveston Harbor and Channel and the Houston Ship Channel for compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). During the assessment it was noted that the elutriate exceeded the EPA acute Water Quality Criterion (Criterion Maximum Concentration [CMC] for ammonia. While the exceedance would not cause a water quality violation, the dilution required to meet the CMC was calculated at 1.44. The dilution curve indicated that the Suspended Particulate Phase (SPP) concentration fell below one percent by 150 minutes after discharge, which allows the ammonia CMC to be easily met within the four hours required by RIA. Based on the findings, the Limiting Permissible Concentration (LPC) for the liquid and suspended particulate phases are met, indicating no toxicity to sensitive marine water-column organisms is expected during placement and no special handling or management requirements during discharge.

Temporary pipeline routes would run near the highest point of the un-vegetated beach and/or be submerged offshore 1,000 to 2,000 feet parallel to the shoreline, then routed perpendicular to the beach with the effluent from the dredge discharge pipe directed toward the nourishment/containment area and relocated as each section of beach is finished. Placement of dredged material on the beach would occur inside of a temporary toe berm, where dredge slurry would be placed within the contained area. Dozers would be used to create dikes from existing material or the start of pumped material to control the discharge slurry and keep the flow within the template long enough for the material to fall out of suspension from the slurry. The dredged material delivery pipeline would be lowered into place from tugboats and would be held in place by its own weight. These BMPs significantly reduce the discharge of material outside the containment area and into adjacent waters.

6.1.5 Biological Communities

No Action

A barrier island, such as Galveston Island, is a dynamic feature that naturally undergoes erosion of the beach and dune from the seaward side and accretion on the back side of the island. In this way, the island essentially “moves” with changing sea states. It is this ability to adapt that allows these features to persist. However, development along the Reach 1-3 shoreline prevents this natural erosion/accretion cycle from occurring; therefore, sand will be progressively lost at approximately 4 to 5 feet per year and not replenished naturally. The No Action alternative would allow for continued erosion of the project area beaches and may result in progressive loss and possible elimination of the remaining beach and dune habitat and the invaluable ecological services these areas provide. Most notably, loss of beach would threaten foraging and nesting habitat for sea turtles, shorebirds and seabirds that frequent the project area.

Additionally, armoring measures, such as construction of seawalls, may be undertaken by property owners, the State, or the Federal government in the absence of nourishment, which would further reduce the available dune habitat and result in negative impacts to biological communities.

Alternative 2

The project area is located on eroding beachfront areas and does not impact existing dunes, dune vegetation, highly valued dune swale wetlands, other wetland areas, or special aquatic sites. Onshore placement and shaping activities to construct the proposed berm and anchoring of the pipelines would temporarily, adversely impact the biological communities that forage on and inhabit the beach, including benthos, infauna and shorebirds. After construction is complete adverse impacts would cease and recolonization would occur. Over the longer-term, beach nourishment would create a wider and more stable environment thus improving the suitability and productivity of available beach habitats. Relative to the No-Action Alternative, the benefits of beach nourishment acting as a barrier against RSLC, dampening shoreline erosion, and improved habitat are expected to outweigh short-term construction impacts.

Benthic and Infaunal Community

Placement of dredged material onto the berm and the temporary anchoring of a pipeline in the nearshore environment would cause a temporary impact to the benthic and infaunal communities within the footprint of the pipeline and berm through direct burial, crushing by heavy equipment or anchoring activities, or removal of invertebrates. Larger and more mobile organisms are more likely to leave the area during construction, while the less mobile or sessile organisms would likely be buried by sand. Even some motile organisms or those able to burrow still have the potential to be buried by the overburden. Studies have documented that invertebrate fauna and prey species such as amphipods, polychaetes, and coquina clams recovered to pre-construction abundance following beach disturbance (National Research Council 1995, Greene 2002, Bolam et al. 2010). Additionally, both the nearshore and the backshore environment along the coast are dynamic and high energy environments which experience rapid sediment flux and recolonization in which the species that may be present are often accustomed to, which should allow for quicker recolonization. Given the abundance of this species assemblage along the coast, the temporary and minor impacts expected from the proposed action, and the recovery rate of these communities, effects of the proposed action on benthic invertebrates are expected to be less than significant.

Indirect effects of this temporary loss of intertidal community would also occur on marine and avian predators, including non-breeding shorebirds, for example due to temporary disruption to foraging patterns. Due to the size and nature of the proposed beach nourishment (i.e., up to 9,000 ft long by 300 ft base on the beach), a one-time placement, and the recovery rates of invertebrate population, this potential disruption to both the invertebrate community and their predators is expected to be less than significant.

Fisheries

Suspension/filter-feeding species, visual predators and other fishery and aquatic organisms could have short-term localized adverse indirect impacts caused by increased turbidity, total suspended sediments, and water temperatures and lower dissolved oxygen levels from placement of material. In general, it is anticipated that any tolerance beyond the existing dynamic and extreme conditions driven by sediment transport and fluctuating turbidity, would result in fish species avoiding the habitat and utilizing waters adjacent to the active construction zone. Any slower moving or less motile species (e.g., smaller or younger fish) unable to avoid the area may be buried by placement of material or crushed by heavy equipment shaping activities or anchoring of pipelines. Suspension/filter feeding organisms could be impacted due to clogging of the gills and feeding mechanisms which could either cause death or reduce growth and reproduction. Visual predators would have a reduced success rate at catching prey due to lower visibility levels.

Following construction activities, turbidity and suspended sediment levels, water temperature, and dissolved oxygen levels are expected to return to pre-construction conditions. These temporary and localized impacts would be minimized and controlled by implementing the best available practical techniques and BMPs during construction.

Terrestrial Community

Alternative 2 would primarily affect shorebirds through habitat avoidance and temporary loss of food sources because of material placement and heavy equipment movement in their foraging habitat. It would be expected that shorebirds would seek out other foraging habitat that is available for several miles in either direction of the placement site. Some avian species may utilize the placed material as a food source depending on the invertebrates present in the dredged material. Temporary loss of the benthic community (a food source for shorebirds) is probable, although the level of impacts is expected to be minor and temporary (see discussion above).

Alternative 2 would not affect the status of invasive species, negatively or positively. The plans and specifications include requirements for the contractor to inspect equipment and clean equipment to prevent spread of existing invasive species.

Mitigation

The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable and permanent impacts to waters of the United States. Because implementation of Alternative 2 is expected to induce temporary impacts to Waters of the US but not long-term or permanent adverse impacts, no compensatory mitigation is necessary.

6.1.5.1 Threatened and Endangered Species

No Action

Under the No Action, the conditions described for Habitats (section [Habitats-No Action]) would also apply to Federally listed species. As loss of coastal habitats throughout the country continues, it is likely that there will be an increase in species warranting conservation and protection over the planning horizon.

Alternative 2

The impacts described in Section [Alt 2 Habitats] would also apply to ESA-listed species. A BO was issued to the NFS by the USFWS on June 17, 2019, through Consultation No. 02ETTX00-2018-F-2491, for the Galveston Parks Board to perform beach nourishment on Galveston Island, Texas under the USACE permit SWG-2007-01025. The USACE permit authorized the NFS to perform beach nourishment activities along beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park, as well as the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive. The BO addressed the effects of the proposed permit action on the endangered Kemp's ridley sea turtle, threatened piping plover, and threatened red knot in accordance with Section 7 of the ESA of 1973, as amended (16 U.S.C. §1531 et seq.).

The USACE determined the permit action would have no effect on the threatened West Indian manatee, endangered Attwater's greater prairie chicken, and endangered leatherback sea turtle; thus, no coordination or contact with the USFWS was necessary for these species. The USFWS concurred with the USACE's effects determinations that the onshore actions of the permit action *may affect but are not likely to adversely affect* the endangered green sea turtle, endangered hawksbill sea turtle, and threatened loggerhead sea turtle, or adversely modify piping plover critical habitat unit TX-34. For additional species-specific related details, refer to the BO (Appendix C).

On September 30, 2022, the USACE requested the USFWS acknowledge and accept the use of the Galveston Parks Board permit and accompanying BO to meet the environmental requirements of the ESA. The Parks Board provided a concurrence letter to the USFWS on September 30, 2022, for the USACE to utilize the permit and BO as a means to expedite the environmental compliance requirements for this project. In a letter of agreement dated October 11, 2022, the USFWS accepted the USACE's request under the precedence that all conditions and conservation measures referenced in the permit and BO are adhered to during nourishment actions. The USFWS also provided additional comments about proposed critical habitat for Rufa red knot that may require a conference opinion during PED, or trigger reinitiating consultation, if critical habitat is designated prior to construction. The USACE is committed to abiding by all conservation measures and conditions outlined in the BO and permit (see Appendix C).

The USACE determined Alternative 2 would have *no effect* on the four NMFS protected species – oceanic whitetip shark, giant manta ray, sperm whale, and rice's whale – because the project occurs outside the known range of these species and no suitable habitat exists in the action area. A Memorandum for the Record (MFR) was written on September 14, 2022, to document compliance with the ESA consultation within the NMFS jurisdiction. NOAA Fisheries released a policy effective January 13, 2017, stating the agency "will not provide formal written responses to requests for concurrence with a federal action agency's determination that its action will not affect any ESA-listed species or designated critical habitat". The MFR can be reviewed in detail in Appendix C.

6.1.5.2 Migratory Birds

No Action

Many migratory birds are sensitive to environmental changes. Increasing temperatures, changing vegetation, loss of habitat, and extreme weather conditions lead to significant changes of the birds' preferred habitats. The ways in which migratory birds respond to these environmental changes differ across species. In general, short- and middle-distance migrating birds can adapt to climate changes more easily, whereas long distance migrants struggle with readjustment to changing temperatures (e.g., changes in annual migration rhythm) or loss of critical stopover sites and breeding/wintering habitat. It is anticipated that some bird species will adapt while others will decline in abundance, shrink in distribution, or become extinct.

Specifically, in the project area, shoreline loss will contribute to a region-wide loss of shoreline habitat critical to many migratory birds as breeding, wintering, or stopover habitat.

Alternative 2

Placement of dredged material and shaping activities are the most likely actions that would create a localized disturbance during construction that will result in avian avoidance of the area and disruption to feeding, resting and nesting/mating behavior as a result of noise, vibrations, lighting, and presence of personnel and equipment. Use of adjacent quality shoreline is expected minimizing the potential for any measurable loss of population, diversity, or abundance. These impacts will be short-term and are expected to cease once nourishment is completed.

During construction, there is a potential for harm and/or harassment of nesting migratory birds. Attempts would be made to conduct all placement activities outside of the nesting season; however, this may not be possible, due to the timing of dredge availability and the extended length of the nesting season for some species. Prior to construction commencing, if during the nesting season, nest surveys should be completed. If nests are identified, all construction activities should observe a 1,000-foot buffer of any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans); a 1,300-foot buffer for any shorebird nesting colonies (e.g., terns, gulls, plovers, skimmers); and a 2,000-foot buffer for any brown pelican nesting colonies near the active construction site. Although unlikely in the project area due to lack of suitable nesting sites, if bald eagle nests are documented a buffer of at least 330 feet should be maintained between active construction and the nest and clearing of vegetation should be restricted within 660 feet of the nest site year-round (USFWS 2007). Coordination with USFWS should be completed prior to construction if nesting has been identified and USFWS guidelines should be followed to avoid adverse impacts to these species. By implementing these conservation measures there should be no adverse effects to migratory birds, including bald eagles.

6.1.5.3 Essential Fish Habitat

No Action

Climate-driven changes in the environment may affect the physiology, phenology, and behavior of marine fish and shellfish at any life-history stage and any of these effects may drive population level changes in distribution and abundance. Changes in ocean temperatures may shift population distribution causing predator-prey overlap, increasing predation mortality or potentially altering post-recruit abundance. The extent of population-level changes may be mediated by the capacity for individual species/populations to adapt to changes in important abiotic and biotic factors through changes in the phenology of important life-history events (e.g., migration, spawning) or through changes in organismal physiology (e.g.,. thermal reaction norms) of key traits such as growth and or through acclimation. Life cycle dynamics will occur in concert with climate-induced expansion, contraction, and/or shifts in the quality and quantity of suitable habitat, and different life stages may be affected differently by changes in habitat characteristics. As a result, it is anticipated that in the future species' range, distribution, and abundance will be different than it is under the existing condition and additional species and habitats may be identified as warranting protection under the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA).

Alternative 2

During onshore placement and shaping activities, anchoring of temporary pipelines in the nearshore environment and movement of vessels into and out of the project area, localized adverse impacts to water column EFH habitat and Federally managed species are anticipated. Direct and indirect impacts to managed species is dependent on the life stage of the species and their usage of the project area (i.e., eggs and larval fish will be affected to a greater extent than adults and juveniles because the older life stages have greater swimming abilities and will be able to move away from construction activities). Impacts to managed species would be similar to those described under Biological Communities for Alternative 2 and include: smothering, injury or entrainment; lowered feeding success due to turbidity, loss of benthic/prey organisms and less available foraging habitat; behavioral alterations due to sound, light, and structure; and changes to soft bottom bathymetry. However, adjacent similar habitat is available for prey and managed species to escape until construction ceases and baseline conditions return. Any loss of managed species would not be expected to affect populations of EFH species that inhabit the project area or the region.

Water quality concerns are of particular importance in the maintenance of the water column habitat. During placement, resuspended materials may interfere with the diversity and concentration of phytoplankton and zooplankton, and therefore could affect foraging success and patterns of schooling fishes and other grazers that comprise prey for managed species. Foraging patterns would be expected to return to normal at the end of placement and shaping activities.

As part of MSFCMA, any Federal agency that authorizes, funds or undertakes, or proposes to authorize, fund, or undertake an activity which could adversely affect EFH is subject to the consultation provisions of the Act and identifies consultation requirements (50 CFR Sections 600.805 - 600.930). This detailed project report and environmental assessment was prepared to serve as the EFH assessment. Since no significant adverse impacts are anticipated and the project as a whole is largely beneficial to EFH species, no mitigation was proposed.

6.1.5.4 Marine Mammals

No Action

Under changing future climate conditions, a shift in the distribution of common bottlenose dolphins is possible as temperatures and habitats change, accompanied by a shift in the distribution and abundance of prey species. There are also likely to be changes in the distribution of pathogens, so naïve populations may be exposed to new diseases. The impacts on populations will depend on their ability to adapt to change and on the continued availability of suitable resources and habitat available for the dolphins and their prey. It is assumed that any future dredging or in-water work would comply with the Marine Mammal Protection Act, which prohibits take of marine mammals and if adverse impacts are possible, mitigation would occur to minimize or compensate for the impacts.

Alternative 2

Impacts to marine mammals from implementation of Alternative 2 could arise during in-water activities occurring at the outer limits of the project area of the nearshore, such as set-up/take-down of dredged material transport pipes and operation of watercraft/vessels into and out of the project area. Impacts could include temporary habitat avoidance, exposure to underwater sound, and visual disturbances, which would all cease after construction is complete.

The most extreme impact could include entrapment and/or collision with pipes, pumps, or vessels. Many marine mammals are known to react to the movement or presence of vessels in response to the noise the vessels make or from a visual cue the animal receives and is highly dependent on the individual’s reactionary behavior. Bottled nosed dolphins in the area are highly mobile and expected to easily avoid equipment. While the slow-moving West Indian manatee would be more susceptible to vessel strikes, this is highly unlikely since vessels would be moving at very slow speeds, the pipeline would be anchored to the sea floor, and implementation of the conservation measures listed below.

Marine mammals are highly vocal and dependent on sound for many aspects of life making them particularly susceptible to impacts from noise. Construction activities are expected to increase the ambient noise levels along the pipeline and at the placement site due to the presence of equipment and personnel, discharge of sediment, operation of booster pumps and other vessels at the construction site. Exposure to underwater noise, particularly continuous, low frequency sound, can be detected by marine mammals over considerable distances and could potentially impact or alter an individual’s normal behavior, such as migration patterns, communication, foraging and breeding habits (Thomsen et al. 2009).

Additional conservation measures are being incorporated into the plan to avoid potential incidental harassment and “take” of marine mammals. The following mitigation measures would be implemented:

- Qualified biologists would monitor the presence of marine mammals during phases which involve open water areas capable of supporting marine mammals.
- Before activities occur in open water areas, a 50-foot radius of the work area should be delineated. If any marine mammal is observed within the 50-foot radius, the biological monitor shall halt construction activities, including shutting down any running equipment until the animal has moved beyond the radius, either through sighting or by waiting until enough time has elapsed (approximately 15 minutes) to assume that the animal has moved beyond the buffer.
- If siltation barriers are used, they will be made of material in which marine mammals cannot become entangled, should be properly secured, and regularly monitored to avoid mammal entrapment.

No long-term adverse impacts to marine mammals are anticipated, since the alternative does not involve measures that would reduce the food base, block or limit passage to or from biologically important areas, or permanently destroy habitat. The anticipated impacts are not expected to rise to the level of significant or result in the need for NOAA to issue an Incidental Take Authorization, especially with the incorporation of the conservation.

6.1.6 Cultural Resources

No Action

Under the No Action, there would be no change in cultural resources as compared to the existing condition. Cultural resources potentially present, but not yet identified, would continue to be subjected to erosional forces and fluctuating and rising sea levels.

Alternative 2

None of the four shipwreck sites would be affected by the current undertaking. Based on the absence of recorded historic properties within the project area and the dynamic nature of the shoreline, and the resultant erosion, the USACE has determined that there is no potential to affect historic properties and pursuant to 36 CFR 800.3 (a)(1), no further coordination is required.

6.1.7 Socioeconomics

No Action

Under the No Action, beaches in the project area would continue to be subjected to erosional forces resulting in narrower recreational beaches and less protection to adjacent private and public properties. Local economies could be impacted through loss of property and sales tax revenue and loss of revenue to local businesses from recreational beachgoers.

Alternative 2

Implementation of Alternative 2 is not expected to have any measurable adverse or beneficial impact on local economies around the project area given the relative density of residential structures and few commercial structures. Since this is only a one-time nourishment, any benefit of protecting property from loss and the subsequent loss of revenue would only be delayed, not eliminated or reduced.

No populations or communities in the study area meet the criteria for identification of minority or low-income populations under the CEQ Environmental Justice Guidance. Coupled with the overall benefits of restoration to the environment and nearby communities, implementation of the Action Alternative would not result in a disproportionately high or adverse impact on minority or low-income populations.

6.1.8 Noise, Aesthetics and Recreation

No Action

Under the No Action, erosion would continue to result in loss of recreational beaches creating a narrow beach that may at some point only become accessible during low tide and make it harder for beach goers to seek solitude away from other recreationists. The loss of dry beach may also be visually unappealing for private property owners or recreationists who often expect to see sandy beaches when they seek a coastal or ocean view.

Alternative 2

The proposed work would have a temporary adverse impact upon the aesthetics and recreational value of the site, caused by the presence of small machinery on-site and presence of booster pumps and work vessels. During construction, noise generated by the dredge and booster pumps would be offshore and should be of sufficient distance to not impact those living near or recreating on the beaches. Noise generated by equipment shaping the beach in the vicinity of the discharge pipe would be relatively localized (noise audible up to 800 feet from the active construction site), low level and of short duration resulting in a temporary reduction in aesthetics and potentially diminished recreational experience that would return to baseline conditions once construction is complete. Many visitors would seek adjacent beaches for quieter areas for fishing, swimming and sunbathing. Additionally, construction equipment would be properly maintained to minimize the effects of noise.

Hundreds of feet of dredged pipe lying on the beach or just offshore would have a negative visual impact on the aesthetics of the area, as well. This impact would be temporary and return to baseline conditions once the pipe is removed upon completion of the work. The negative visual impacts of the equipment and pipe would be offset to an extent by the natural curiosity of some individuals to see what is going on and how work is progressing. Once completed, the project would result in an overall improved aesthetic and recreation quality. Beach nourishment would restore the natural appearance of a wider beach which is considered pleasing to observers and beachgoers.

During construction, use of the beach in the vicinity of the active construction zone would be temporarily restricted for public safety. As portions of the renourished beaches come available, use by the public could resume and are expected to return to pre-construction activity levels. The public would be more inclined to use the nourished beaches rather than by-passing them for others with more sand above the high tide line. Additionally, a nourished beach would increase suitable habitat for shorebirds and wading birds, thus increasing the bird watching opportunities in the project area.

6.1.9 Hazardous, Toxic and Radioactive Waste

No Action

Under the No Action, the existing condition is anticipated to remain the baseline condition through the planning horizon.

Alternative 2

Despite the lack of identified sites that could be reasonably expected to affect Alternative 2, there is always a possibility that previously unidentified HTRW could be uncovered, even when a proposed project is entirely within a preexisting project footprint. Care should be taken as the project progresses to identify and address HTRW concerns that may arise in a timely manner so as not to affect the proposed project.

The maintenance material from the Galveston Harbor and Channel is considered to be of acceptable quality and free of any of the prohibited materials listed in 40 CFR Part 227, Subparts B (227.5 (a-d) or 227.6 (a) (1-5)). Material from the channel has, to date, been evaluated several times using bioassay and bioaccumulation procedures. The results of historic chemical and grain size analyses, solid phase bioassays, and bioaccumulation assessments indicate no unacceptable adverse impacts will occur as a result of dredging and dredged material placement operations. While some constituents listed in the “constituents prohibited as other than trace contaminants,” such as organohalogens, carcinogens, mutagens, and teratogens, are not tested for nor are they historically known to be present in the Galveston Harbor and Channel.

7 Environmental Operating Principles

Systems Watershed Context

The TSP is integrated with other watershed purposes of recreation and continues to provide habitat for migratory birds, foraging seabirds, and nesting sea turtles while not impacting cultural resources.

Environmental Operating Principles

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

The TSP, Alternative 2, supports the USACE Environmental Operating Principles. The diverse disciplines of the project team including Non-Federal stakeholders complied with policy and statutory law in formulating the TSP. Science was employed to formulate economic, social, and environmentally sustainable solutions while using risk management considerations for the project life cycle. The TSP and its selection process was provided to the public for review.

8 Key Social and Environmental Factors and Mitigation Actions

8.1 Stakeholder Perspectives and Differences

In accordance with NEPA, 42 U.S.C. 4321 et seq., the draft DPR/EA was published July 2022 for a 30-day public comment period. The USACE accepted written public comments from July 15 to August 15, 2022. During the comment period, the USACE received 58 individual comments, including four industry letters and one city government letter with multiple signatories. Fifty-three comments expressed support for the project, identifying erosion risks to their communities, their failed attempts to combat erosion, and their concerns for future conditions without project implementation. Supportive comments raised concerns about housing loss and damages, damage or loss of evacuation routes, and beach loss. The comments supporting the proposed action referred to economic, ecologic, protection and safety benefits that could result if the TSP is implemented. One individual objected the project, indicating concerns with property ownership, the NFS, and tools used for erosion rates.

The four industry letters provided conditional support to the proposed action, citing existing concerns for risks to navigation. Specifically, industries expressed that the project, 1) should not impose or extend draft restrictions for the entrance channel; 2) should conduct market research for procurement and any costs above the Federal

Standard of disposal at the ODMDS be incurred by local and state sponsors; 3) ensure all regulatory, lands, easements, and rights of way are approved and secured prior to requesting dredging; 4) should secure an alternative sediment source if impacts to the costs and schedule of dredging is unavoidable in the entrance channel; and 5) be approved by the USACE Operations Division before proceeding.

The USACE analyzed all comments received during the public review period and considered them in preparation of this final DPR/EA. Detailed responses to public comments are included in Appendix F.

8.2 Agency Consultation and Coordination

The USACE consulted with other federal, state, and city agencies to gather input on the proposed project and to inform development of the alternatives described in this report. These consultations helped ensure environmental compliance and maximized information input and collaboration when developing the criteria and measures for evaluating the action alternatives. A list of agencies consulted for this project included USFWS, NMFS, TCEQ, GLO, Texas Parks and Wildlife Department, Galveston Parks Board of Trustees, and the City of Galveston. Agency coordination letters, including environmental consistency determinations, provided to the USACE during the public comment period are included in Appendix C.

The USACE coordinated with the Galveston Parks Board to expedite ESA compliance by requesting concurrence from the USFWS to operate under the NFS's BO to perform the proposed action. The USFWS accepted the USACE request, as such, the USACE will share responsibility with the NFS to adhere to all conditions and conservation measures referenced in the BO (Consultation No: 02ETTX00-2018-F-2491; Appendix C; section 6.1.5.1).

Compliance with Section 401 of the CWA has been achieved and no further coordination is warranted as indicated in a letter from TCEQ dated September 2, 2022 (see Appendix C).

8.3 Environmental Compliance

This DPR/EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared using the Council on Environmental Quality (CEQ) 2020 NEPA regulations (40 CFR Part 1500–1508) and the USACE's regulation ER 200-2-2 – Environmental Quality: Policy and Procedures for Implementing NEPA, 33 CFR 230. In implementing Alternative 2, the USACE would follow provisions of all applicable laws, regulations, and policies related to the proposed actions (Table 9).

Table 9 - Environmental Compliance

Policies	Compliance Status	Notes
Public Laws		
Abandoned Shipwreck Act of 1988, as amended	Not Applicable	
Archeological and Historic Preservation Act of 1974, as amended	Not Applicable	
Bald and Golden Eagle Protection Act of 1940, as amended	Compliant	Section [Alt2 Migratory Birds]
Clean Air Act of 1970, as amended	Compliant	Section [Alt 2 Air]
Clean Water Act of 1972, as amended	Compliant	Appendix C
Coastal Barrier Resources Act of 1982, as amended	Not Applicable	
Coastal Zone Management Act of 1972, as amended	Compliant	Appendix C
Endangered Species Act of 1973, as amended	Compliant	Section [Alt 2 T&E], Appendix C
Farmland Protection Policy Act of 1981	Not Applicable	
Fish and Wildlife Coordination Act of 1934, as amended	Compliant	Appendix C
Magnuson-Stevens Fisheries Conservation and Management Act of 1976, as amended	Compliant	Section [Alt 2 EFH]
Marine Mammal Protection Act of 1972, as amended	Compliant	Section [Alt 2 Marine Mammals]
Marine Protection, Research, and Sanctuaries Act of 1972, as amended	Not Applicable	
Migratory Bird Treaty Act of 1918, as amended	Compliant	Section [Alt 2 Migratory Birds]
National Environmental Policy Act of 1969, as amended	Compliant	

Policies	Compliance Status	Notes
National Historic Preservation Act of 1966, as amended	Compliant	Section [Alt 2 Cultural]
Native American Graves Protection and Repatriation Act of 1990	Not Applicable	
Rivers and Harbors Act of 1899, as amended	Compliant	Section [Federal Navigation Project]
Wild and Scenic Rivers Act, as amended	Not Applicable	
Executive Orders		
Environmental Justice (E.O. 12898)	Compliant	Section [Alt 2 Socioeconomic]
Flood Plain Management (E.O. 11988)	Compliant	Section [Alt 2 Hydro]
Protection of Wetlands (E.O. 11990)	Compliant	Section [Alt 2 Habitats]
Protection of Children from Environmental Health Risks (E.O. 13045)	Compliant	Section [Alt 2 Socio]
Invasive Species (E.O. 13751)	Compliant	Section [Alt 2 Wildlife/Fisheries]
Migratory Birds (E.O. 13186)	Compliant	Section [Alt Migratory Birds]

9 Costs and Cost Sharing

9.1 Project Costs

Under Section 204 authority, the feasibility costs ($450,000) are a 100 percent Federal cost. The Federal per project cost limit is $10,000,000. Design and construction phase costs are cost-shared with the sponsor at rates based on the purpose of the beneficial use for coastal storm risk management and the benefits derived. Project costs were developed to meet the constraint of not increasing costs of schedule to existing O&M dredging contracts. Base plan costs ($7,548,000) were subtracted from the first costs of dredging and sand placement for beneficial use including lands and damages, engineering and design, and construction management ($22,011,000) determining the Section 204 project first cost of $14,427,000 as all protected properties and all identified benefits are to private lots developed for residential and small business use (Table 10). Federal and non-Federal costs were apportioned at a 65/35 rate (Table 11). The project first cost assigned to the beneficial use was used for computing the Section 204 project costs, annual costs, and the benefit-cost analysis. The project cost estimate summaries are provided in Appendix B.

Table 10 – Project First Cost Summary

Account	Construction Item	Cost
01	Lands & Damages	$77
12	Navigation, Ports and Harbors	$18,912
	Subtotal	**$18,989**
30	Preconstruction Engineering & Design (PED)	$1,889
31	Construction Management (E&D, S&A)	$1,133
	FIRST COSTS	$22,011
Base Plan, FWOP		-$7,584
	INCREMENTAL FIRST COSTS	**$14,427**

October 2022 Price Levels, Price in $1,000s, 25% Contingency

9.2 Project Cost Sharing

Based upon total project costs, the Non-Federal share is $5,565,000; 37 percent of the $15,115,000 BUDM fully funded cost including an additional $275,000 since the Federal project expenditure limit is $10,000,000. Real estate costs are $77,000, of which sponsor's real estate cost is $47,000 and its cash share is $5,518,000 (Table 11).

Table 11 - CSRM Cost Share of Project First Costs

Item	Federal Cost	Non-Federal Cost	Totals
Real Estate	$33	$47	$77
Construction, ED, SA & Real Estate	$9,792	$5,243	$15,035
Federal Feasibility Cost	$450		
Federal Limit ($10,000,000)	**$10,000**		
Non-Federal Additional Cash Share Required (Total Non-Federal Cash Share)	$0	$275	$5,518
Total Non-Federal Share		**$5,565**	

October 2022 Price Levels, Price in $1,000s

10 Operations Maintenance, Repair, Rehabilitation and Replacement

Project will not require OMRR&R as work is done primarily on a single, one-time basis.

11 Real Estate Requirement

A Real Estate Plan is included as Appendix D. The report describes the interests required for project implementation and identifies the properties involved, their value, and ownership. Need for temporary access and staging for construction equipment and operations beyond what is publicly available will be determined during the design and implementation phase.

The project will be implemented on approximately 102 acres of "public beach." The "public beach" includes both the state-owned wet beach and the areas of the dry beach seaward of the vegetation (Figure 18). Existing public recreation access is available and will be maintained for existing and expected future recreation activities. Galveston Island has six open and operating public beach access points along the shore within or directly adjacent to the proposed project footprints for Alternative 2 (Figure 18).

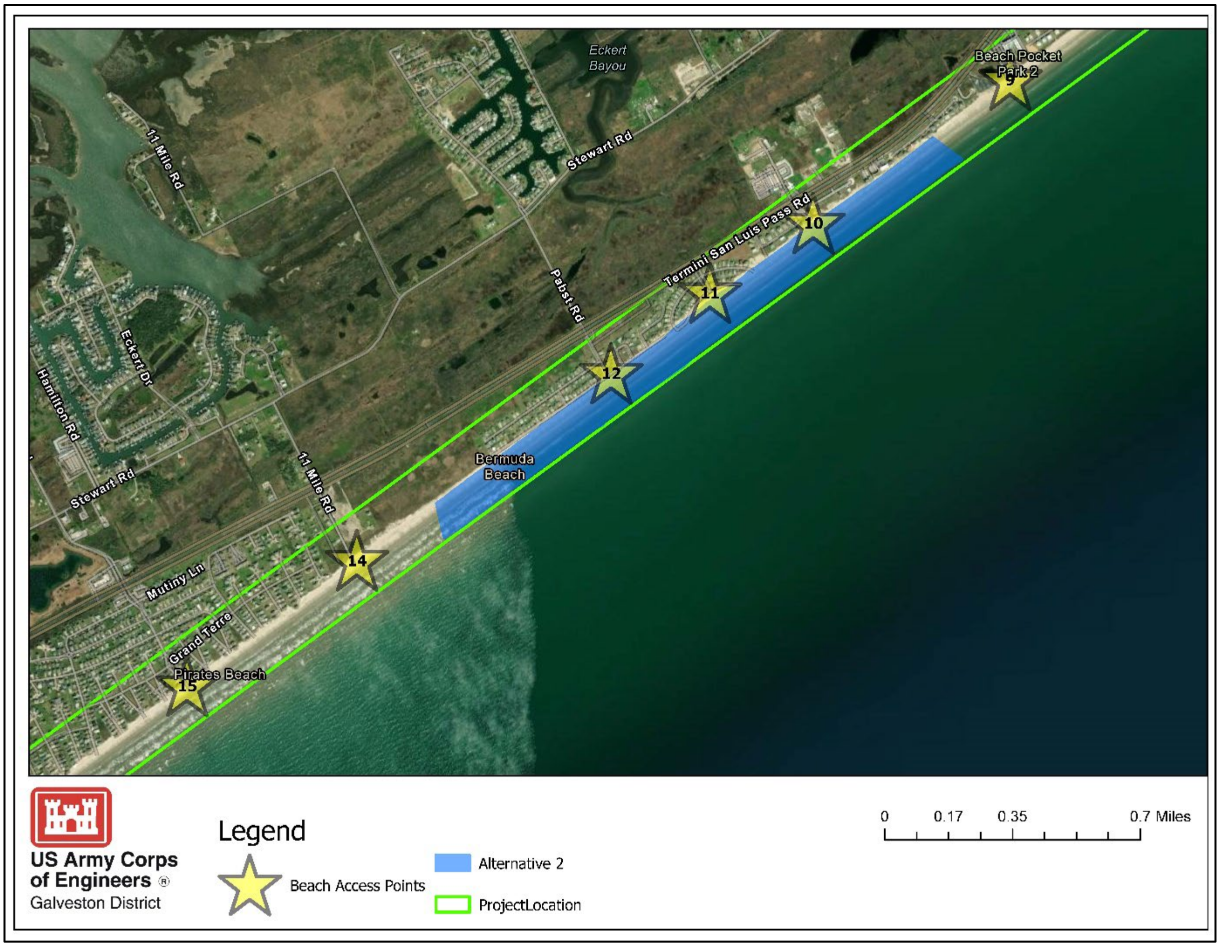


Figure 18 - Public Beach Access Points

The “public beach” area is subject to a public easement. Therefore, it is understood the State of Texas, managed by the GLO, owns the portion of the beach seaward of the vegetation. To facilitate construction, USACE will include secure an Authorization of Entry for Construction from the Texas GLO.

12 Project Implementation

As of May 3, 2022, the City of Galveston is the non-Federal sponsor (See Attachment 2) for project implementation and will enter into a Project Partnership Agreement (PPA) with The Department Of The Army. Texas General Land Office (GLO) will aid the City of Galveston and has actively participated in the feasibility study. GLO is to enter into a Project Cooperation Agreement (PCA) with the City of Galveston to provide access to public lands and for financial participation in the project construction. GLO through the State of Texas, is to protect the public easement (the wet and/or dry beach seaward of the vegetation) and its use from erosion or reduction caused by development or other activities on adjacent land including beach cleanup and maintenance.

12.1 Timeline

- Public Review: July 15 – August 15, 2022
- Feasibility Report Approval: 27 January 2023
- Execute Project Partnership Agreement: 6 April 2024
- Construction Award: 1st Quarter FY 2025

The above timeline considers that the results of the Galveston District market research determines that capable dredging equipment is available to execute the work (bid the contract) prior to requesting Section 204 project funding. The Galveston District's Operations Division initiates all contracts to dredge for operations and maintenance and emergency dredging. The Section 204 project funding must be secured in advance of the scheduled maintenance dredging and that awardable contractor bids are received as coordinated by Operations to not impose undue risk to costs and schedule of operations and maintenance or emergency dredging of the Galveston Entrance Channel.

12.2 Implementation Risks

Implementation of the selected plan may include risks that could result in adverse impacts to the existing Federal Navigation Projects.

a. Operations is partnering with the Texas GLO and the Galveston Park Board for BUDM at 61 St and west (~ +20 miles).
b. Under the current partnership between USACE, GLO and the Park Board, our hopper dredge contractors are achieving ~3.5 loads per day with disposal to the 61st street location.
c. The additional Section 204 project distance reduces productivity to ~2 to 2.5 loads per day, an increase in contract duration by ~20 percent.
d. This may increase the time to clear shoaling from the Houston / Galveston Entrance Channel. Draft restrictions during dredging could take 20 percent longer to clear.
e. Any draft restrictions during dredging would require project's BUDM to be delayed or reduced.
f. With increased sail distance, only four Contractor trailing suction hopper dredges are estimated to be capable of effectively executing the work (i.e., bid the contract).
g. Delay of BUDM placement to next O&M cycle could result in cost risk, which can result in not implementing the Section 204 project under this study and/or decrease erosion delay protection.
h. Choice of dredging method could increase the Section 204 project cost. The project sponsor has indicated its willingness and ability to pay the incremental project costs above the base plan costs that might exceed the Federal $10,000,000 expenditure limit.

i. The Federal limit of participation in the design and construction is $10,000,000.

j. The project must adhere to all relevant federal, state and local laws and regulations. Ex. No alternatives may intentionally adversely affect threatened or endangered species.

k. This Sec 204 project cannot increase costs or schedule to existing Federal Navigation Project's O&M dredging contracts; the Base Plan.

As determined through discussions with the Non-Federal Sponsors of the Federal Navigation projects and Industry, the Section 204 project will reduce the number of single hopper dredging plants that can perform the work, and/or cause the contractors to utilize two dredges to perform the work as to not increase the time associated with clearing critical shoaling from the navigation channel. This will inadvertently reduce competition for available hopper dredges and cause an increase in project costs. However, industry indicated that several hopper dredge plants are currently in production to be brought online over the next few years, and several more are in the design phase for the outer years. The addition of Hopper dredges could allow for later mitigation to the risks to the O&M of the Federal Navigation projects and the Section 204 project.

12.3 Federal Responsibilities

The Federal government will be responsible for preparation of plans and specifications and contract advertisement, award and supervision and inspection of the work. The Federal government will be responsible for project compliance with Federal environmental laws and regulations, including the NEPA, ESA, consistency with the Coastal Zone Management Act (CZMA), and the CWA.

12.4 Non-Federal Responsibilities

The NFS is responsible for all actions and costs as laid out in the USACE Project Partnership Agreement for CAP Section 204 Beneficial Use of Dredged Materials.

13 Recommendation

I recommend that the Coastal Storm Risk Management plan as generally describes in this Detailed Project Report and Integrated Environmental Assessment, be implemented under the authority of Section 204 of the Water Resources Development Act of 1992, as amended, Regional Sediment Management (Beneficial Use of Dredged Material), with such modifications as within the discretion of the appropriate authority may be deemed advisable. The incremental project first cost for benefit-cost analysis purposes is currently estimated to be $14,427,000.

Prior to the commencement of construction, local interests must agree to meet the requirements of Local Sponsor responsibilities as outlined in this report and future legal documents. The City of Galveston, Texas has demonstrated that they have the authority and financial capability to provide all Local Sponsor requirements for the implementation, operation and maintenance of the project. The recommendations contained herein reflect the information available at the time and current Department of the Army policies governing formulation, evaluation and development of individual projects under the US Army Corps of Engineers Continuing Authorities Program.

15 · FEB · 23

Date

Rhett A. Blackmon, P.E.
Colonel, U.S. Army
District Engineer

14 List of Preparers

NAME	DISCIPLINE
Reuben Trevino	Project Management
Julie Smethurst	Planning
Brandon Ford	Environmental
Melinda Fisher	Environmental
Raven Blakeway	Environmental
John Campbell	Cultural Resources
Jason Thies	Hydrology and Hydraulic Engineering
Mason McGown	Cost Engineering
Luke Prendergast	HTRW
Nichole Schlund	Real Estate
Arden Sansom	Economics
James Purcell	Office of Counsel
Andrew Cook	Operations
Chris Frabotta	Operations
Kathy Skalbeck	Planning

15 References

American Community Survey (ACS). 2020a. Census Report: BG1, Tract 7260, Galveston, TX. Accessed 24 August 2022, at https://censusreporter.org/profiles/15000US481677260001-bg-1-tract-7260-galveston-tx/

American Community Survey (ACS). 2020b. Census Report: Galveston, Texas. Accessed 24 August 2022, at https://censusreporter.org/profiles/16000US4828068-galveston-tx/

American Community Survey (ACS). 2020c. Census Report: Texas. Accessed 24 August 2022, at https://censusreporter.org/profiles/04000US48-texas/

Bolam, S.G., J. Barry, M. Schratzberger, P. Whomersley, and M. Dearnaley. 2010. Macrofaunal recolonization following the intertidal placement of fine-grained dredged material. Environmental Monitoring and Assessment 168(1–4):499–510.

Environmental Protection Agency: National Ambient Air Quality Standards for Ozone. 80 Fed. Reg. 65292. October 26, 2015. To be codified at 40 CFR Parts 50, 51, 52, 53, and 58. https://www.govinfo.gov/content/pkg/FR-2015-10-26/pdf/2015-26594.pdf

Environmental Protection Agency: Review of the Ozone National Ambient Air Quality Standards. 85 Fed. Reg. 87256. December 31, 2020. To be codified at 40 CFR Part 50. https://www.govinfo.gov/content/pkg/FR-2020-12-31/pdf/2020-28871.pdf

Federal Register (FR). Thursday, December 11, 2014. Endangered and threatened wildlife and plants; threatened species status for the Rufa red knot. Fish and Wildlife Service. 79 FR 73706, to be codified at 50 CFR Part 17.

Galveston Economy. 2020. Available at https://www.galveston.com/galvestonliving/economy/

Greene, K. 2002. Beach Nourishment: A Review of Biological and Physical Impacts. Atlantic States Marine Fisheries Commission (ASMFC) Habitat Management Series #7. Washington, D.C.

Johnson, D.R. 2008. Ocean Surface Current Climatology in the Northern Gulf of Mexico. Gulf Coast Research Laboratory. Ocean Springs, MS.

National Research Council (NRC). 1995. Beach Nourishment and Protection. Washington, DC: The National Academies Press. https://doi.org/10.17226/4984

NRC. 1987. Responding to Changes in Sea Level: Engineering Implications. National Academy Press. Washington, D.C.

Nielsen-Gammon, J.W. 2009, The changing climate of Texas in “The Impact of Global Warming on Texas” Eds. G. North, J. Schmandt & J. Clarkson, University of Texas Press. Austin, TX.

Paine, J.G. and T.L. Caudle. 2020. Shoreline Movement Along the Texas Gulf Coast, 1930s to 2019. Bureau of Economic Geology (BEG). Jackson School of Geosciences. The University of Texas at Austin. Austin, TX. Available at:

https://www.beg.utexas.edu/research/programs/coastal/the-texas-shoreline-change-project.

TAMUG Coastal Geology Laboratory, 2006. Survey Of Upper Texas Coast From High Island To Northern Freeport Jetty. Texas A&M University In Galveston

Thomsen, F.T., S. McCully, D. Wood, F. Pace, and P. White. 2009. A Generic Investigation into Noise Profiles of Marine Dredging in Relation to the Acoustic Sensitivity of the Marine Fauna in UK Waters with Particular Emphasis on Aggregate Dredging: PHASE 1 Scoping and Review of Key Issues. Center for Environment, Fisheries & Aquaculture Science. Lowestoft, Suffolk, 61 pp.

Tourism Economics. 2022. Economic Impacts of Tourism on Galveston Island – 2021. Available at https://www.galvestonparkboard.org/AgendaCenter/ViewFile/Item/7768?fileID=11895

US Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. Department of Interior, US Fish and Wildlife Service Midwest Region. Available at: https://ecos.fws.gov/ServCat/DownloadFile/36458?Reference=36436

Attachment 1 – Sponsor's Letter of Study Request

GALVESTON
* ISLAND *
Park Board of Trustees

601 Tremont – P. O. Box 1080
Galveston Island, Texas 77550
(Phone) 409-797-5000
(Toll Free) 1-888-GAL-ISLE
(Fax) 409-762-8911
www.galvestonparkboard.org

November 23, 2020

Colonel Timothy Vail
Galveston District, U.S. Army Corps of Engineers
2000 Fort Point Road
P.O. Box 1229
Galveston, TX 77550

Dear Colonel Vail:

The Park Board of Trustees of the City of Galveston (Park Board) is seeking opportunities for a system-based approach to managing sediment resources in our region. Galveston Island is a "sand limited" system, with a minimal supply of new sand. The area has no nearshore source of sand for nourishment projects, and therefore, is a good fit for beneficial use of dredged material projects using the sediment from the ongoing operations and maintenance of the nearby Houston-Galveston Ship Channel. In 2016, the Park Board worked with the Engineering, Research and Design Center (ERDC) of the Army Corps of Engineers through the Planning Assistance to States program to develop a 50 Year Sand Management Plan which highlighted the beneficial use of dredged material as a principal strategy.

The Park Board requests that the Army Corps of Engineers investigate the possibility of implementing this principal strategy under its Section 204(d) Water Resources Development Act of 1992, as amended Regional Sediment Management (Beneficial Uses of Dredged Material) Continuing Authorities Program to formulate a series restoration projects for the shoreline west of the Seawall along the Island's West End. The dredged material from the routine maintenance of the Houston-Galveston Entrance Channel is considered beach quality sand and should be used to consistently address the island's on-going erosion.

The requested project would have a significant public safety and storm protection benefits for the community. Results could have lasting impacts through future shoreline protection projects that would protect against loss of life and damage to improved property. The Galveston Seawall, built following the largest disaster in U.S. history, helps protect a significant portion of Galveston Island from coastal flooding and storm surge. Although the Seawall was designed to stand alone, it is susceptible to flanking. The presence of a wide beach seaward of the Seawall helps protect this infrastructure and preserve the residential, commercial, environmental, and other assets located behind the structure.

The Park Board is committed to serving as the local sponsor for the Section 204(d) Continuing Authorities Program and understands the cost-sharing requirements for the project moving forward after the determination of federal interest per EP 1105-2-58, Section 33, Paragraphs b.(2), (3) and (5), and Section Paragraph C. We are aware of public use and access requirements and are prepared to provide all Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas (LERRDs) if needed (see attached Tx Natural Resource Code). We look forward to executing a cost-sharing agreement for the study at the appropriate time in the process. Thank you for your assistance with this much needed effort. Please contact Kimberly Danesi at kdanesi@galvestonparkboard.org for further information or assistance.

Sincerely,

Kelly de Schaun
Chief Executive Officer

Encl.
Texas Natural Resources Code, Section 61.011, 61.016 and 61.017
Map of proposed project area

Attachment 2 – Letter of Non-Federal Sponsor Transfer

City of Galveston

OFFICE OF THE CITY MANAGER
PO Box 779 | Galveston, TX 77553-0779
citymanager@galvestontx.gov | 409-797-3520

May 3, 2022

Colonel Timothy Vail
Galveston District, U.S. Army Corps of Engineers
2000 Fort Point Road
P.O. Box 1229
Galveston, TX 77550

Dear Colonel Vail:

The City of Galveston is committed to growing and strengthening the relationship forged between the United States Army Corps of Engineers Galveston District and our community. In close coordination with the Galveston Park Board of Trustees we are beginning the next chapter of our communities' role in regional sediment management and resiliency efforts.

This letter is to notify you that the City of Galveston has assumed the role of non-federal sponsor for the Galveston BUDM Project under the Section 204(d) Continuing Authorities Program.

We appreciate the effort and organization that you and your staff have poured into this project and we commit to continuing to serve as engaged partners. We understand that stepping into this position may require additional financial contributions to aid in bringing the project into fruition. We along with our partners in the GLO remain willing and able to facilitate the funding of incremental cost which may arise through future approvals by our Industrial Development Corporation.

Please contact Brandon Hill at bhill@galvestontx.gov for further information or assistance.

Thank you

Brian Maxwell
Galveston City Manager

CC Kelly de Schaun, Chief Executive Officer, Galveston Park Board of Trustees

Appendix A – H&H Engineering

Galveston Island Coastal Erosion, City of Galveston, Galveston County, Texas

Section 204

Final Integrated Detailed Project Report and Environmental Assessment

February 2023

US Army Corps of Engineers
Galveston District

(NOTE: This page intentionally left blank.)

Engineering Appendix
Hydrology and Hydraulics
Table of Contents

List of Figures and Tables

1 Introduction

Galveston Island experiences an average annual erosion rate of approximately 3 to 5 feet that negatively impacts hurricane protection, recreational activities, and local wildlife due to reduced nesting ground area. USACE has been contacted by the City of Galveston to perform a feasibility study to evaluate alternative solutions to mitigate ongoing erosion. Receding shorelines have generated local interest in evaluating nourishment options to increase beach width on the West End of Galveston Island. An estimated 500,000 cubic yards of dredged material is available from Galveston Harbor and Channel every dredge cycle. The dredge cycles occur every two years, or every odd fiscal year. The earliest dredge cycle available for this project area will be in fiscal year 2023. The project is under CAP section 204 of the Water Resources Development Act of 1992. This authorizes USACE to perform projects with the intent of the protection, restoration to reduced storm damage to property, in connection with dredging for the construction or operations and maintenance of an existing, authorized Federal navigation project. The feasibility phase is funded 100% federally and there is a $10.0 million federal project limit. The study sponsor is the Park Board of Trustees of the City of Galveston.

1.1 Geographic Setting

Galveston Island is located on the upper Texas Coast between the Galveston Ship Channel to the north and San Luis Pass to the south. The sandy barrier island is oriented at approximately 237° azimuth (assuming a bearing from NE to SW and cardinal north at 0°), measuring approximately 29 miles in length and 0.3 to 0.6 miles in width. The Project site located at the West End of Galveston Island is shown in Figure 1. For context throughout the remainder of the report the Project site is segmented and referred to in one of two manners: (1) per the PMP, the site is initially split into two sections, defined as “Project Area 1” and “Project Area 2”, (PA1 and PA2, respectively) or (2) per morphological similarities discovered during analyses, the site is later split into three sections, referred to as Reach 1, 2, & 3. The latter is distinguished by the yellow, purple/violet, and green polygons, respectively, as seen in Figure 1. Roughly speaking, Reach 1 includes Sunny Beach, Reach 2 covers Bermuda Beach, and Reach 3 covers Pirates Beach.

Similarly, the red to blue linework indicates PA 1 and PA2, respectively. Project Area 1 extends from 8-Mile Road to Pabst Road, covering Sunny Beach and much of Bermuda Beach. Project Area 2 extends from Pabst to 11-Mile Road, including Pirates Beach and a portion of Bermuda Beach. The line follows the same path as the Coastal Storm Risk Management (CSRM) line, established by the State of Texas’s Government Land Office (GLO) as the landward boundary for beach construction per the Coastal Texas Protect and Restore Feasibility Study (USACE, 2020). This line is the assumed landward limit of construction templates for the purposes of this project.

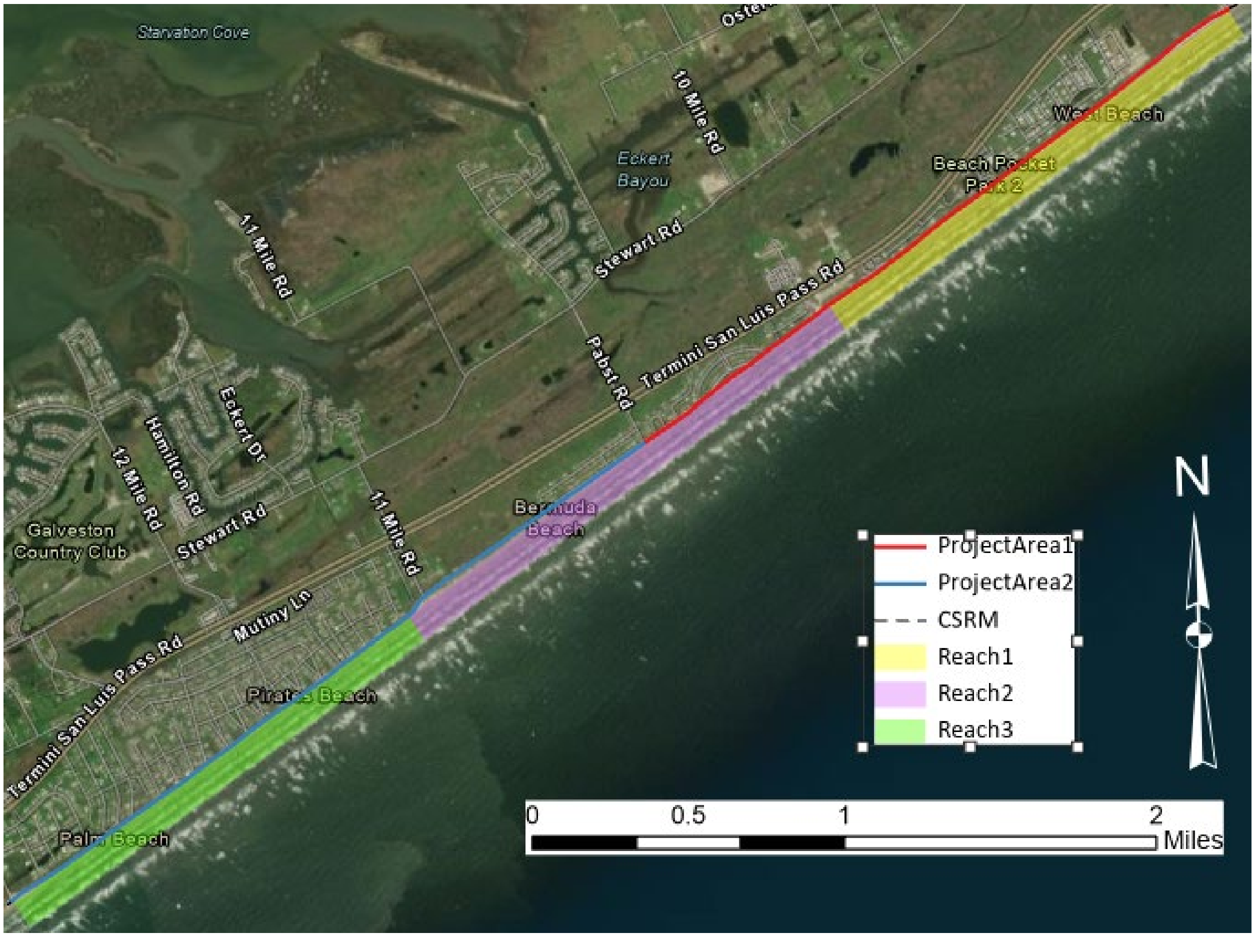


Figure 1: Project site on West Galveston; legend indicates project-specific designations

1.2 Objectives

The intended purpose of this study is to evaluate the feasibility of five (5) alternative solutions that are intended to mitigate erosion within the West Galveston project area. The alternatives listed below must meet criteria within the Section 204 program, which is oriented towards the Beneficial Use (BU) of dredged material.

1. Alternative 1: No-Action – the FWOP (future without project) analysis serves as the baseline for evaluating other alternatives
2. Alternatives 2 & 3: Beneficial use of dredged material for coastal storm risk management, alternatives are differentiated by the location of targeted placement areas
3. Alternatives 4 & 5: Seawall extension from current end through Placement Area 1 and Placement Area 2, respectively.

Results from H&H analyses are used to screen alternatives and inform the economic analysis, which ultimately drives selection of the TSP (Tentatively Selected Plan). Additionally, PED (Preliminary Engineering Design) phase and general future work recommendations are provided in the final sections of this Appendix.

2 Site Conditions

The following sections will discuss the site conditions of the study area. Conditions to be discussed include the nourishment history, tides, historical storms, winds, currents, waves, and sea level rise.

2.1 Tidal Datums and Sea Level Change

Water level data was obtained from NOAA's Tides and Currents website for Station 8771450 located at Pier21 in Galveston, TX. Figure 2 shows the location of the Galveston Pier 21 station. The astronomical tides are diurnal along Galveston Island – there is one high and one low tide every lunar day.

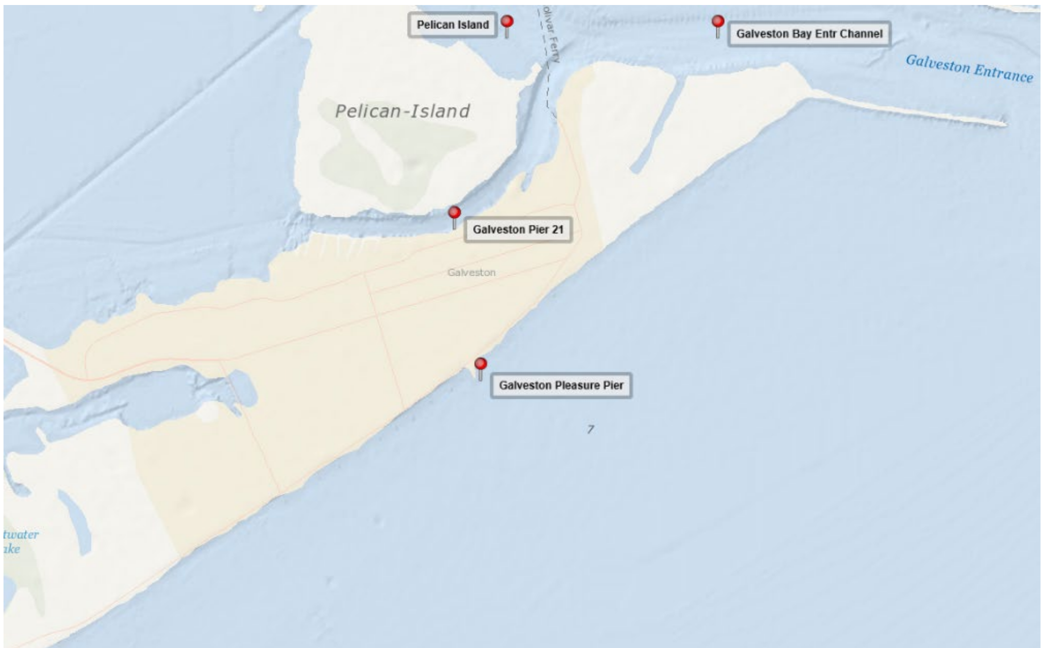


Figure 2: Location of NOAA Tide Station 8771450

The USACE Sea Level Change Curve Calculator (Version 2021.12) is used to project three local RSLC (relative sea level change) scenarios in accordance with ER 1100-2-8162 (USACE, 2019). The historic RSLC rate utilized (0.02106 ft/yr) reflects NOAA's regional rate at the Galveston, TX Pier 21 gauge (8771450). RSLC is projected out to year 2038, which is consistent with the FWOP analysis duration of 15-years (2023 to 2038). Projections are summarized for three scenarios (low, medium and high) in Table 1, along with station datums (on NAVD88) projected with intermediate RSLC in Table 1 and Figure 3. The mid-epoch analysis year (1992) is used as the starting year of RLSC projections according to the station's tidal datum analysis period.

Table 1: Relative Sea Level Change (RSLC) projections for Pier 21 in Galveston, TX

Galveston Pier 21 (NOAA Gauge 8771450): Relative Sea Level Change Projections								
RSLC Projections (Low = 0.02106 ft/yr)				Datums on NAVD88 with Intermediate SLC (ft)				
Year	Low	Int.	High	MLLW	MLW	MSL	MHW	MHHW
1992	0.00	0.00	0.00	-0.31	-0.01	0.52	1.01	1.10
2023	0.65	0.74	1.01	0.43	0.73	1.26	1.75	1.84
2024	0.67	0.77	1.05	0.46	0.76	1.29	1.78	1.87
2025	0.69	0.78	1.09	0.47	0.77	1.30	1.79	1.88
2026	0.72	0.82	1.15	0.51	0.81	1.34	1.83	1.92
2027	0.74	0.85	1.19	0.54	0.84	1.37	1.86	1.95
2028	0.76	0.87	1.24	0.56	0.86	1.39	1.88	1.97
2029	0.78	0.90	1.29	0.59	0.89	1.42	1.91	2.00
2030	0.80	0.93	1.34	0.62	0.92	1.45	1.94	2.03
2031	0.82	0.96	1.39	0.65	0.95	1.48	1.97	2.06
2032	0.84	0.99	1.44	0.68	0.98	1.51	2.00	2.09
2033	0.86	1.01	1.49	0.70	1.00	1.53	2.02	2.11
2034	0.88	1.03	1.53	0.72	1.02	1.55	2.04	2.13
2035	0.91	1.07	1.59	0.76	1.06	1.59	2.08	2.17
2036	0.93	1.10	1.64	0.79	1.09	1.62	2.11	2.20
2037	0.95	1.13	1.70	0.82	1.12	1.65	2.14	2.23
2038	0.97	1.16	1.75	0.85	1.15	1.68	2.17	2.26

Notes:
(1) All units are in feet and reference the North American Vertical Datum of 1988
(2) MLLW = "Mean Lower-Low Water" tidal datum at Station 8771450
(3) MLW = "Mean Low Water" tidal datum at Station 8771450
(4) MSL = "Mean Sea Level" tidal datum at Station 8771450
(5) MHW = "Mean High Water" tidal datum at Station 8771450
(6) MHHW = "Mean Higher-High Water" tidal datum at Station 8771450

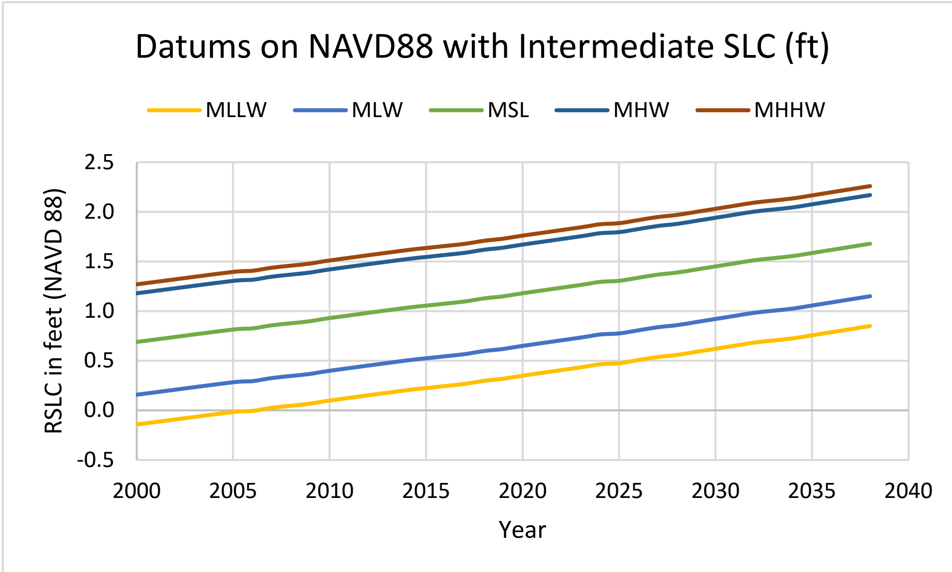


Figure 3: Pier 21 Datums adjusted for intermediate RSLR

2.2 Historic Storms

Figure 4 from NOAA's historical hurricane tracks website displays every major storm track within 100 miles of Galveston Island, between 2005 and 2020. Relevant storm data is summarized in Table 2, wherein peak surge water surface elevations (WSE) are based on time-series records from NOAA's Pier 21 gauge (8771450). The annual exceedance probability (AEP) values are similarly based on curves developed by NOAA according to the full period of record (from 1908 to present) at Pier 21 (NOAA, 2021). Time-series WSE records from individual events are compared against the station's AEP curves to determine the probability of occurrence (%) associated with each storm.

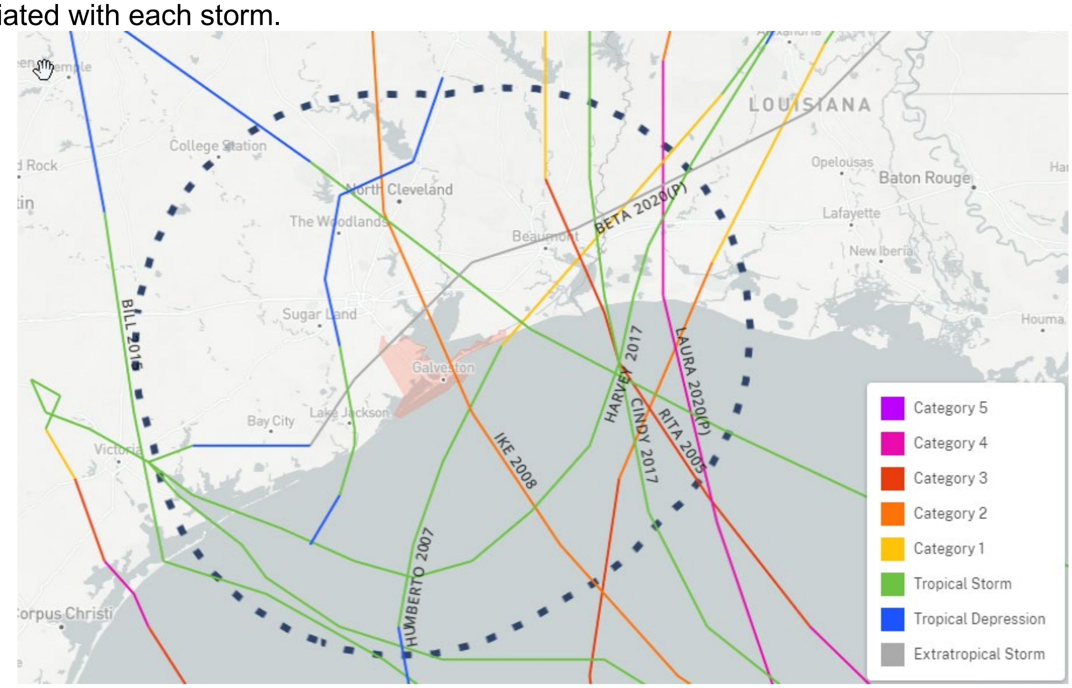


Figure 4: NOAA storm tracker (https://coast.noaa.gov/hurricanes/#map=4/32/-80)

Table 2: Summary of recent storms in Galveston area; peak surge and related AEP values are extrapolated from Pier 21 exceedance probability curves and gauge records (NOAA, 2021)

Storm Name	Year	Peak SWE (ft - NAVD88)	Return Period (years)	Local WSE AEP (%)
Rita	2005	3.47	2.29	44%
Humberto	2007	2.74	1.15	87%
Edouard	2008	1.61	0.41	99%
Ike*	2008	10.52	81.4	1.2%
Bill	2015	3.58	2.28	44%
Cindy	2017	3.72	2.35	43%
Harvey	2017	3.8	2.48	40%
Imelda	2019	3.18	1.4	71%
Laura	2020	5.08	6.48	15%
Beta	2020	4.87	5.8	17%
Delta	2020	3.65	1.99	50%
* Peak surge not captured due to gauge malfunction				

2.3 Wind

Stations 73070 & 73071, displayed in Figure 5, are determined to be the closest WIS stations to the project location (USACE, 2010).

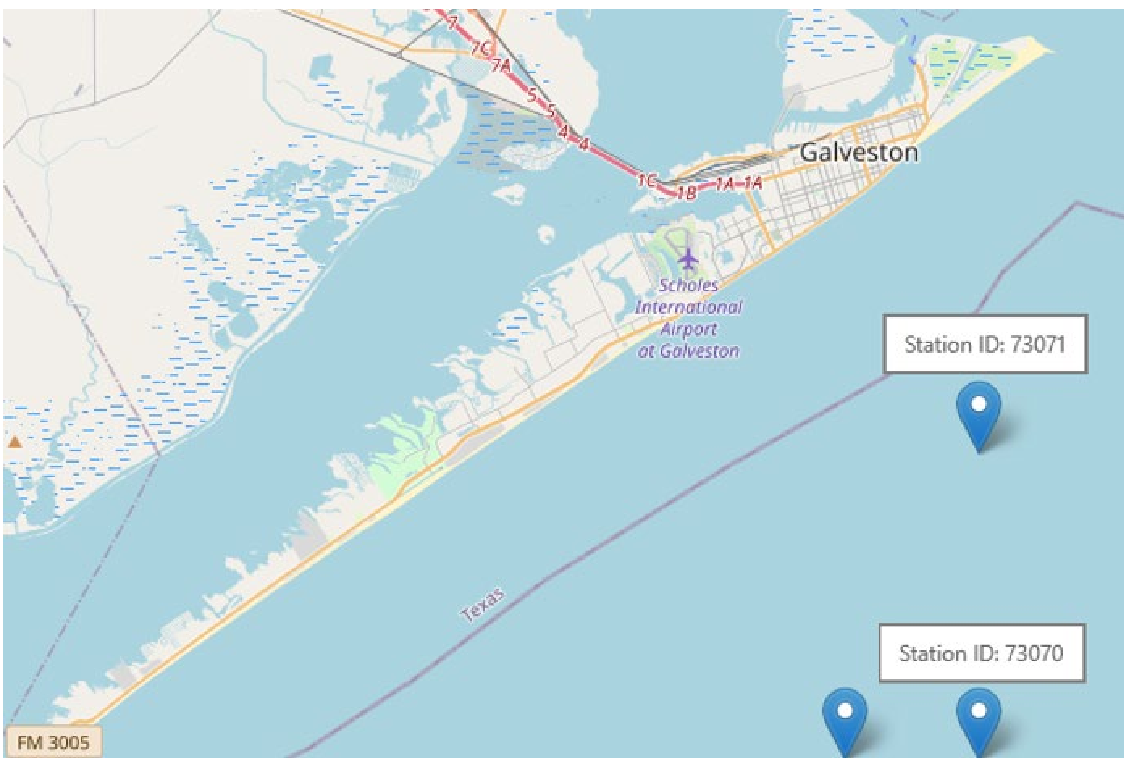


Figure 5: Location of USACE WIS Station 73071

The wind rose displayed in Figure 6 shows 34 years of hindcast data per Station 73071. The dominant wind direction for lower wind speeds (0-5 m/s and 5-10 m/s) comes predominantly from the southeast, while northerly winds tend to occur at lower frequency and higher magnitudes.

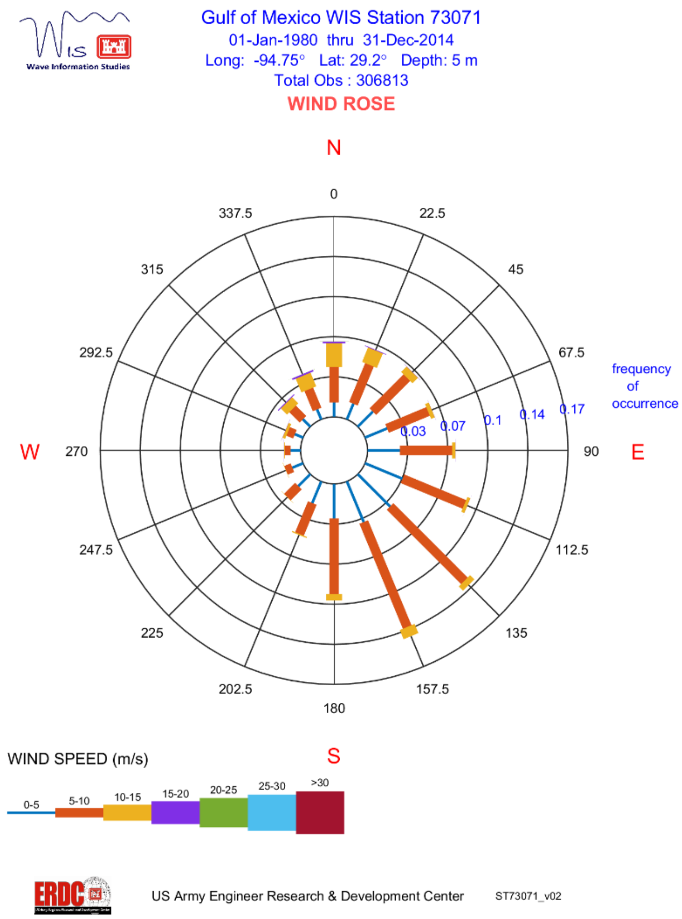


Figure 6: Wind Rose from WIS Station 73071; units are in meters per second

2.4 Waves

Predictably, the predominant wave direction is also from the southeast, according to the wave rose for WIS Station 73071 seen in Figure 7. The shore-normal direction for waves approaching Galveston Island is approximately 147 degrees azimuth, which is roughly midway between the two most frequent direction bins per the wave rose. For this reason, there is a fairly even split in the directional frequency of wave driven longshore currents. However, seasonal variations in wave magnitude and direction ultimately yield a net longshore transport direction to the southwest.

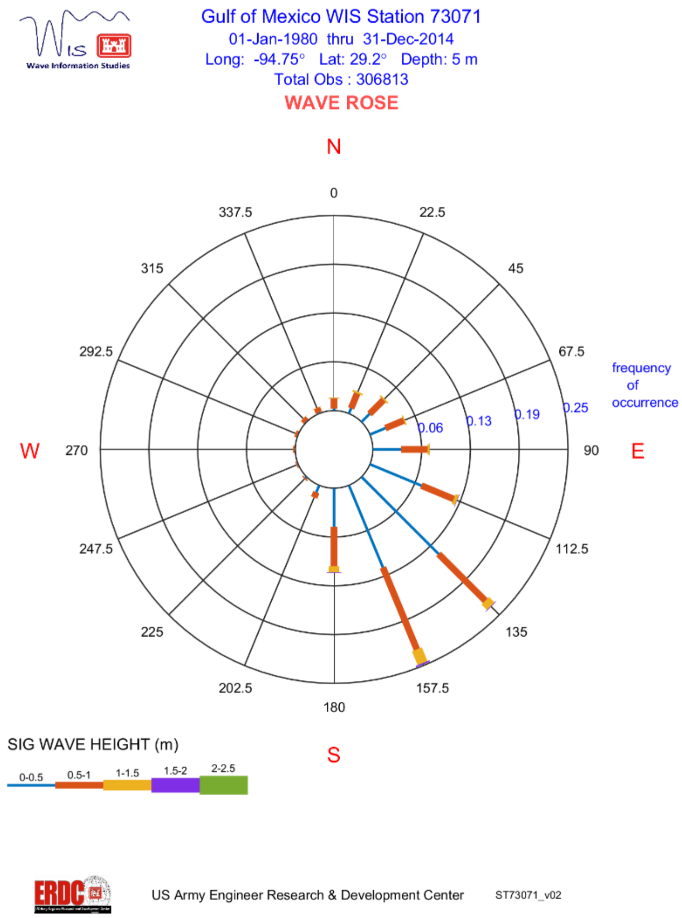


Figure 7: Wave Rose for USACE WIS Station 73071; units are in meters

2.5 Currents

Currents are affected by many different factors including wind, waves, thermohalines, tides, and the Coriolis effect. NOAA's Atlantic Oceanographic and Meteorological Laboratory records daily geostrophic current fields for the Gulf of Mexico. During non-summer months the current along Galveston moves in same direction as the net longshore current (southwest) at higher magnitudes than in summer months when it shifts to the opposite direction, as seen in Figure 8 and Figure 9, respectively (Johnson, 2008).

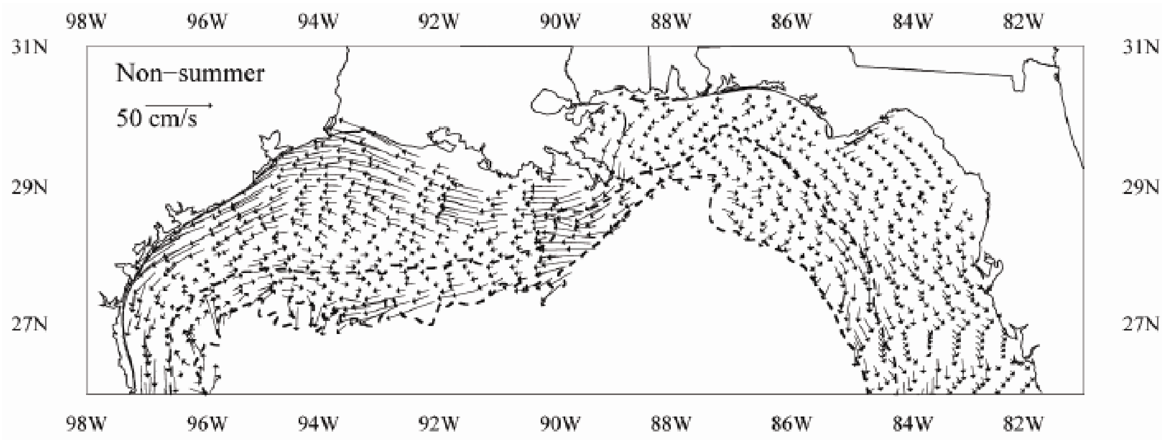


Figure 8: September-May Surface Current Climatology

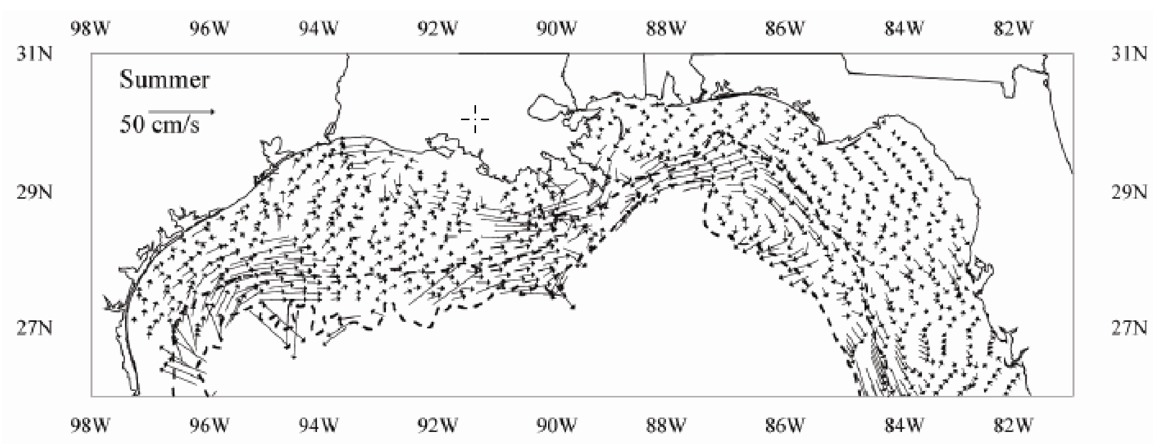


Figure 9: June-August Surface Current Climatology

2.6 Sediment & Morphology

2.6.1 Native Sediment Properties

Sediment samples from the Texas Coastal Sediment Geodatabase (TxSed), compiled by the Texas Government Land Office (TXGLO), were analyzed to review spatial variation, and estimate median grain size (D_{50}) of native beach sediment. A total of 42 samples with sieve data are identified along West Galveston (Figure 10), including 18 beach samples collected by HDR in 2003 and 22 nearshore samples collected by TAMUG in 2005, between depths of 14 and 26 feet (datum unverified) (HDR, 2003; TAMUG, 2005).

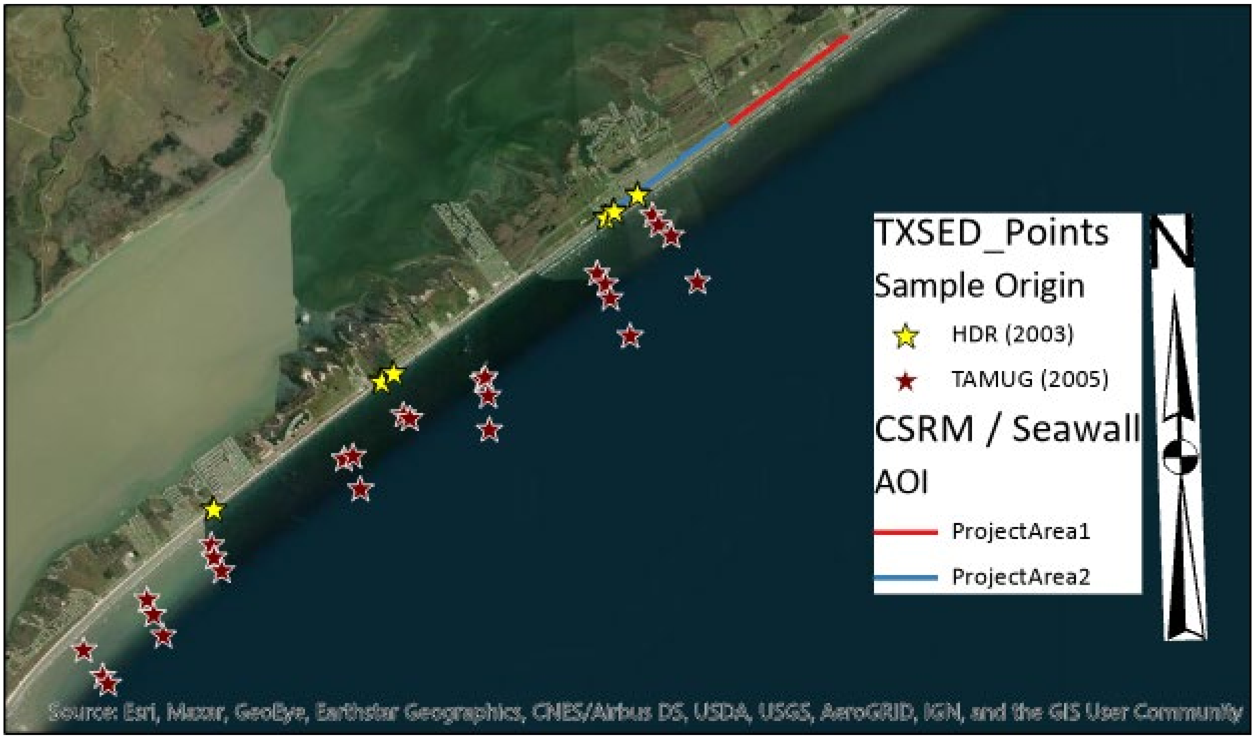


Figure 10: Effective sediment sample locations, mined from TxGLO's TxSed database

The data are manually recorded in Excel, reviewed for consistency, and particle size distribution curves are developed for each sample to evaluate gradation, estimate D_{50}, and review spatial variation. Table 3 summarizes D_{50} estimates, relative to depth and collection date.

Table 3: Median grain size estimates, values averaged according to depth

Sampled D_{50} Grain Size (mm) Relative to Depth					
Collected by:	TAMUG (2005)				HDR (2003)
Depth (ft):	> 25'	20' > x > 25'	15' > x > 10'	<= 15	Beach
D50 (mm):	0.075	0.103	0.104	0.100	0.156
Note:	Data accessed via <https://cgis.glo.texas.gov/txsed/index.html>				

The calculated average D_{50} is 0.156 mm for samples collected along the beach, while nearshore samples collected by TAMUG yield an average D_{50} at 0.094 mm.

Alongshore consistency is observed in sampled D_{50} values collected at similar depths and is assumed for the purposes of this study. Similarly, the particle size distribution curves consistently indicate poorly graded (well sorted) native sediment at any given sample location. This is attributed to coastal processes that naturally distribute/sort sediment to varying distances/depths along the cross-shore profile. This natural sorting process is driven by the fall velocity of sand particles, which is largely controlled by the respective grain size. The coarsest sand is concentrated along the surf/swash zone of the beach, where samples are often collected, while finer sand is distributed seaward by waves/current, or landward to dunes via aeolian processes (Benedet, 2004).

According to beach equilibrium profile theory, discussed further in Section 3.4.3, the shape of existing cross-shore (depth of closure) profiles in the project area indicate a theoretical equivalent D_{50} range of 0.07 - 0.1 mm, in good agreement with TAMUG samples. It should be noted that many past studies have used a coarser D_{50}, consistent with samples collected on the beach, to represent the effective native fill. However, the portion of the active profile that consists of coarser material is relatively small. To represent the entire active profile and to maintain consistency with equilibrium profile concepts, the native beach is assigned an effective D_{50} = 0.09 mm.

Beach quality sand that meets USACE criteria will be obtained from the Galveston Entrance Channel, an authorized Federal project, during routine maintenance dredging operations for use as borrow fill. The median grain size of borrow fill is estimated according to the latest (2016) Galveston Harbor and Channel sediment sample data, provided by SWG Operations, to inform cross-shore spreading loss estimates, as discussed in Section 3.3.3.

2.6.2 Historic Erosion

The University of Texas BEG (Bureau of Economic Geology) reports shoreline change rates in Galveston that range from -5.1 to +24.9 meters per year (-16.7 to +81.7 ft/yr; negative indicating erosion/loss and positive indicating accretion/gain), and a net rate of +0.98 m/yr (+3.2 ft/yr) between the years 2000 and 2012 (Paine, 2014). Between 2000 and 2019 the updated change rates reportedly range from -2 to +11 meters per year (-6.6 to +36.1 ft/yr), and a net rate of +0.77 m/yr (+2.5 ft/yr), as seen in Figure 11 (Paine, 2020). Rates are not specifically reported for the period between 2012 and 2019, however min/max values reduced significantly between available periods indicating a stabilizing trend in recent history.

The BEG reports long-term (1930s-2019) historic retreat rates that range from -4.5 to -8 ft/yr (rounded) at the Project site (Paine, 2019). PA 1 long-term rates range from -7 to -8 ft/yr and PA 2 rates range from -4.5 to -7 ft/yr (west to east). Recent trends (2000-2019) show a reduction to shoreline retreat at the Project site, with rates that range from -3.5 to -5 ft/yr (rounded) (Paine, 2019). Interestingly, long-term historic alongshore trends (increased erosion from west to east) are not reflected in recent trends. Instead, peak retreat rates are somewhat sporadic with less consistency between transects and tend to exist in the western third of PA1, on the east side of Bermuda Beach.

Long-term erosion trends documented within the project area indicate that shoreline retreat rates generally increase with proximity to the erosional hotspot located at the end of the seawall. This has been mitigated partially due to regular nourishments that have occurred in recent history.

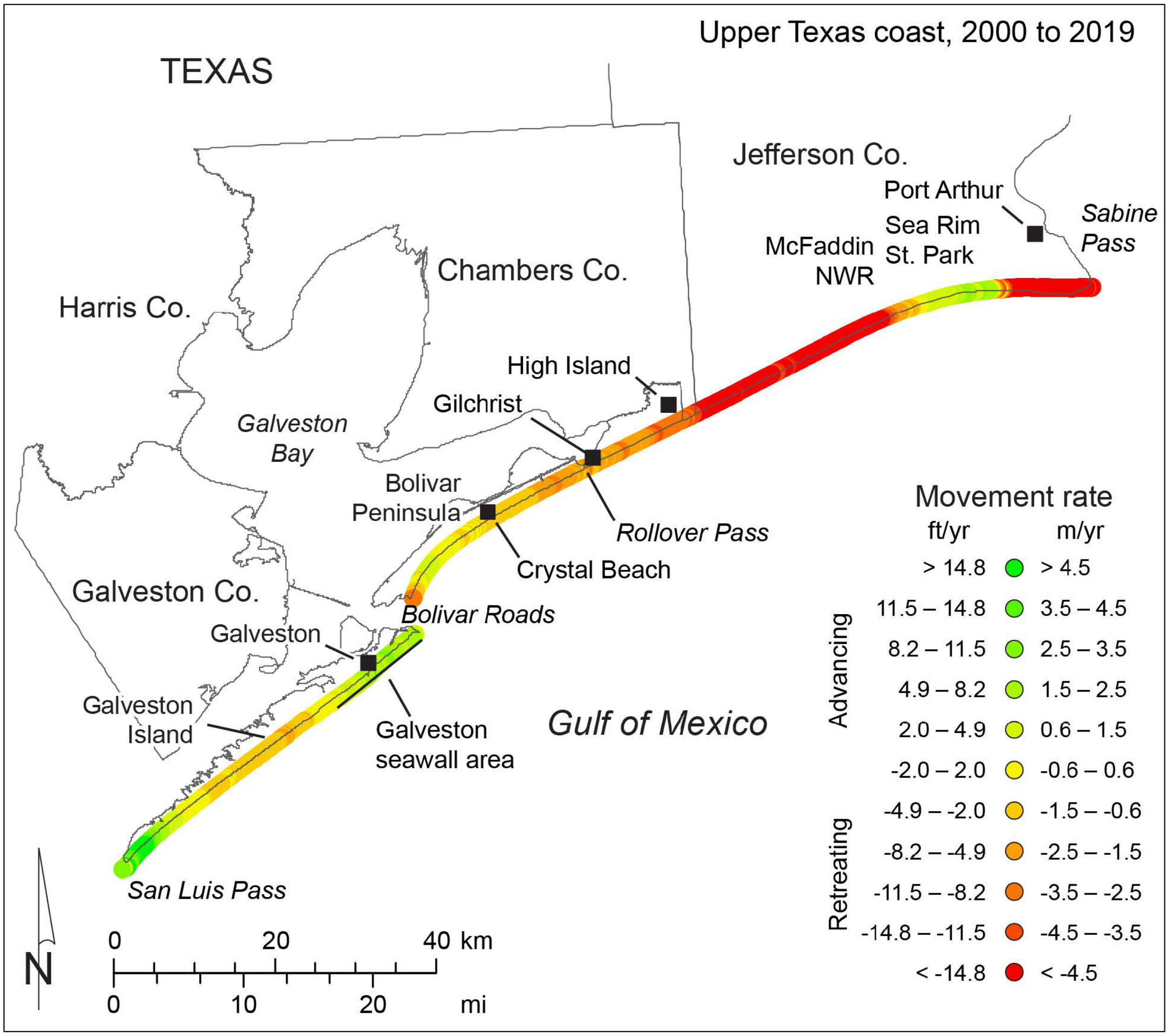


Figure 11: BEG shoreline change rates between 2000 and 2019 (Paine, 2020)

2.6.3 Recent Nourishment

Beach nourishment on Galveston Island has historically been in response to severe storm events. However, in recent history regular nourishments have been placed in front of the seawall, along Babe's Beach (61st street to west end of seawall). Recent nourishments are provided in Table 4, courtesy of the American Shore and Beach Preservation Association (ASBPA) nourishment database online.

Table 4: ASBPA Nourishment Records for Galveston Island

Galveston, TX Nourishment Events

Year	Length (ft)	Volume (cy)	Cost	Sand Source
2019	6,400	423,027	$20,900,000	Houston-Galv Nav Channel
2017	19,487	1,000,000	$16,746,500	Houston-Galv Nav Channel,South Jetty Borrow Area
2015	2,100	113,000	$5,000,000	
2015	4,980	629,188	$22,993,051	
2009	18,480	450,000	$6,000,000	East Beach, Steward Beach, Offshore
2008		42,000		Upland
2003	1,500	80,000		Big Reef borrow area
2001	1,310	13,300	$90,000	
2000	20,000	70,000		
1999	485	1,200		
1999	20,000	70,000		
1998	20,000	70,000		East Beach
1995	19,008	710,000	$5,900,000	Big Reef Shoal
1993	6,000	500,000		Galveston Ship Channel and Galveston Harbour
1985	1,456	14,989	$21,275	East Beach
Totals	**141,206**	**4,186,704**	**$77,650,826**	

3 Analysis of Alternative Solutions

Alternative solutions, described in Section 1.2, are evaluated in the sections that follow.

3.1 Topographic/Bathymetric Data

Available topographic/bathymetric shoreline surveys that were utilized for the purposes of this analysis are summarized in Table 5.

Table 5: Available topographic/bathymetric survey data utilized

Effective Date*	Source (see references)	Description
June, 2006	TAMUG, 2006	xyz transect data at 2-mile intervals, out to “DOC”
June, 2014	Atkins, 2014	wading depth survey – contours to “DOC”
May, 2015	Atkins, 2015	wading depth survey – beach contours
Sep., 2016	OCM Partners, 2021	CZMIL topobathy LiDAR to “DOC”
Sep., 2017	Atkins, 2017	wading depth survey – beach contours
Feb., 2018	Stratmap, 2018	LiDAR – beach only
Feb., 2019	NOAA, 2019	Leica Chiroptera II topobathy beach/nearshore

3.2 FWOP (Future Without Project) Alternative 1 – Projected Shoreline Change

Historic shoreline change rates track the annual evolution (feet per year) of the +4’ contour between 2014 and 2019, based on 15 cross-shore profiles, spaced at 1/3-mile intervals along the project area. Volumetric change rates (cubic yards per year) are similarly developed through transect comparisons, which are checked against GIS cut/fill operations using applicable DEM (digital elevation model) surfaces. Historically derived change rates are used to inform background erosion rates that are applied to FWOP and FWP (Future With Project) analyses for Alternatives 1-3.

Transects are labeled “PA1-15” (PA = project area) in chronological order from northeast to southwest. The domain of analysis is defined by the alongshore extent of the project area (totaling

4.84 miles measured in a straight line, or ~5.1 miles following shoreline curvature), and a cross-shore extent that spans from the CSRM (Coastal Storm Risk Management) line to the seaward extent of 2016 LiDAR, which is the limiting factor in 2014-2016 "depth of closure" survey overlap. Transects are intentionally aligned with available 2006 XYZ transects, which are used to extend the temporal domain of three transects (PA-2, -8 & -14) by extracting elevation data from 2014 to 2019 DEMs at each point. Initially the transects were divided into two reaches, as indicated by the red to blue color change of the CSRM line in Figure 12. However, the transects are eventually divided into three reaches (5 transects per reach) to conform with (1) morphological trends, and (2) the length of the recommended construction template (see Section 3.3.3).

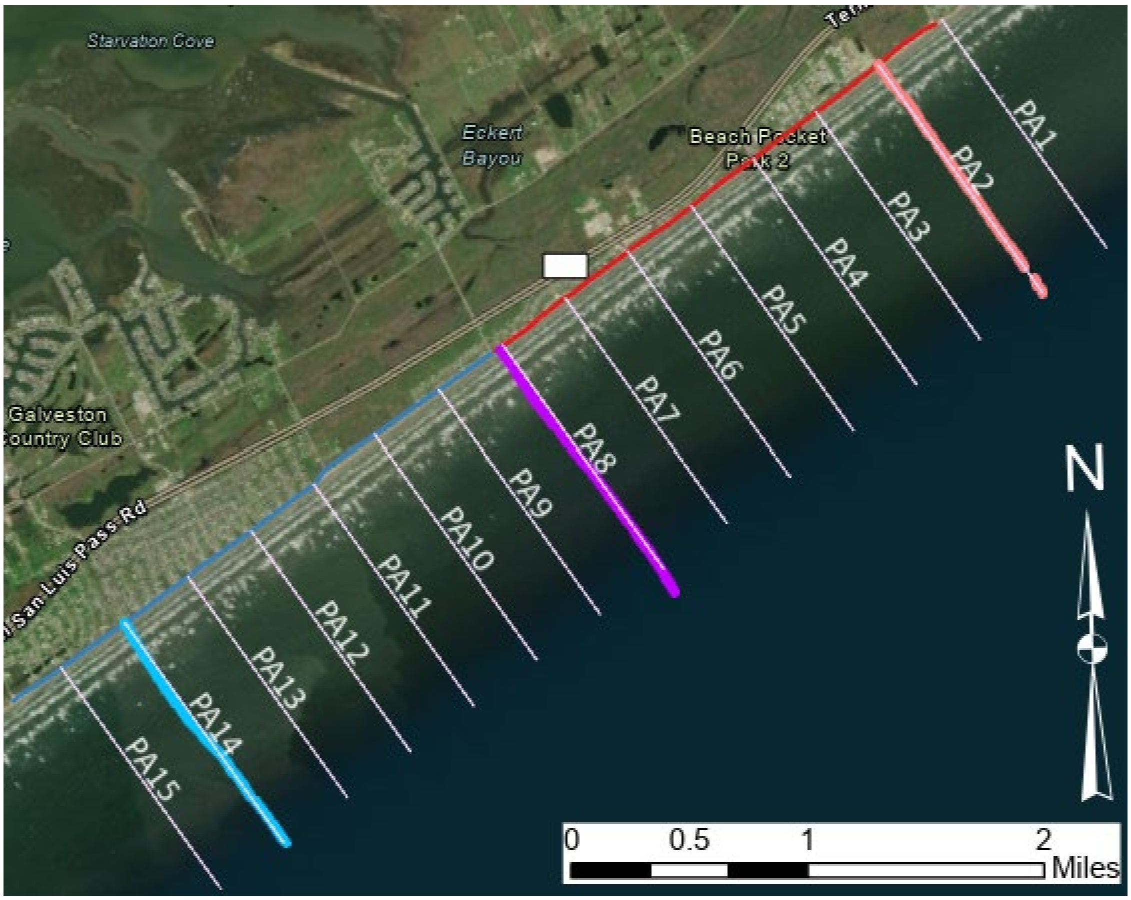


Figure 12: Plan view of transects in project domain

An example cross-section of transect (PA 7) is provided in Figure 13 and Figure 14, showing the approximate max offshore extent of available survey data, followed by a close-up of the beach profiles.

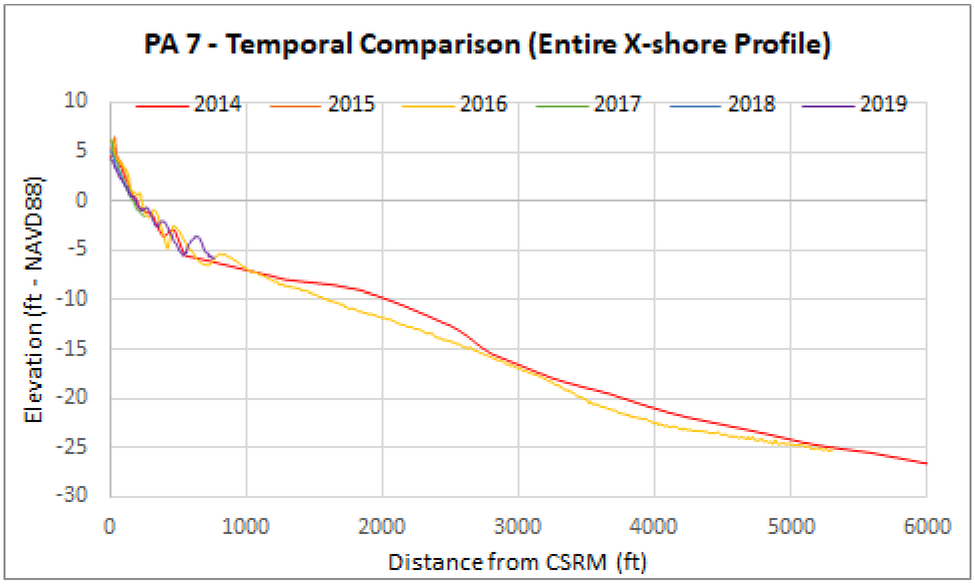


Figure 13: PA 7 evolution of active profile over survey years

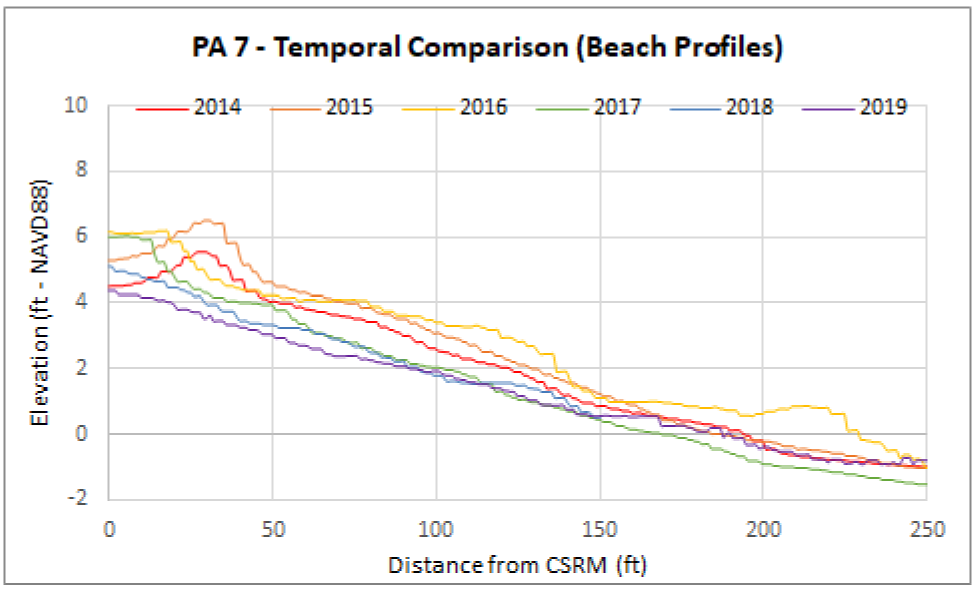


Figure 14: PA 7 evolution of beach profile over survey years

Temporal comparisons at each transect yield annual shoreline change rates (Table 6) in terms of (1) volume of sand accreted (+) or eroded (-) per linear foot alongshore, and (2) seaward advance (+) or landward retreat (-) of the +4' elevation contour, relative to the NAVD 88 datum; units are in cubic-yards per linear-foot per year (cyd/ft/yr), and feet per year (ft/yr), respectively.

Table 6: Summary of Historic Shoreline Change Analysis

	Shoreline Change (+ Advance / - Retreat)					Volumetric Change Rate (+ Accretion / - Erosion)						
	MHW Change Rate			4' Contour Change Rate		Transect Analysis					GIS Cut-Fill Analysis	
Transect Name	Net Change, 2014 to 2019	Max Advance	Max Retreat	Net Change, 2014 to 2019	Effective Rate	Beach (140' length)	Beach Max Accretion	Beach Max Erosion	Construction Template AOI (2014-2019)	DOC (2014-2016)	CT AOI (2014-2019)	DOC (2014-2016)
(NE to SW)	(lft/yr)	(lft/yr)	(lft/yr)	(lft/yr)	lft/yr	(cyd/lft/yr)	(cyd/lft/yr)	(cyd/lft/yr)	(cyd/lft/yr)	(cyd/lft/yr)	(cyd/lft/yr)	(cyd/lft/yr)
PA1	-0.27	13.94	-27.86	-1.39	-0.83	-0.33	2.82	-4.32	0.85	-139.93		
PA2	-3.67	43.07	-32.66	-1.36	-2.52	-0.13	1.32	-3.89	0.36	-86.28		
PA3	-0.92	29.38	-26.84	2.03	0.55	-0.07	3.81	-5.79	0.66	-52.13		
PA4	-2.15	28.30	-26.05	4.98	1.41	-0.17	2.71	-5.73	0.43	-103.72		
PA5	-3.81	9.58	-26.39	-5.35	-4.58	-1.23	0.89	-5.44	-1.01	-80.51		
Reach 1 Avg:	-2.16	24.85	-27.96	-0.22	-2.69	-0.39	2.31	-5.03	0.26	-92.51	-0.13	(85.42)
PA6	-3.79	13.89	-22.46	-0.19	-1.99	-0.83	2.24	-5.27	-0.39	-46.35		
PA7	-3.79	23.15	-26.81	-6.96	-5.37	-1.05	3.23	-5.28	-0.66	-65.03		
PA8	-3.45	40.47	-24.36	-6.30	-4.87	-1.05	0.93	-5.71	-1.19	-96.31		
PA9	-4.61	11.80	-37.90	-7.70	-6.16	-0.62	3.54	-4.98	-0.25	-85.11		
PA10	-2.72	27.64	-24.05	-7.61	-5.16	-0.45	1.69	-10.64	-0.97	-35.01		
Reach 2 Avg:	-3.67			-5.75	-5.75	-0.80	2.33	-6.38	-0.69	-65.56	-0.91	(60.53)
PA11	-4.31	12.93	-25.30	-4.58	-4.44	-1.04	2.59	-5.58	-0.66	-73.31		
PA12	-3.43	34.24	-25.62	-5.81	-4.62	-1.17	1.63	-5.99	-1.39	-92.56		
PA13	-3.74	19.75	-23.46	-5.64	-4.69	-1.10	0.93	-5.00	-1.36	-72.44		
PA14	-5.43	19.27	-26.07	-6.26	-5.85	-1.47	1.16	-6.42	-1.98	-72.11		
PA15	-4.81	14.54	-28.01	-5.39	-5.10	-0.70	4.14	-5.13	-0.78	-98.68		
Reach 3 Avg:	-4.34			-5.54	-5.54	-1.10	2.09	-5.62	-1.23	-81.82	-1.34	(75.54)
					TOTAL (CYD):	(20,506.6)	60,362.0	(152,905.6)	(14,944.7)	(2,039,319.6)	(21,291.7)	(1,882,870.6)
NOTE:	Reach 1 average change rate (ft/yr) show poor comparison to historic long-term rates, to remain conservative the effective rate is the arithmetic mean value of MHW & 4' contour historic retreat rates (negative) minus half a standard deviation; Reach 2 & 3 utilize mean retreat rates of the 4' elevation contour only											

The effective shoreline retreat rates, highlighted in green, inform FWOP results (Figure 15) and are the effective background erosion rates for FWP analyses (Section 3.3). Results yield shoreline retreat rates at -2.69 ft/yr, -5.75 ft/yr, and -5.54 ft/yr for Reaches 1, 2, and 3, respectively. Total retreat therefore ranges from approximately -40 to -86 feet over the 15-year period of analysis.

Reach 2 & 3 net rates are calculated as the distance between the position of the +4' (NAVD88) elevation contour at the end and beginning of the surveyed period, divided by elapsed time, which is then averaged amongst the five transects for each respective reach. The net rate for Reach 1 was calculated at -0.22 ft/yr using this method, which compares poorly with long-term rates in the region, reported at -7 to -8 ft/yr between 1930s and 2019 according to BEG studies (Paine, 2019). However, BEG also reports a significant reduction to the rate of retreat in this region in recent years according to 2019 updates, which report local rates closer to -4 to -5 ft/yr between 2000 and 2019 (Paine, 2019). The rates dropped notably upon the most recent update that accounted for the period between 2012 and 2019, which can be attributed largely to recent nourishments that have effectively reduced the rate of local erosion (see sections 2.6.2 & 2.6.3). It is anticipated that local nourishments will continue on a biannual basis into the near future, however, to build some conservatism into projections, the effective rate for Reach 1 is calculated using a different method than Reach 2 & 3. The Mean High Water Level net change rate is calculated at -2.16 ft/yr for Reach 1 (this accounts for intermediate sea level rise), which is averaged with the change rate of the +4' contour, then half of a standard deviation of the Reach 1 net change rates (for MHW and +4' contour) is added to reach the final value.

This method is intended to strike a balance between long-term and recent trends, under the assumption that regular nourishments will continue over the anticipated project life. Further, it is assumed that the relative magnitude and frequency of storms over the project life will be similar to conditions experienced over the duration of the monitoring period.

Annual volumetric losses calculated in the project area between 2014 and 2016 total approximately 2-million cubic-yards over the active profile, which equates to about 78 cyd/ft/yr. The volumetric rate of change is secondary to the advance/retreat rate, as it is not directly used in the economic analysis, however it does provide some valuable insights. For example, there is no apparent correlation between volumetric loss estimates calculated on the beach when compared to estimates over the entire (available) active profile, i.e. – beach change rates are not a good predictor for changes over the entire active profile in the same period of analysis. Similarly, when beach losses and "DOC" losses are normalized in terms of cubic-yards per square-foot per year, DOC losses are 5.5X higher than beach losses on average. This is indicative of a much larger active profile that is more dynamic offshore than is often suggested, however it is likely composed of much finer sediment than what is found on the beach according to sediment samples reviewed in section 2.6.1 and beach equilibrium profile theory concepts reviewed in section 3.3.3. Pilkey et al. (1993) provides supporting evidence, citing studies in the Gulf of Mexico that measured offshore bedstream currents of up to 200 cm/sec and large volumes of sediment transport to the edge of the continental shelf. Further, Pilkey notes that large volumes of sediment frequently move seaward of the DOC during both fairweather and storm conditions, though he does attribute large scale seaward flux to storm events.

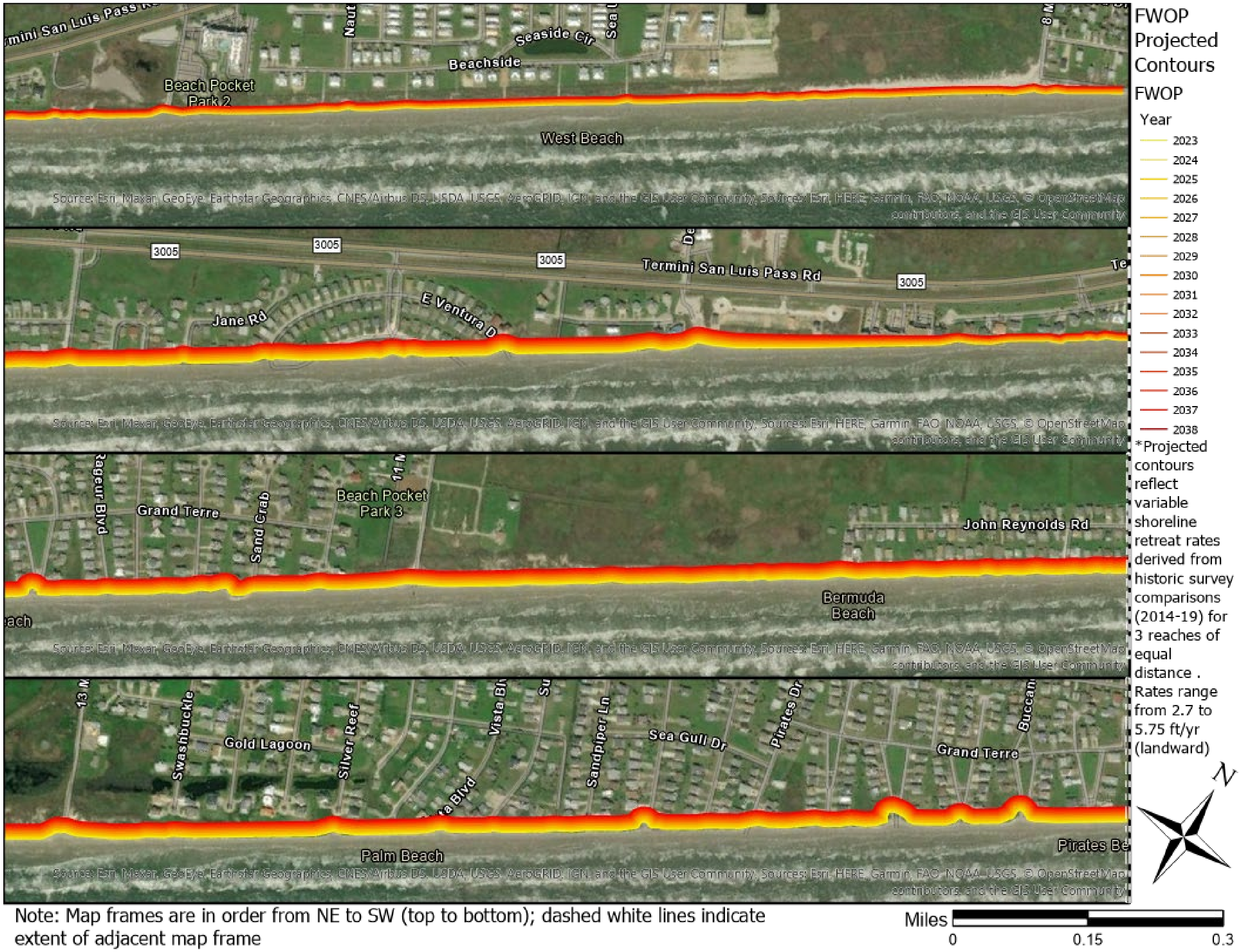


Figure 15: FWOP projected shoreline change in the project area from 2023 to 2038

3.3 FWP (Future with Project) Alternatives 2 & 3 – Beach Fill Design and Evolution

Alternatives 2 and 3 are beach nourishment alternatives that are differentiated only by their respective alongshore placement. The Alternative 2 location was developed by the PDT (project design team) based on NFS (non-federal sponsor) input. Results from the Alt. 2 analysis informed further collaboration amongst the PDT to inform Alternative 3 placement, which ultimately resulted in a 3000 ft shift southwest of the Alt. 2 template to extend benefits further into the Pirates Beach community. Details of the analysis, and results, are provided in sections that follow.

3.3.1 Design Berm Considerations

All shoreline change (retreat/advance) projections are based on the +4' NAVD88 contour unless otherwise stated. This elevation is selected for consistency with the design berm elevation. The significance of the +4' (NAVD88) elevation contour is multifaceted, and is selected according to the following list of considerations:

1. The contour coincides with the approximate (landward) limit of wave runup during typical conditions according to observation of aerial imagery.
    a. The wet/dry interface selected by BEG for 2019 updates is +3.84' NAVD88. If intermediate SLC is accounted for, the equivalent WSE in 2023 (assumed construction year) is +3.96' NAVD88 (Paine, 2019).
2. The 1-year AEP total WSE (still water elevation + intermediate sea level rise + 2% wave runup) is calculated at +4.6' NAVD88, according to Stockdon & MASE (with Melby modification) runup calculations (Melby, 2012).
    a. Structures located proximal to this elevation contour have historically been subjected to "buy-backs". This is likely because such structures are at immediate risk of exposure to surge and waves during high frequency storms (1 to 5-year AEP storms).
    b. Exposure to such events is unlikely to yield instantaneous failure of a properly constructed coastal structure, however it will rapidly evolve into an impractical liability to the local environment and surrounding structures. Without intervention, the structure will exacerbate local erosion (due to scour) and will eventually fail in the event of a more severe storm, elevating risk to nearby structures due to debris. Further, there is no obvious path towards intervention at this point since the structure is presumably in the immediate path of the natural dune/vegetation alignment, likely inhibiting construction of a uniform and contiguous system.
3. It is located seaward of the CSRM (Coastal Storm Risk Management) line for most of the project length, which was established as the landward construction limit for the purposes of the Coastal Texas Feasibility Study.
    a. It is important to note that the tentatively selected plan (TSP) from the Coastal Texas Feasibility Study includes the construction of dunes, which must not extend landward of the CSRM line. Assuming the plan is ultimately pursued, the construction date will not likely occur until 10+ years from today. The establishment of dunes is key to mitigating the flood hazard posed by coastal storm surge, as well as to the long term the health of the beach. Well established dunes are fortified with vegetation that promotes aeolian (wind-

blown) sand capture and ultimately provide a less-ephemeral, natural defense system against severe storm surge and waves.

b. The resilience of the dune system relies on a large enough beach/berm buffer to minimize the frequency of exposure to waves. This is particularly true of unvegetated dunes; however, vegetation tends to take several years to establish, leaving dunes vulnerable in the interim (USACE, 2008, V-4-3-2c).

c. Given these considerations, and assuming no change to the CSRM line, it seems imperative to the success of projects like Coastal Texas for regular nourishments to continue into the foreseeable future. Otherwise, continued shoreline recession and sea level rise will place the CSRM line at lower elevation and in closer proximity to the Gulf. This would introduce significant construction challenges, cost, and risk, particularly to dune construction projects such as the Coastal Texas TSP.

4. It is immediately adjacent and seaward of the vegetation line, allowing for beach fill construction to avoid disturbance of established vegetation.

5. The elevation roughly matches the design berm elevation of past nourishment projects.

3.3.2 Depth of Closure

The depth of closure (DOC) is intended to define the seaward limit of the active profile, which is the theoretical cross-shore extent of sediment movement, beyond which elevation changes are thought to be negligible. Guidance and wave data from the Coastal Inlets Research Program (CIRP) are utilized to calculate the depth of closure. Wave data, hindcast from 1980 to 2012, originates from local WIS stations 73070 & 73071 (see Figure 5). The data are shoaled by CIRP to a uniform depth of 30 feet for all GOM (Gulf of Mexico) WIS stations, unless already located in shallower water (Brutsche, 2015). Station data are used to calculate the DOC with equations developed by Hallermeier (1981) and Birkemeier (1985). Results are converted from metric units and averaged across stations for three total values.

(Hallermeier, 1981) $$h_{*inner} = 2.28H_e - 68.5\left(\frac{H_e^2}{gT_e^2}\right)$$ *Eq. 1*

(Hallermeier, 1981) $$h_{*outer} = (\overline{H}_s - 0.3\sigma_s)\overline{T}_s\left(\frac{g}{5000D}\right)^{0.5}$$ *Eq. 2*

(Birkemeier, 1985) $$h_* = 1.57H_e$$ *Eq. 3*

where, $$H_e = \overline{H}_s + 5.6\sigma_s$$

The three methods yielded average values of 16 ft, 41 ft, and 11 ft (rounded), respectively. Values calculated with Hallermeier's equations (16 ft & 41 ft) represent an inner DOC and outer DOC, respectively. The respective depths define the seaward limits of the littoral zone, and the less dynamic shoal zone. Hallermeier's values show good comparison with historical surveys and are adopted for the purposes of this study. The inner DOC is utilized for longshore diffusivity calculations in Section 3.3.4. The outer DOC is applied to beach equilibrium concepts; however, it is limited by the extent of available, overlapping survey, which extends to an approximate elevation of -25.5 feet (NAVD88). The limiting elevation ultimately has negligible impact on the analysis as a result of intersecting profiles that occur due to assumed differences in native and borrow fill characteristics, discussed further in Section 3.3.3.

3.3.3 Beach Equilibrium – Cross-shore Spreading Component

The cross-shore elevation profile shape of a given shoreline is largely controlled by its sediment composition and associated grain size. Empirically derived formulas predict beach equilibrium shape from a profile shape parameter (A-parameter), that is directly correlated to the D_{50} grain size. The shape of a submerged profile can be calculated based on the characteristic D_{50} grain size with Equation 4 (EM 1110-2-1100, Equation IV-3-7).

$$h = Ay^{2/3} \qquad \textit{Eq. 4}$$

where

$$\mathrm{h} = \text{water depth at a distance (y) from the shoreline}$$
$$\mathrm{A} = \text{a scale parameter based on sediment particle size}$$

The median grain size associated with an active profile can be used to develop a theoretical equilibrium profile with the equation above. Similarly, the concept can be used to fit an equivalent grain size to an existing beach profile, or to modify a design profile based on differences between native and borrow fill D_{50} parameters according to guidance from EM 1110-2-1100 Part V. The added distance of translation W_{add} (V-4-5) is used to modify the design profile as a function of depth (*y*) based on the sediment characteristics of the native and borrow fill with Equation 5 (EM 1110-2-1100, Equation V-4-5).

$$W_{add}(y) = y^{3/2}\left[\left(\frac{1}{A_F}\right)^{3/2} - \left(\frac{1}{A_N}\right)^{3/2}\right] \qquad \textit{Eq. 5}$$

Where A_N is the A-parameter associated with native sand and A_F is the A-parameter for fill/borrow sand. The added distance is positive (seaward) if borrow material is finer than native sand, resulting in increased cross-shore spreading and a more gradual design profile slope. Borrow material that is coarser than native sediment results in a negative (landward) “added distance” yielding a steeper design slope that intersects the native shoreface. The latter theoretically requires less fill to achieve the same added beach width.

Native beach samples collected by TAMUG in 2005 yield a D_{50} of 0.094 mm (see section 2.6.1). The theoretical D_{50} is estimated from the representative (averaged) existing profile in BMAP (Beach Morphology Analysis Package) with the least square method yielding a theoretical D_{50}=0.09 mm, as seen in Figure 16.

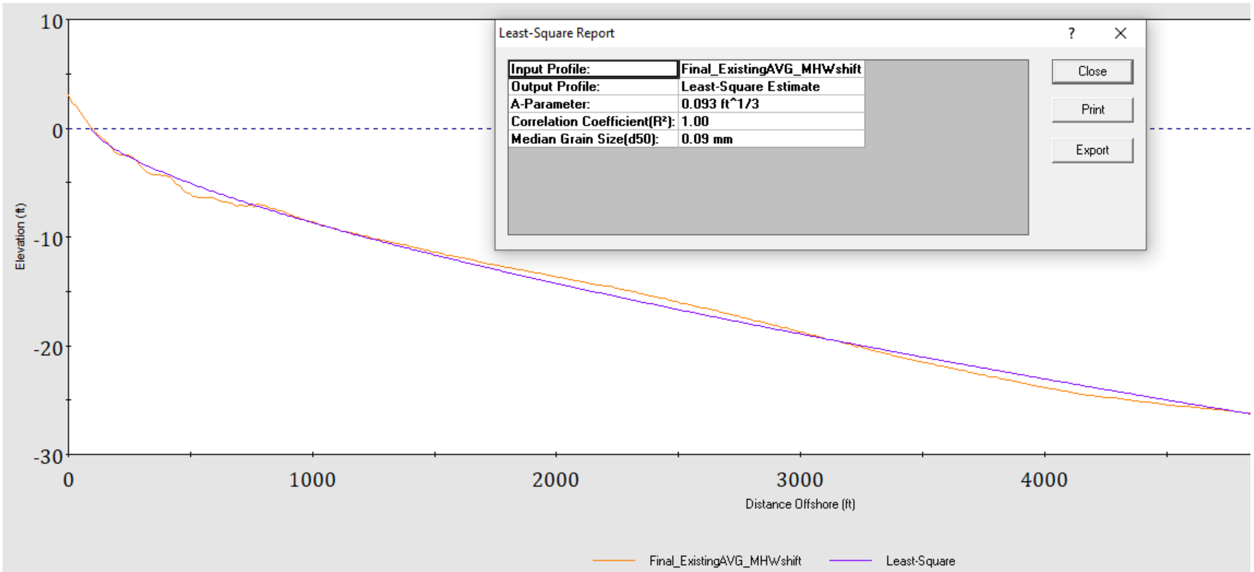


Figure 16: Screenshot of BMAP least square estimate results, which yield an equivalent D50 of 0.09mm; profile is translated vertically such that MHW=0 to capture entire submerged profile

The borrow fill D_{50} is estimated based on 2016 Galveston Entrance (ship) Channel samples, which indicate significant variation in the overall gradation/distribution throughout the channel. There is no obvious way to generate an appropriately weighted average from available borrow fill samples, however given the nature of “added width” concepts, a conservative approach is taken by eliminating the coarsest outlier, then attempting to weight the remaining samples spatially based on the indicated channel station. The assumed borrow and native material sediment sizes are summarized in Table 7.

Table 7: Effective D50 and A-parameter for native material and borrow fill

Sediment Parameters	D_{50} (mm)	A (ft^1/3)
Borrow Fill	0.11	0.1
Native Beach	0.09	0.087

The existing representative profile is developed in BMAP by averaging 2019 profiles (minus two outliers), which are then combined with the averaged 2016 profiles to extend seaward coverage to the effective DOC. The averaged 2016 profile is translated landward to tie into the end elevation of the 2019 profile to create the representative existing profile.

Next the design profiles are developed based on the design berm height established in section 3.3.1 (+4’ NAVD88), beach equilibrium profile concepts, past construction template dimensions, and an assumed volumetric range of available borrow fill. The anticipated volume of suitable borrow material for beneficial use is between 490K cubic yards and 630K cubic yards, based on 2019 and 2015 placement records, respectively. Design profiles consist of (1) the translated profile, (2) the anticipated design profile, and (3) the construction template. The translated profile is developed by clipping the portion of the existing profile that extends seaward of the design berm elevation, then translating it by the design berm width. Differences in borrow fill and native beach characteristics then inform the added width correction to yield the anticipated design profile. The construction template defines the general shape, dimensions, and elevations of a proposed beach fill design for construction purposes. It must have a berm elevation and volume equivalent to the anticipated design profile, which requires an iterative design process between the two. The existing and design profiles are provided in Figure 17.

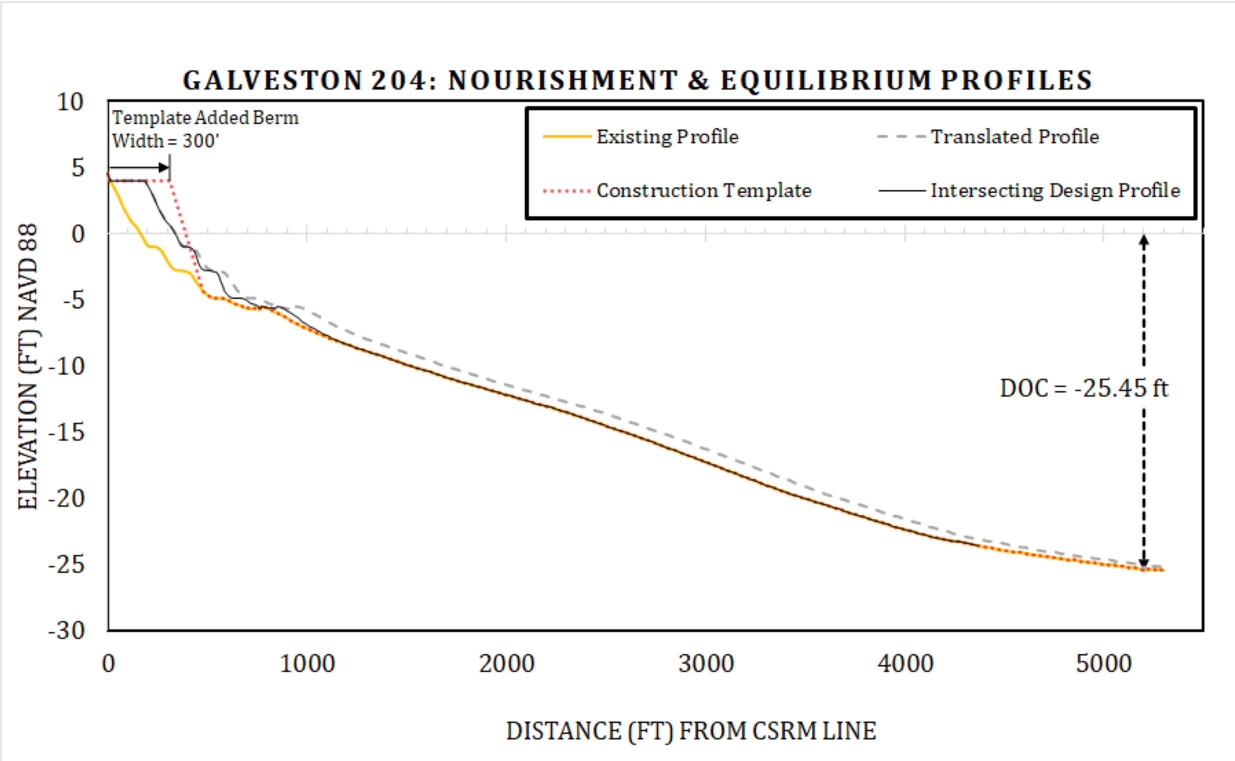


Figure 17: Existing and design profiles based on beach equilibrium concepts

The construction template dimensions include a 300' added berm width, followed by a 1:20 slope to tie into the existing profile. A three-dimensional version (DEM) of this template is created in GIS, extending the entire length of the project area, which is used to determine total fill requirements by comparing the construction template DEM with the 2019 DEM, using GIS cut/fill operations. The calculations revealed that approximately 1/3 of the total project length could be covered by 530K cubic-yards of fill material, which is on the lower end of the range of anticipated borrow fill. The project length is then split into three reaches of equal length and the cut/fill analysis is run again to confirm uniformity of fill requirements. By comparing volume requirements with the construction template (530K cyd or 59 cyd/ft), the equivalent design profile added berm width, after cross-shore equilibration, is determined to be 175 feet.

3.3.4 Longshore Diffusion – Alongshore Spreading Component

The Pelnard-Considere equation, or P-C equation, is solved analytically to determine the planform evolution of a beachfill.

(Pelnard – Considere, 1956) $$\frac{dy}{dt} \cong G\frac{d^2y}{dx^2}$$ *Eq. 6*

Where y is the cross-shore direction, x is the alongshore direction, and t is time. Longshore diffusivity, represented by parameter *G*, is calculated as follows:

$$G = \frac{2C' H_b^{5/2} \cos 2\theta_b}{(h_* + B)} \quad \textit{Eq. 7}$$

$$C' = \frac{K\sqrt{g/\delta_b}}{8(S-1)(1-p)} \quad \textit{Eq. 8}$$

Where H_b is the breaking wave height, θ_b is the breaking wave angle relative to shore normal, h_* is the depth of closure, B is the berm height, *K* is the sediment transportation coefficient, g is acceleration of gravity, δ_b is the breaking wave index, S is specific gravity of sand, and p is porosity of sand. The inner DOC ($h_* = 16ft$; see Section 3.4.2) is utilized, as it defines the littoral zone (Hallermeier, 1981; Brutsche, 2015).

There are multiple solutions to the Pelnard-Considere (P-C) equation, depending on the shape of fill, and the presence of groins or inlets. The rectangular beach fill solution was selected instead of the trapezoidal fill solution (despite the trapezoidal planform shape of the construction template) for simplicity and to remain conservative. The trapezoidal fill solution results in a reduction to end losses, hence the conservatism, and it complicates the process used to (1) add background erosion, and (2) correlate the P-C solution with background erosion to XY coordinates for GIS representation (see Section 3.4.5). Other solutions were considered, but ultimately eliminated under the assumption that the project area is located sufficiently far from groins and inlets, such that their impact is negligible on the beachfill evolution.

The solution for a rectangular beachfill project on a long straight beach is seen in Equation 9.

$$y(x,t) = \frac{Y}{2}\left\{ \begin{array}{l} erf\left[\frac{l}{4\sqrt{Gt}}\left(\frac{2x}{l}+1\right)\right] \\ -erf\left[\frac{l}{4\sqrt{Gt}}\left(\frac{2x}{l}-1\right)\right] \end{array} \right\} \quad \textit{Eq. 9}$$

Where *l* is the alongshore length of beach fill, *Y* is the cross-shore width, and *t* is time in years. The cross-shore added berm width, *Y*, of the design profile (*Y* = 175 ft) is used, rather than the construction template berm width, under the assumption that all cross-shore flux occurs immediately and prior to longshore diffusion (Work, 1997).

3.3.5 Results – Beach Fill Longevity / Berm Evolution – (explanation of results)

Results in Figure 18 and Figure 19 show the planform evolution of the beachfill Alternatives 2 & 3, respectively. The planform construction template is indicated by the tan polygon. Shoreline change projections, represented by the group of lines with violet to yellow color progression, show the estimated movement of the +4' (NAVD88) contour, projected annually from 2023 to 2048. The FWP analysis period is extended 10-years beyond the original FWOP period of analysis to accommodate the framework of the economic analysis and calculate FWP benefits that extend beyond the FWOP period of analysis. The shoreline change curves account for cross-shore equilibration of the construction template profile, statistically derived background erosion, and longshore diffusion of each beachfill alternative.

The one-line shoreline retreat results compare well with volumetric loss projections, indicating losses inside the original placement area (construction template) at over half of the original beach fill in year one, approximately 80% by year 5, and 100% loss between years 8 and 10. This is fairly consistent between each alternative, with minor differences due to varying background erosion rates. The results will inform the economic analysis, which will also account for benefits that result from longshore diffusion along the project area. Based on these results, a 5-year (maximum) renourishment period is recommended, which coincides with

20% retained fill. This recommended nourishment interval does not address episodic erosion due to storms in between nourishment intervals.

Further, and arguably more importantly, continued monitoring (survey) is strongly recommended. Analytical methods utilized for the purposes of estimating longshore diffusivity and cross-shore equilibration are limited in real-world applications. While statistically derived background erosion rates mitigate some uncertainty inherent in the analytical solutions, analytical projections which form the basis of design here should not be considered representative of actual shoreline evolution. Additional discussion on assumptions and recommendations is provided in Section 4.2.

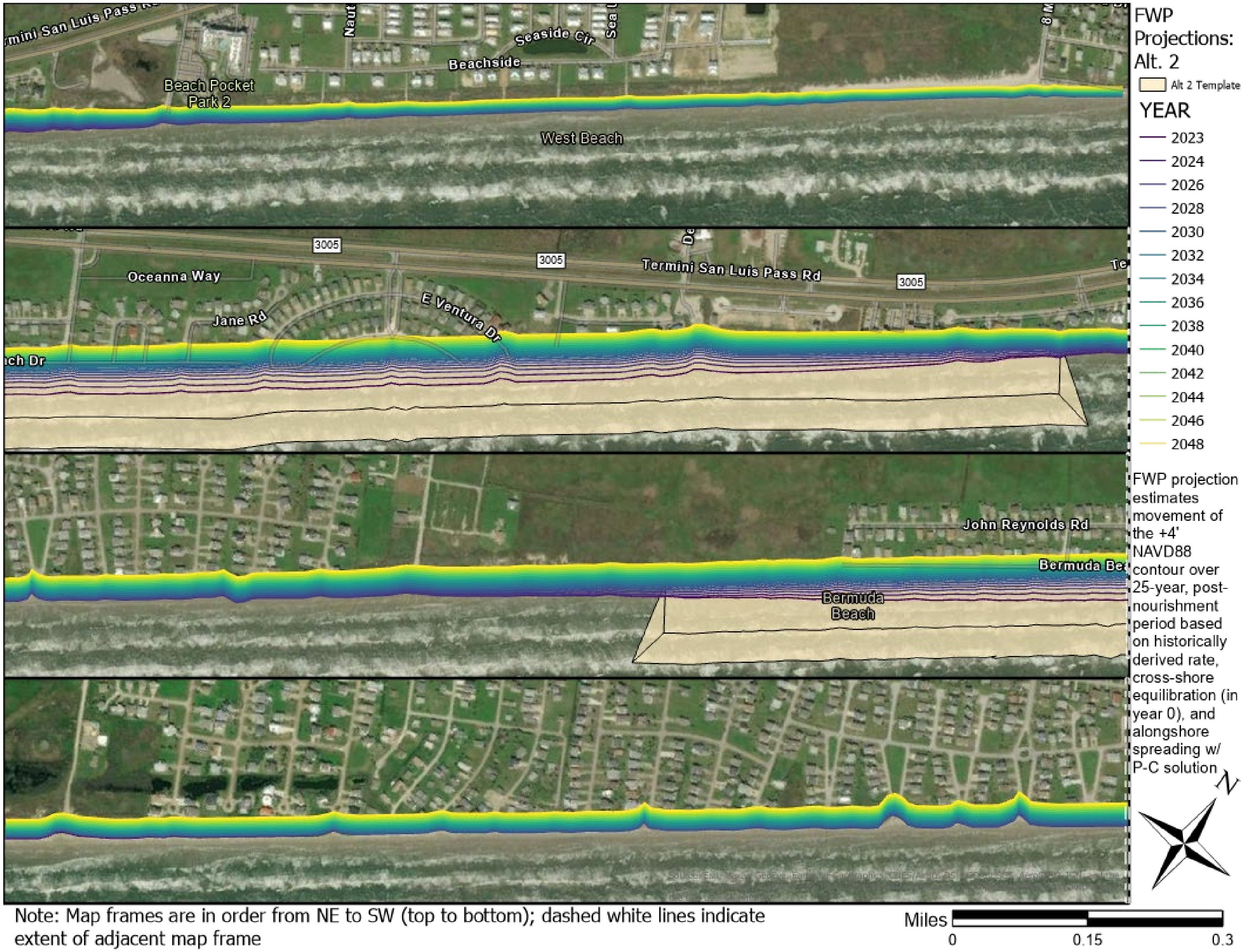


Figure 18: FWP Alternative 2 results; construction template polygon & projected shoreline change shown with violet to yellow line group

Note: Map frames are in order from NE to SW (top to bottom); dashed white lines indicate extent of adjacent map frame

Figure 19:FWP Alternative 3 results construction template polygon & projected shoreline change shown with violet to yellow line group

3.4 FWP Alternatives 4 & 5 – Seawall Extension

Alternatives 4 & 5 call for extension of the seawall from the existing southwestern termination point. The alternatives are differentiated only by the total extended length. Alternative 5 extends the seawall approximately 5.8 miles to the southwestern extent of the project area, while Alternative 4 extends 3.3 miles to the approximate midway point. A plan view of Alternative 4 & 5 (with overlapping footprints) is provided in Figure 20.

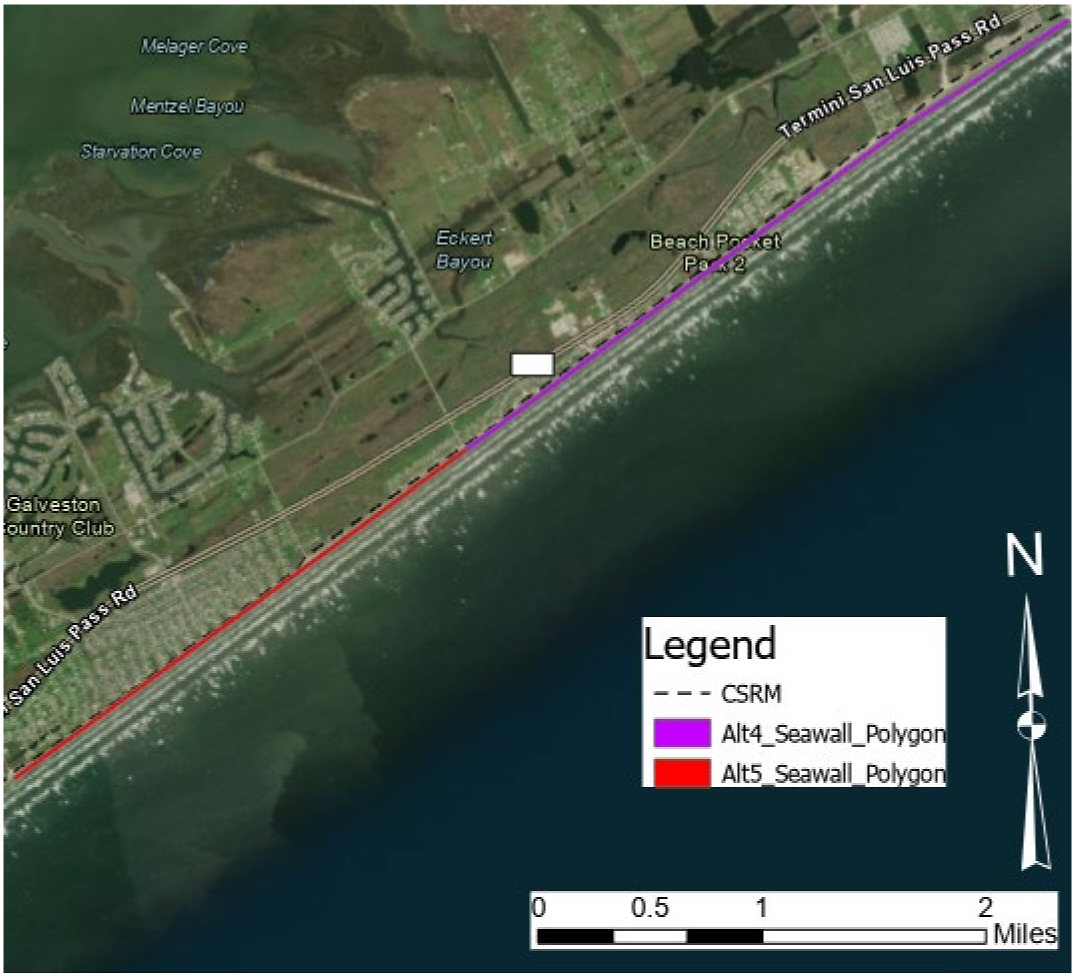


Figure 20: Plan view of Alternative 4 & 5 concepts

To evaluate feasibility of these alternatives in detail would require a large-scale, multidisciplinary, and multifaceted analyses, which is unwarranted based on the project scope. Instead, a brief qualitative overview of the design requirements and considerations is provided to screen the alternatives.

As-built drawings developed by the USACE Galveston District in 2009 show new construction and repairs made to the seawall following damages that were incurred by Hurricane Ike in 2008. On the west end, new construction included the replacement of the western ~270 ft span and a ~200 ft landward return with cutoff walls (steel sheet piling) to mitigate scour damage from flanking. A plan view and cross-sectional view of the new seawall construction are provided in Figure 21 and Figure 22.

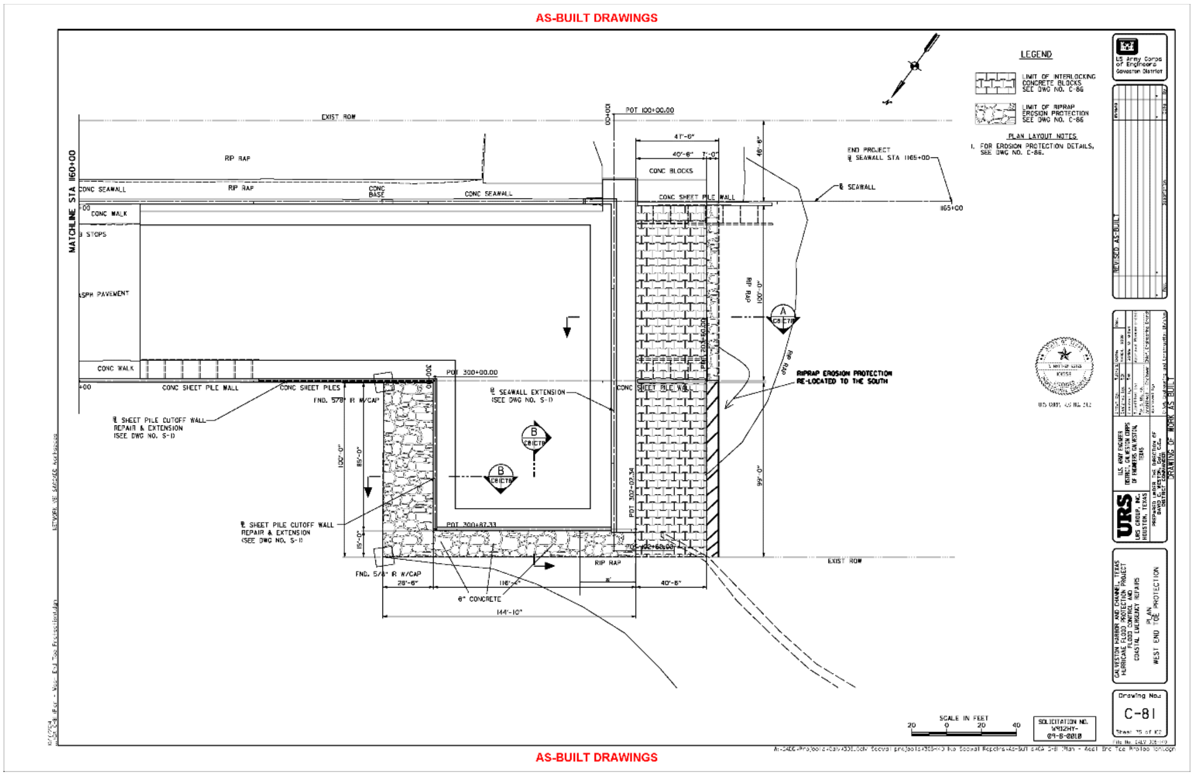


Figure 21: West end seawall construction, plan view of toe protection (USACE-SWG, 2009)

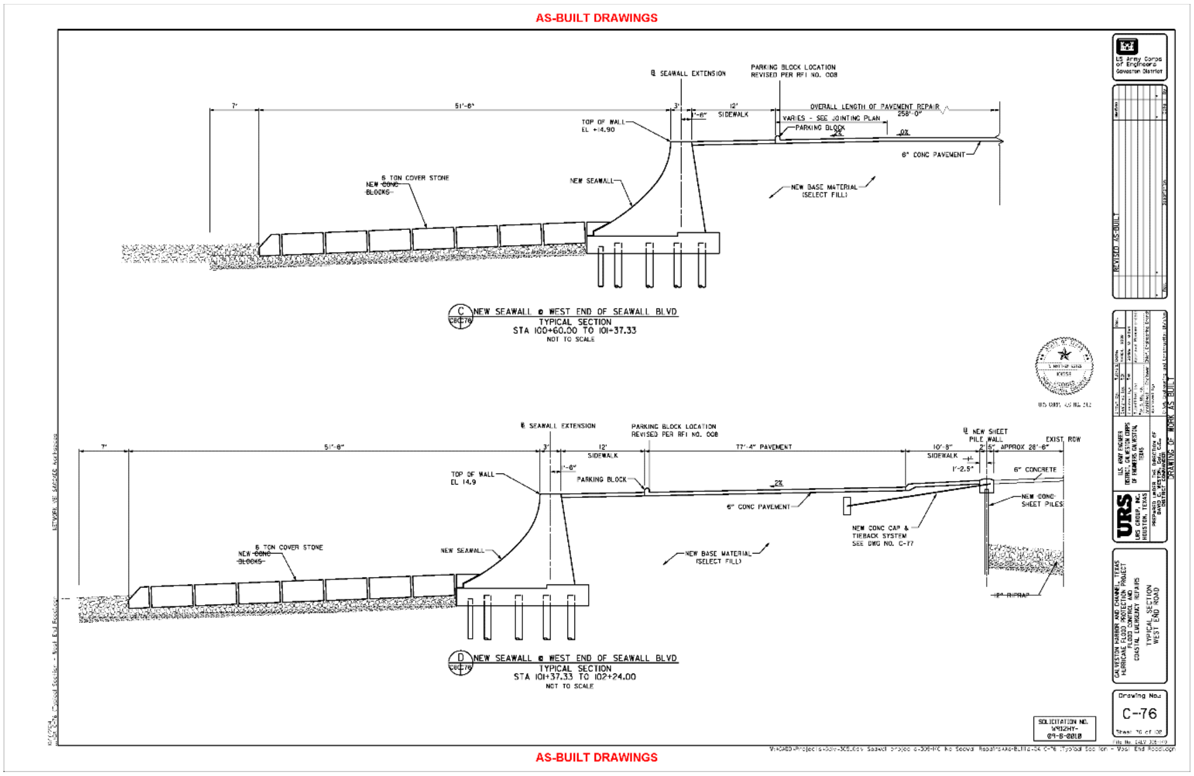


Figure 22: XS of new seawall construction on West End per March 2009 As-Built Drawings; Drawing No. C-76 (USACE-SWG 2009)

The drawings indicate a top of seawall elevation at +14.9 ft (NAVD88), with a total pavement top width at ~100 ft (as depicted by Figure 20 polygons). In ArcGIS the Surface Volume tool is used to estimate the fill volume required by each alternative, as defined by their respective polygon boundaries, the +14.9 ft elevation plane and the 2019 DEM. According to GIS calculations, Alternative 4 and 5 require 1.46M and 0.86M cubic yards of fill, respectively. This does not account for the fill that would be required both landward and seaward of the prospective alternatives, nor does it account for the actual seawall concrete volume or other materials.

The required fill exceeds the anticipated volume of borrow fill, which may alone be enough to consider the prospective alternatives infeasible. However, even if the significant environmental and economic challenges were to be addressed, the seawall extension alternatives are still faced with a host of challenges that would be impractical to overcome, as summarized in the bulleted list below:

- **Scour** – If waves can reach the seawall, its presence will induce scour, exacerbating local erosion. Ultimately large armor stone (and associated maintenance) will be required to prevent the wall from being undermined.

- **Fill** – In addition to the previously mentioned considerations, a seawall alternative does not alleviate the need for beach nourishments. On the contrary, it increases reliance/dependence on continued nourishments and cuts off a cross-shore sediment source. The longevity of a seawall alternative is dependent upon a seaward beach, which acts as a buffer limiting the frequency and duration of exposure to waves. In other words, alternative 4/5 can not be considered without considerably more beach fill than what is anticipated for alternative 2/3.

- **Public perception** – Residential areas behind the seawall would benefit from additional protection against storm surge and coastal erosion, relative to other alternatives. However, these areas may also face beach access challenges, a diminished view of the Gulf, and a reduction to the overall beach width if regular nourishments are not conducted. Further, adjacent shorelines to the southwest would likely see accelerated erosion as a result.

The project area is at higher risk of damages from storm surge than most of the island. As such, it is not unreasonable to consider more robust solutions to potentially mitigate that risk. However, this would need to be part of a larger study effort that lends consideration to comparable alternatives for that level of risk mitigation. For example, an offshore breakwater (or series of breakwaters) is a more economically comparable hardened structure that alleviates some of the drawbacks of a seawall. Alternatively, a large-scale dune restoration & beach nourishment project, such as the Coastal Texas Feasibility Study TSP (tentatively selected plan), offers a soft-structure alternative that may suit the needs of this region more appropriately when compared to Alternatives 4 & 5.

4 Recommendations

The following is a summarization of the alternatives reviewed for consideration with recommendations for each alternative. This is followed by a discussion highlighting areas of uncertainty within this study, and a review of future work recommendations that could be implemented to improve/expand upon the existing analysis.

4.1 Alternatives Summary and Recommendations:

Alternative 1 (FWOP): Alternative 1 should be avoided, as it offers no beneficial use of materials dredged from the ship channel. Instead, the materials would be placed in a designated offshore placement area, where they would be more difficult to access for later use. Given the limited availability of naturally sourced sand, it is important to utilize any locally sourced (dredged) beach-quality borrow fill for nourishment purposes. Beneficial use of the material does result in an incremental cost increase relative to offshore placement. However, benefits are provided at a lower cost than pumping sand from offshore sources which has been proposed for large-scale nourishment projects such as the Coastal Texas Protection and Restoration Feasibility Study (USACE, 2020).

TSP - Alternatives 2 & 3 (FWP – Beach Nourishment): Alternatives 2 & 3 offer the best solution for beneficial use of the dredged material. The economic analysis details the benefits associated with each alternative, which will ultimately decide the tentatively selected plan (TSP) for the purposes of this study effort.

Alternatives 4 & 5 (FWP – Seawall Extension): The seawall extension alternative is not considered feasible within the project constraints.

4.2 Assumptions & Future Work Recommendations

The following will review assumptions to highlight areas of uncertainty and offer future work recommendations to improve upon the existing analysis.

Available Data:

- **Sediment Samples**: Sediment grain size samples, of native beach and borrow fill, are spatially and temporally limited, resulting in a medium-high level of uncertainty related to borrow fill sediment parameters and a medium level related to native beach sediment parameters.
    - **Assumptions**: Native beach estimates are based on comparison between theoretically derived & sampled D_{50} estimates. Borrow fill estimates are based on 2016 Galveston entrance (ship) channel samples, which indicates significant variation in the overall gradation/distribution. A conservative approach is utilized, eliminating the coarsest outlier, then attempting to weight the remaining samples spatially based on the indicated channel station.
    - **Significance**: Sediment texture/size is key to the accuracy of beach equilibrium profile concepts and the development of sediment transportation estimates via analytical and/or numerical solutions. Overestimating grain size of borrow fill can result in unrealistic and less conservative design estimates related to fill longevity.
    - **Future work recommendations include**: (1) improved spatial and temporal resolution of borrow & native fill sampling, (2) improved documentation to map & compare D_{50} estimates over time, and (3) development of specific design guidance to develop weighted D_{50} estimates for borrow fill that account for spatial variation and volumetric composition of sampled texture.

- **Survey Data:** Survey is limited in the cross-shore direction, and "depth of closure" surveys from 2014 and 2016 to not extend to the calculated outer limit of the active profile.
    - **Assumptions**: The Hallermeier inner and outer DOC is calculated & averaged according to WIS data from two nearby stations (73070 & 73071), at 16 feet and 41 feet, respectively, however the calculated outer limit is outside the extent of available survey. The inner limit (16' depth) is used to calculate alongshore/lateral diffusion with the P-C solution. The outer DOC is limited by the overlap between available survey, which is ultimately defined by an approximate elevation of -25.5 feet (NAVD 88).
    - **Significance**: Since it is assumed that the D_{50} of borrow fill is greater than that of native beach material, beach equilibrium concepts yield intersecting profiles, which limits the significance of missing survey data, given that D_{50} assumptions are accurate. Further, the historical shoreline retreat rate estimates (ft/yr) are used to develop FWP projections that inform the economic analysis, which also mitigates the significance of the missing data. However, the total volume change (loss) over the entire active profile remains unknown, which ultimately yields a high level of uncertainty in regard to the (1) verification of the calculated outer DOC, and (2) calculated total volumetric loss rate over active profile.
    - **Future work recommendations**: (1) Improve/maximize the cross-shore extent of future survey work to capture the theoretical outer limit of the DOC. (2) Track the upcoming (2021) beach nourishment evolution with frequent topographic and bathymetric surveys.

FWOP Analysis:

- **Shoreline Change Rates**: The FWOP analysis utilizes historically derived shoreline change rates from 2014 – 2019 surveys to project future shoreline change.
    - **Assumptions**: Shoreline change between 2019 and 2038 will continue at a similar rate.

- **Significance**: The influence of storm events, nourishments, offshore morphology, sea level change, subsidence, and the resistance to erosion offered by the exposed material substrate are among a few of the considerations that may result in a net change to the rate of erosion.
- **Future work recommendations**: Shoreline change is not constant, as evidenced by year-to-year historic survey comparisons. It's not possible to predict year-to-year fluctuations or to account for all factors that contribute to historically observed changes. However, probabilistic models that are informed by, and calibrated to, measured data offer a significant reduction to the uncertainty associated with mid- to long-term projections. The collection and documentation of measured data has improved significantly in recent years, however there are still many missing pieces. In addition to previously suggested items (survey/sediment sampling improvements), the primary "missing piece" can be summarized as an improved network of gauges, buoys, and other (temporary or permanent) ocean measurement devices. The overall value of such an investment is difficult to overstate as it is capable of significantly improving the models that inform coastal design, strategic planning, and related construction. Ultimately, this is fundamental to making informed engineering decisions that improve the resilience of the sediment-starved Texas coastline against rising sea levels. While outside the purview of this project, a robust, inter-agency effort to improve coastal data collection is strongly recommended for future work.

FWP Analysis:

- **Alongshore spreading:** Longshore diffusivity (spreading) is estimated analytically, according to the one-line (+4' contour) P-C (Pelnard-Considere) solution (see Section 3.3.4).
  - **Assumptions:** An infinitely long shoreline with a cross-shore profile that always remains in equilibrium (no cross-shore flux) is assumed, therefore cross-shore spreading losses must be accounted for separately. Further assumptions include, no currents, constant wave direction, small angle of wave incidence, and a linear relation between incidence angle and littoral drift (Kim, 2020).
  - **Significance:** The P-C solution is only used to account for alongshore spreading. Several of the above assumptions are addressed through use of historically derived erosion rates and beach equilibrium profile concepts to modify projected shoreline change. Still, alongshore spreading is applied uniformly throughout the project area, regardless of the net (long-term) littoral drift direction. This is not likely to be reflected in reality. However, it is somewhat dependent on seasonal timing of placement. If nourishment is placed in the spring/summer it will tend to spread northeast initially, according to seasonal trends.
  - **Future work recommendations:** The one-line, numerical model GenCade could be employed to improve the distribution/shape of alongshore spreading results. This would be a low effort endeavor. However, the degree of value added to the project should be tempered by the fact that GenCade is similarly governed by a modified version of the P-C equation.

- **Cross-Shore Equilibrium:** Cross-shore equilibrium profile theory concepts are used to estimate cross-shore flux/spreading of the placed beach fill material (see Section 3.3.3).

- **Assumptions:** Shoreface equilibrium profile theory is a useful design concept, however it is inherently problematic due to a number of assumptions and oversimplifications, including, but not limited to: (1) the depth of closure oversimplification, (2) sediment-rich shoreface assumption, and (3) assumption that all sediment movement is driven by wave orbital motion, acting on the shoreface. Additionally, the use of a single sediment parameter to describe the theoretical equilibrium profile is an oversimplification that is compounded by lacking sediment data. Further, it is assumed that conditions/storm events that occur over the project life will be similar to the surveyed period from which shoreline change rates were derived.
- **Significance:** Compounding uncertainty associated with the above assumptions is somewhat mitigated by the application of statistically derived shoreline change projections. Reliance on theoretical concepts is lessened. However, there is statistical uncertainty inherent in the probabilistic nature of predicting future storm events, which increases with the total duration of projections.
- **Future work recommendations:** Beachfill performance could be simulated in a cross-shore model like Beach-fx or CSHORE. These models may add some value, however they are limited by some of the same assumptions and by the availability of statistically derived data for calibration purposes. The utility of such models is limited to relatively short simulation periods, and the modeled results are only as good as the calibration and user-specified inputs.

Conclusion/Summary:

During pre-construction, engineering and design (PED) phase of the project, modeling recommendations may provide some value. However, this is limited by the availability of statistical data for calibration and user-defined inputs. This gap can be addressed now by more frequent monitoring (survey) of upcoming beach fill projects, including the 2021 project that is slated to occur over the summer. This, and improved sediment sampling, would provide valuable data that could aid in the improvement of related estimates and models during PED.

5 References

i. Atkins North America, Inc., 2014, 2015, & 2017. Galveston Island Wading Depth Surveys on June 2014, May 2015, & Sep. 2017 for City of Galveston, Galveston Park Board of Trustees, and City of Jamaica Beach.

ii. Birkemeier, W.A., 1985. Field Data on Seaward Limit of Profile Change. J. of Waterway, Port, Coastal and Ocean Engineering, 111(3), 598-602.

iii. Brutsché, K.E., Rosati, J., and Pollock, C.E., 2014. *Calculating Depth of Closure Using WIS Hindcast Data*. ERDC/CHL CHETN-VI-XX. Vicksburg, MS: U.S. Army Engineer Research and Development Center

iv. Hallermeier, R.J., 1978. *Uses for a calculated limit depth to beach erosion.* Proceedings, Coastal Engineering 1978, 1493-1512.

v. Hallermeier, R.J., 1981. A Profile Zonation for Seasonal Sand Beaches from Wave Climate. Coastal Engineering, 4, 253-277.

vi. HDR, 2003. Galveston Beach & Surf Sediment Sample Data, Principal Investigator: Christopher A. Rock . 555 N. Carancahua Suite 1650, Corpus Christi, TX 78478. Collected by HDR/Shiner Moseley and Associates, Inc. Compiled by Texas Governement Land Office (TxGLO) on Texas Sediment Geodatabase, Accessed via: https://cgis.glo.texas.gov/txsed/index.html

vii. Johnson, Donald R., 2008. Ocean Surface Current Climatology in the Northern Gulf of Mexico. Gulf Coast Research Laboratory. Ocean Springs, Mississippi

viii. Kim, Sung-Chan, Richard Styles, Julie Rosati, Yan Ding, and Rusty Permenter., 2020. Comparison of GenCade, Pelnard-Considere, and LITPACK. ERDC/CHL CHETN-IV-124. Vicksburg, MS: US Army Engineer Research and Development Center. http://dx.doi.org/10.21079/11681/35933.

ix. King, David B., 2007. *Wave and Beach Processes Modeling for Sabine Pass to Galveston Bay, Texas, Shoreline Erosion Feasibility Study*. Technical Report CHL-07-6. Vicksburg, MS: U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory.

x. Melby, Jeffrey A., N.C. Nadal-Caraballo and N. Kobayashi, 2012. *Wave Runup Prediction for Flood Mapping.* Coastal Engineering

xi. NOAA, 2019. National Oceanic and Atmospheric Administration (NOAA) Digital Coast Data Access Viewer. Custom processing of "2018 - 2019 NOAA NGS Topobathy Lidar Post Hurricane Harvey: Galveston to Corpus Christi, TX". Charleston, SC: NOAA Office for Coastal Management. Accessed Apr 28, 2021 at https://coast.noaa.gov/dataviewer.

xii. NOAA. (2021). *Center for Operational Oceanographic Products and Services: Galveston Pier 21 Gauge, Station ID: 8771450.* Retrieved from NOAA Tides and Currents: https://tidesandcurrents.noaa.gov/waterlevels.html?id=8771450

xiii. OCM Partners, 2021: 2016 USACE NCMP Topobathy Lidar: Gulf Coast (AL, FL, MS, TX) from 2010-06-15 to 2010-08-15. NOAA National Centers for Environmental Information, https://www.fisheries.noaa.gov/inport/item/49738.

xiv. Paine, Jeffrey G., T. Caudle and J. Andrews, 2013. *Shoreline, Beach, and Dune Morphodynamics, Texas Gulf Coast*. Bureau of Economic Geology (BEG). Jackson School of Geosciences, The University of Texas at Austin, Austin, Texas.

xv. Paine, Jeffrey G., T.L. Caudle and J.R. Andrews, 2014. *Shoreline Movement Along The Texas Gulf Coast, 1930's to 2012*. Bureau of Economic Geology (BEG). Jackson School of Geosciences, The University of Texas at Austin, Austin, Texas.

xvi. Paine, Jeffrey G., and T.L. Caudle, 2020. *Shoreline Movement Along The Texas Gulf Coast, 1930's to 2019*. Bureau of Economic Geology (BEG). Jackson School of Geosciences, The University of Texas at Austin, Austin, Texas.

xvii. Pilkey, O. H., Young, R. S., Riggs, S. R., Smith, A. W. S., Wu, H., and Pilkey, W. D., 1993. "The Concept of Shoreface Profile of Equilibrium: A Critical Review," Journal of Coastal Research, Vol 9, No. 1, pp 225-278.

xviii. Strategic Mapping Program (StratMap), 2018. Upper Coast Lidar, 2018-03-22. Web. 2021-05-05

xix. TAMUG, 2005. Galveston Nearshore Sediment Sample Data, Principal Investigator: Dr. Timothy M. Dellapennna, P.O. Box 1675 Galveston, TX 77553. Compiled by Texas Governement Land Office (TxGLO) on Texas Sediment Geodatabase, Accessed via: https://cgis.glo.texas.gov/txsed/index.html

xx. TAMUG Coastal Geology Laboratory, 2006. Survey of Upper Texas Coast from High Island to northern Freeport Jetty. Texas A&M University in Galveston

xxi. USACE, 2008. Coastal Engineering Manual. EM 1110-2-1100. Part III-V

xxii. USACE, 2019. Engineering Regulation No. 1100-2-8162: Global Changes: Incorporating Sea Level Change in Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers. Washington, DC: Department of the Army.

xxiii. USACE, 2010. *US Army Corps of Engineers Wave Information Studies Project Documentation.* Coastal and Hydraulics Laboratory, Engineer Research and Development Center. December 2010.

xxiv. USACE, 2020. Appendix D: Engineering Design, Cost Estimates, and Cost Risk Analysis for the Coastal Texas Protection and Restoration Feasibility Study. October, 2020. U.S. Army Corps of Engineers, Southwestern Division – Galveston District

xxv. Work, Paul A. & W.E. Rogers, 1997. Wave transformation for beach nourishment projects. Elsevier Science B.V. Coastal Engineering 32 (1997) 1-18. In association with (a) Clemson University, Department of Civil Engineering, 110 Lowry Hall, Clemson, SC 29634-0911, USA and (b) Planning Systems Inc., MSAAP Bldg. 9121, Stennis Space Center, MS 39529, USA

6 Appendix A: Preliminary Analysis of a Nourishment Location East of the Study Area (Alternative 6)

According to the Economic Analysis, Alternative 2 yields the highest BCR (Benefit to Cost Ratio) within the project study area. Further, the NFS (Non-Federal Sponsors) expressed strong preference towards Alternative 2 based on existing conditions and a qualitative assessment of at-risk structures within the study area. For these reasons, Alternative 2 is ultimately designated as the Tentatively Selected Plan (TSP). However, the location of Alternative 2, and of the project area in general, is further west of the navigation channel than any past BUDM (Beneficial Use of Dredged Material) contracts within the region. Past BUDM placements have not ventured west of the Seawall, and the relative increase in sail distance required by Alt. 2 (approximately 4-miles, one-way) gave rise to concerns from Navigation and Operations. Chief amongst these concerns was the potential implications to the cost and duration of the Federal navigation channel dredge-maintenance contract. The increased risk warranted review of an additional BUDM placement location on Babe's Beach, east of the project area, where BUDM has been placed in previous contracts. This alternative is referred to as Alternative 6, or Alt. 6. The proposed Alt. 6 construction template can be seen in Figure 23, along with the study area and Alt. 2 template for context.

Figure 23: Alternative 6 construction/nourishment template location relative to Alt. 2 and the study area

A preliminary analysis of Alt. 6 is conducted to review potential benefits to the study area relative to Alt. 1 (FWOP) and Alt. 2 (the existing TSP). The analysis tracks shoreline movement rates within the study area over a 25-year period using the same methodology employed for Alt. 2 and Alt. 3. The P-C equation is used to quantify Alt. 6 impacts to shoreline movement rates within the study area that result from longshore diffusion/spreading of the material. Historically derived shoreline movement (background erosion) rates within the study area are maintained, and cross-shore equilibration/spreading losses are held constant between Alt. 2 and Alt. 6. Further, potential impacts from the presence of the Seawall are neglected.

The results from the analysis indicate that anticipated benefits (within the study area) from Alt. 6 are marginal in comparison to Alt. 2, particularly at high priority regions of the study shoreline. Figure 24 shows the predicted shoreline position of Alt. 2, relative to Alt. 6 (Alt. 2 minus Alt. 6), revealing an advanced seaward position relative to Alt. 6 except for the eastern 500-ft of vacant land.

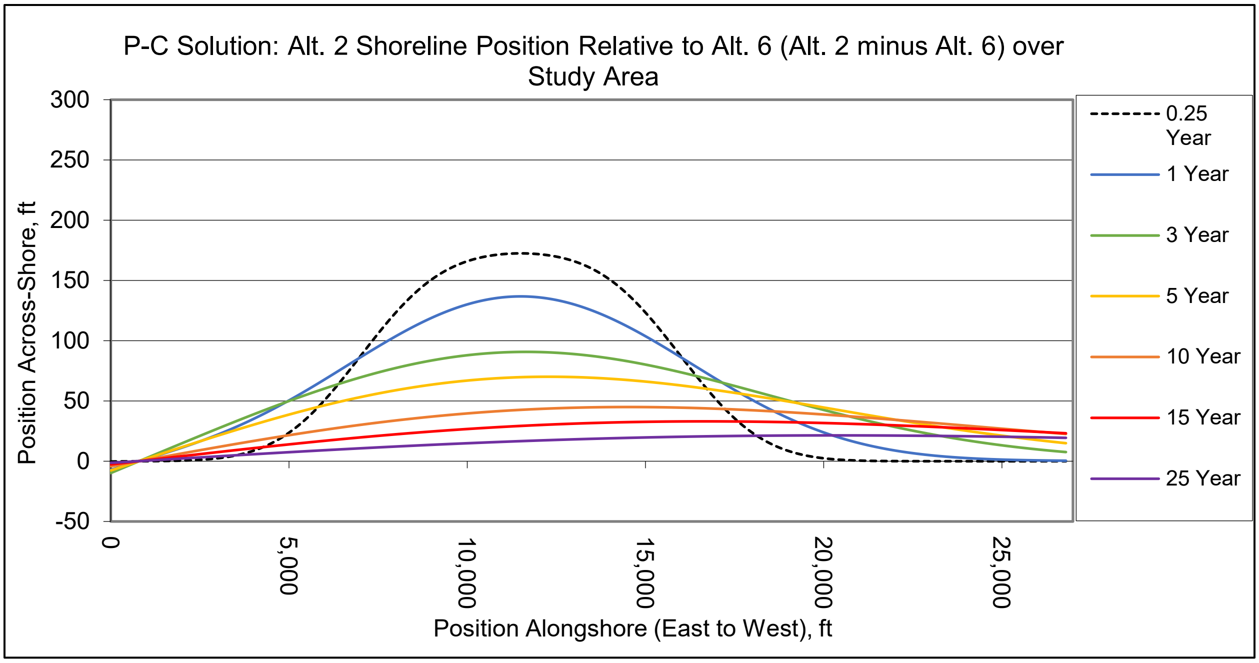


Figure 24: Predicted shoreline position of the study area for Alt. 2, relative to Alt. 6

Figure 25 shows (a) Alt. 2 and (b) Alt. 6 impacts to the study shoreline position relative to Alt. 1, the FWOP (Future Without Project) condition. And the predicted change in the study shoreline area (acres) over time is provided in Figure 26. The results indicate that beneficial impacts from Alt. 6 are primarily confined to the eastern 5,000-ft of the study shoreline. However, this region is considered lower-priority due primarily to the relative proximity of structures to the Gulf of Mexico, which tend to be newer homes that are setback further from the coast. To the west, delayed benefits observed, however they are minor by comparison to Alt. 2. Further, delayed benefits are inherently subject to a higher degree of uncertainty, which increases with time.

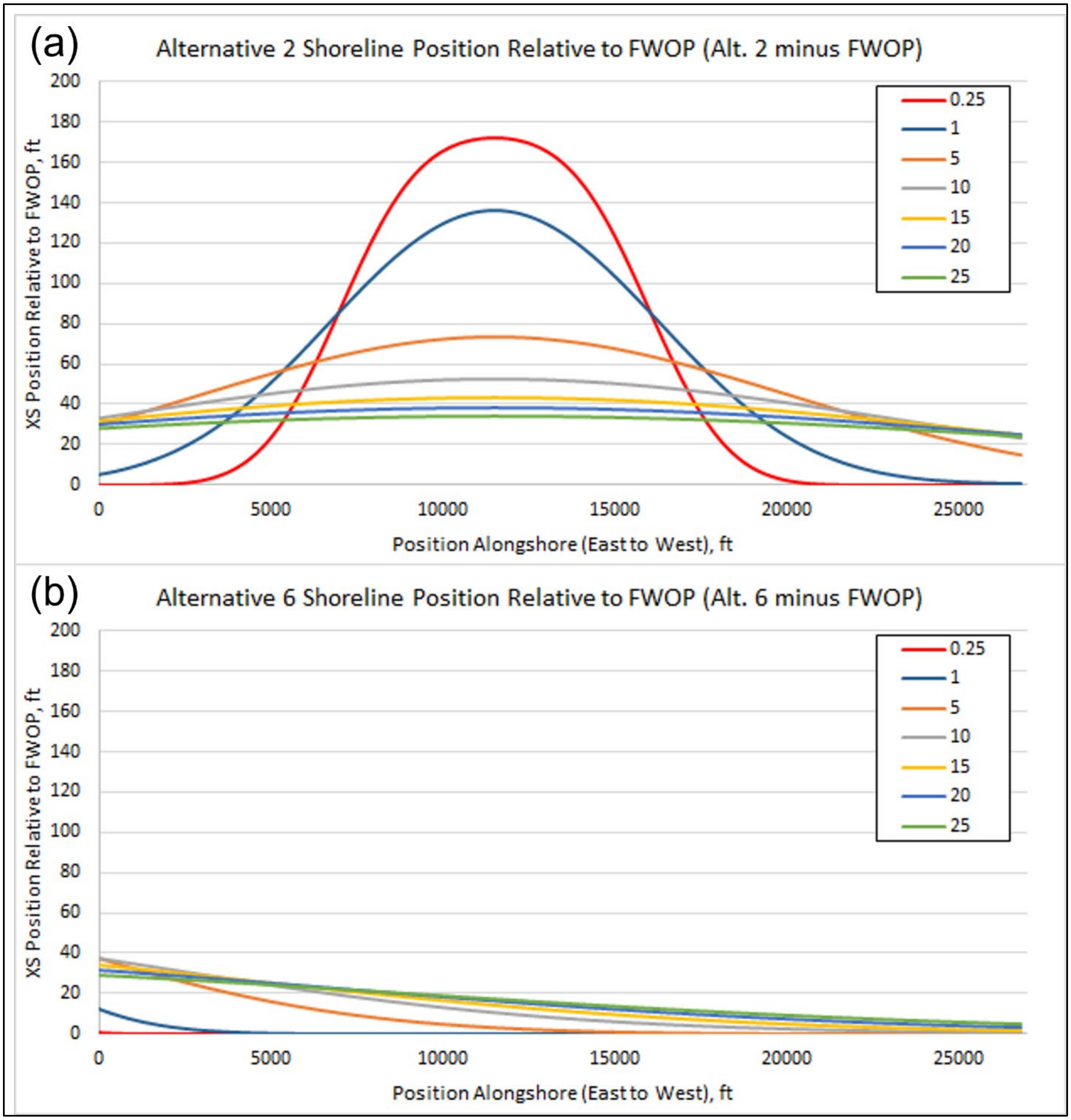


Figure 25: Shoreline position of (a) Alternative 2, and (b) Alternative 6, relative to the Future Without Project condition

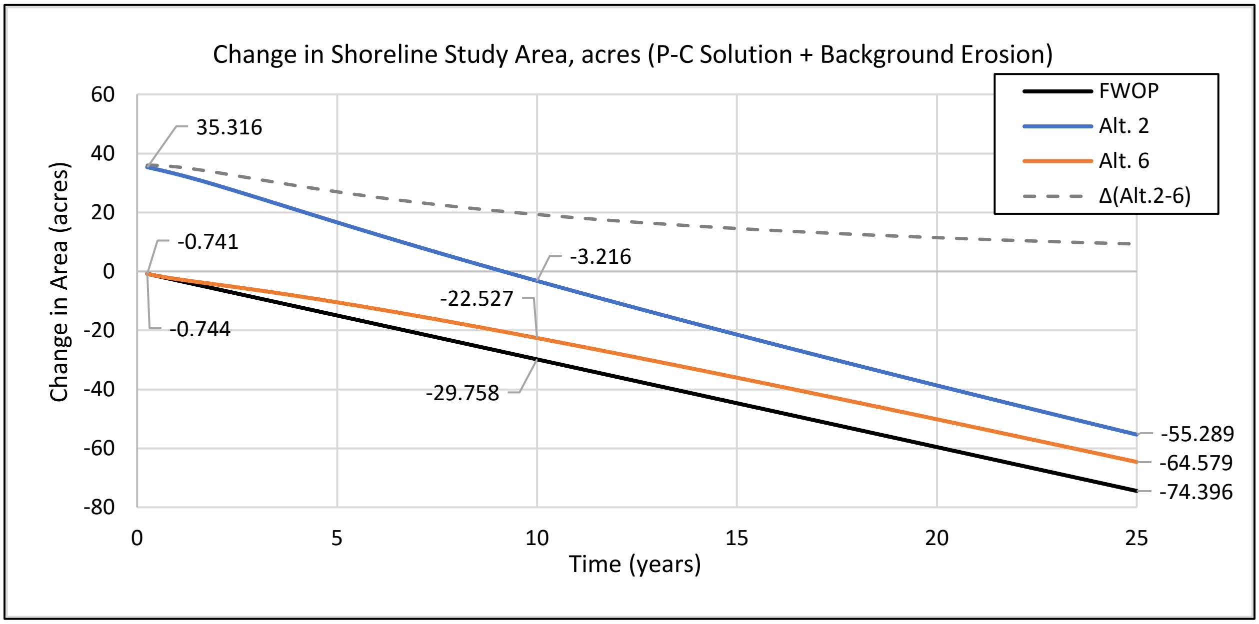


Figure 26: Change in study shoreline area (acres) between alternatives over 25-year period of analysis

The greatest benefits from Alt. 6 are seen in the eastern 20% of the study area, where most of the assets are setback far enough from the shoreline so as not to trigger damages in the economic analysis, even in the FWOP condition. In the western 80% of the study area, beneficial impacts from Alt. 6 are too late to offset damages that are triggered at high-priority homes within the first few years of the analysis, and they are too small to make a difference of more than 2-3 years relative to the FWOP condition. Due to delayed and substantially reduced beneficial impacts in regions with at-risk assets and considering the time-value of money, it is highly unlikely that Alt. 6 will yield a BCR > 1. Based on the results of the preliminary analysis and input from the Non-Federal Sponsors (NFS), Alternative 6 is abandoned without additional consideration.

7 Appendix B: Response to Climate Preparedness and Resilience Community of Practice (CPR CoP) Climate Assessment Agency Technical Review (ATR) Comments

The following update (09/22/2022) is provided to address CPR CoP related comments that were issued during the ATR review:

Comment 1:
High Curve Analysis
Concern: *Appendix A, Page 8, Section 2.1 Tidal Datums and Sea Level Change 2nd paragraph.*
Basis: *Incorporating Sea Level Change In Civil Works Programs ER 1100-2-8162 Section 6D*
Significance: *Medium. Need to analyze the high curve not just the medium curve.*
Action: *Compare the high alternative against the medium scenario as this approach avoids focusing on the medium alternative that seems to be the best under a specific SLC scenario. Need to include an inundation map or extent of upstream impacts of RSLC for the high sea level scenario at the end of the project's lifecycle.*

Response
The application of a high SLC rate is anticipated to increase projected shoreline retreat uniformly across FWOP (Future Without Project) and FWP (Future With Project) conditions, relative to the medium (or low) SLC scenario. Therefore, the difference in damages/benefits incurred between FWOP and FWP conditions would remain constant between various SLC scenarios, yielding no foreseeable change to the BCR. Similarly, risk to the project, environment or public would not vary between FWOP and FWP conditions as a result of a different SLC scenario. The project is intended to delay shoreline retreat, not to reduce the rate of erosion or to mitigate flood risk.

Comment 2:
RSLC Risk Discussion
Concern: *Appendix A, Page 8, Section 2.1 Tidal Datums and Sea Level Change 2nd paragraph.*
Basis: *Incorporating Sea Level Change In Civil Works Programs ER 1100-2-8162 Section 6D*
Significance: *High. Missing discussion of risk associated with lack of data or modeling.*
Action: *Discuss the risks associated with lack of data or modeling. Discuss the critical elevations for project non-performance and stability with thresholds shown on cross-section and plan view illustrations for representative project elements.*

Response
See Section 3.3.1 "Design Berm Considerations" for discussion on design berm elevation considerations. The berm elevation and landward edge of the nourishment template is constrained by the CSRM line, which defines the allowable construction zone. The project calls for a one-time placement of available sand to delay ongoing erosion. Based on an analysis of available survey data, the volume of sand required by the template is consistent throughout the study area, at ~59 cubic-yards per linear foot alongshore. As a result, there are no design or O&M (operations and maintenance) measures that could be implemented to minimize adverse consequences or maximize beneficial effects as they relate to SLC. The alongshore location of the template was ultimately determined by weighing NFS input and results from the economic analysis.

Comment 3:
5. Adaptive Management Discussion
Concern: *Appendix A, Page 8, Section 2.1 Tidal Datums and Sea Level Change 2nd paragraph.*
Basis: *Incorporating Sea Level Change In Civil Works Programs ER 1100-2-8162 Section 6D*

Significance: *Medium.*
Action: *The report should identify alternative actions that will need to be taken or quantify expected impacts and system responses if significant future risk of failure or non-performance exists.*

Response
See response to previous comments (above). Based on project constraints and objectives, no foreseeable adaptive management measures exist that would mitigate the risk of failure or nonperformance of the project.

Appendix B – Costs

Galveston Island Coastal Erosion, City of Galveston, Galveston County, Texas

Section 204

Final Integrated Detailed Project Report and Environmental Assessment

February 2023

US Army Corps of Engineers
Galveston District

(NOTE: This page intentionally left blank.)

Table of Contents

List of Tables

List of Acronyms

ARA – Abbreviated Risk Analysis
CAP – Continuing Authorities Program
CEDEP – Cost Engineering Dredge Estimating Program
CESWG – Corps of Engineers Galveston District
CM – Construction Management
FWOP – Future with out Project (Federal Base Plan)
H&H – Hydraulics and Hydrology
MII – Micro-Computer Aided Cost Estimating System, Second Generation
NED – National Economic Development
O&M – Operations and Maintenance
PDT – Project Delivery Team
PED – Planning, Engineering, and Design
PM – Project Manager
TPCS – Total Project Cost Summary

461161 – Galveston Island Coastal Erosion (CAP SEC 204)
October 2021 Price Levels

This study focuses on beneficial use of dredged material for beach nourishment on the west end of Galveston Island. Two alternative placement areas were considered. Both extend for 1.7 miles and are offset from each other by approximately 0.5 miles.

Class 4 cost estimates and an Abbreviated Risk Analysis (ARA) were developed for the alternatives. Costs include a Future With Out Project (FWOP) alternative so that the incremental costs above the FWOP state could be found for the other alternatives.

Alternative 2 was selected as the plan with the greatest benefit to cost ratio. Alternative 2 calls for dredge material to be brought to the west end of Galveston Island by a hopper dredge with pumpout capabilities for beach placement beginning at Sunbather Lane and extending 1.7 miles west.

A class 3 cost estimate and an ARA were developed for Alternative 2. The ARA resulted in a 26% contingency, which the PDT deemed as reasonable for this project. This contingency is applied to all costs except Real Estate.

The PDT developed, quality controlled, and verified quantities. The estimate was organized in accordance with the work breakdown structure using the following codes of account.

ACCOUNT CODE 01 - LANDS AND DAMAGES: The Galveston District Real Estate Division developed costs and contingency for Lands and Damages.

ACCOUNT CODE 12 – NAVIGATION PORTS AND HARBORS: H&H Branch provided the quantities associated with this account. It was assumed that the dredge material would come from the Galveston Entrance Channel using traditional dredging methods for the area. The dredging cost was developed using a CEDEP and based on standard operating practices for the Galveston District.

ACCOUNT CODE 30 – PLANNING, ENGINEERING, AND DESIGN: The cost for this account code was developed using a percentage of the construction work and in coordination with the PM/PDT.

ACCOUNT CODE 31 - CONSTRUCTION MANAGEMENT: The cost for this account code was developed using a percentage of the construction work and in coordination with the PM/PDT.

The construction schedule was estimated given CEDEP values for dredging time as well as prior projects of similar scope with regards to beach nourishment. The resulting calendars (Tables 1 and 2) show the resulting project length of four months and the construction schedule estimate. The four months includes 2 months of mobilization and dredging of the ship channel, followed by an additional 2 months of pumping, shaping material, and closeout.
Lastly, the Total Project Cost Summary, attached at the end of the appendix, gives the total cost for a fully funded project. This includes contingency and escalation/inflation before and during project construction. The total project cost is $23,061,000. Subtracting the cost of the Federal Standard (Base Plan - $7,946,000), which will be funded by Operations and Maintenance funds, the final bottom line total for a fully funded project is **$15,115,000**.

Table 1

Construction Calendar

--- NEW WORK ---														
P2-461161 - Galveston Island Coastal Erosion (CAP Sec 204) - NED Plan														
Feasibility Study														
October 2021 Price Levels														
VISUAL CALENDAR														
			FY 2024 - YEAR 1											
NO.	DESCRIPTION	DURATION	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
			1	2	3	4	5	6	7	8	9	10	11	12
CONT 1	Dredging													

Table 2

Contract Calendar

--- NEW WORK ---
P2-461161 - Galveston Island Coastal Erosion (CAP Sec 204) - NED Plan
Feasibility Study
October 2021 Price Levels
CONTRACT CALENDAR

CONTRACT	DESCRIPTION	DURATION (month)	DESIGN MIDPOINT	START DATE	MIDPOINT	END DATE
1	Dredging	4	Apr-24 (2024Q3)	Oct-24 (2025Q1)	Nov-24 (2025Q1)	Jan-25 (2025Q2)

Galveston Beach Nourishment

Estimated by	Mason McGown
Designed by	CESWG-ECE-P
Prepared by	U.S. Army Corps of Engineers - Galveston District
Preparation Date	10/29/2021
Effective Date of Pricing	10/1/2021
Estimated Construction Time	30 Days

Description	Quantity	UOM	ProjectCost
Project Cost Summary Report			**5,602,105.00**
Contract 1	**1**	**JOB**	**5,602,105.00**
12 Navigation, Ports, and Harbors	**1**	**JOB**	**5,602,105.00**
0001 Mobilization and Demobilization	**1**	**JOB**	**2,830,205.00**
0002 Dredging	**530,000**	**CY**	**2,771,900.00**

Galveston Beach Nourishment

Estimated by	Mason McGown
Designed by	CESWG-ECE-P
Prepared by	U.S. Army Corps of Engineers - Galveston District
Preparation Date	10/29/2021
Effective Date of Pricing	10/1/2021
Estimated Construction Time	120 Days

Description	Quantity	UOM	ProjectCost
Project Cost Summary Report			**14,401,251.36**
Contract 1	**1**	**JOB**	**14,401,251.36**
12 Navigation, Ports, and Harbors	**1**	**JOB**	**14,401,251.36**
0001 Mobilization and Demobilization	**1**	**JOB**	**5,528,456.00**
0002 Pipeline Management & Beach Shaping	**1**	**JOB**	**1,690,328.36**
02 Beach Shaping	**376**	**HR**	**766,507.24**
03 Floating Pipeline Management	**1**	**JOB**	**86,740.52**
04 Submerged Pipeline Management	**1**	**JOB**	**260,221.57**
05 Shoreline Pipeline Management	**1**	**JOB**	**90,739.05**
06 Mobilize/Demobilize for Beach Restoration	**1**	**LS**	**486,119.98**
0003 Beach Placement	**530,000**	**CY**	**6,863,500.00**
0004 Endangered Species Monitoring	**1**	**JOB**	**121,109.63**
0005 Depth of Closure Survey	**1**	**JOB**	**197,857.37**
09 Upland and Nearshore Profiles	**40**	**DAY**	**117,201.86**
10 Offshore Profiles	**18**	**DAY**	**77,343.38**

Labor ID: NLS2021 EQ ID: EP20R06 Currency in US dollars TRACES MII Version 4.4

Abbreviated Risk Analysis

Project (less than $40M): **461161-Galveston Beach Nourishment CAP sec 204** Alternative: **Base Plan**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Low Risk: Typical Construction, Simple** Meeting Date: **8/4/2022**

Total Estimated Construction Contract Cost = **$ 6,498,000**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	**01 LANDS AND DAMAGES**	**Real Estate**	**$ -**		0%	$ -	$ -
2	**12 NAVIGATION, PORTS AND HARBORS**	**Dredging**	**$ 5,602,000**		12%	$ 662,188	$ 6,264,188
3	**30 PLANNING, ENGINEERING, AND DESIGN**	**PED**	**$ 560,000**		12%	$ 66,195	$ 626,195
4	**31 CONSTRUCTION MANAGEMENT**	**Const. Man.**	**$ 336,000**		12%	$ 39,717	$ 375,717
5			$ -		0%	$ -	$ -
6			$ -		0%	$ -	$ -
7			$ -		0%	$ -	$ -
8			$ -		0%	$ -	$ -
9			$ -		0%	$ -	$ -
10			$ -		0%	$ -	$ -
11			$ -		0%	$ -	$ -
12	All Other	**Remaining Construction Items**	$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ -		0%	$ -	$ -
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ -		0%	$ -	$ -
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals				
Real Estate	$ -	0%	$ -	$ -
Total Construction Estimate	$ 6,498,000	12%	$ 768,100	$ 7,266,100
Total Planning, Engineering & Design	$ -	0%	$ -	$ -
Total Construction Management	$ -	0%	$ -	$ -
Total Excluding Real Estate	**$ 6,498,000**	**12%**	**$ 768,100**	**$ 7,266,100**

	Base	50%	80%
Confidence Level Range Estimate ($000's)	$6,498k	$6,959k	$7,266k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

461161-Galveston Beach Nourishment CAP sec 204 Base Pl

Feasibility (Recommended Plan)

Abbreviated Risk 14305994

Meeting Date: 4-Aug-22

Risk Level

	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				**Maximum Project Growth**		**40%**
PS-1	Real Estate	NA	NA	Negligible	Unlikely	0
PS-2	Dredging	USACE Funding Constraint	For the Base Plan, O&M funding should be extremely low risk	Marginal	Unlikely	0
PS-3	PED	USACE Funding Constraint	For the Base Plan, O&M funding should be extremely low risk	Marginal	Unlikely	0
PS-4	Const. Man.	USACE Funding Constraint	For the Base Plan, O&M funding should be extremely low risk	Marginal	Unlikely	0
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Real Estate	NA	NA	Negligible	Unlikely	0
AS-2	Dredging	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	There are no agreements required for the Base Plan. There is a potential for other acquisition delays (e.g. unawardable contract environment), but these are unlikely.	Marginal	Unlikely	0
AS-3	PED	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	There are no agreements required for the Base Plan. There is a potential for other acquisition delays (e.g. unawardable contract environment), but these are unlikely.	Marginal	Unlikely	0
AS-4	Const. Man.	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	There are no agreements required for the Base Plan. There is a potential for other acquisition delays (e.g. unawardable contract environment), but these are unlikely.	Marginal	Unlikely	0
Construction Elements				**Maximum Project Growth**		**15%**
CON-1	Real Estate	NA	NA	Negligible	Unlikely	0
CE-2	Dredging	Hopper Dredge(s) not available	Base Plan has a much wider range of possible dredges. Low risk of cost increases due to delays or more expensive dredges	Marginal	Unlikely	0
CE-3	PED	Hopper Dredge(s) not available	Base Plan has a much wider range of possible dredges. Low risk of cost increases due to delays or more expensive dredges	Marginal	Unlikely	0

CE-4	Const. Man.	Hopper Dredge(s) not available	Base Plan has a much wider range of possible dredges. Low risk of cost increases due to delays or more expensive dredges	Marginal	Unlikely	0
Specialty Construction or Fabrication				**Maximum Project Growth**		**50%**
SC-1	Real Estate	NA	NA	Negligible	Unlikely	0
SC-2	Dredging	NA	NA	Negligible	Unlikely	0
SC-3	PED	NA	NA	Negligible	Unlikely	0
SC-4	Const. Man.	NA	NA	Negligible	Unlikely	0
Technical Design & Quantities				**Maximum Project Growth**		**20%**
T-1	Real Estate	NA	NA	Negligible	Unlikely	0
T-2	Dredging	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Base Plan has no sand quantity requirements resulting in delays. Only potential for more sand than estimated, but unlikely given regular dredging and knowledge of shoaling rates for this area.	Marginal	Unlikely	0
T-3	PED	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Base Plan has no sand quantity requirements resulting in delays. Only potential for more sand than estimated, but unlikely given regular dredging and knowledge of shoaling rates for this area.	Marginal	Unlikely	0
T-4	Const. Man.	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Base Plan has no sand quantity requirements resulting in delays. Only potential for more sand than estimated, but unlikely given regular dredging and knowledge of shoaling rates for this area.	Marginal	Unlikely	0
Cost Estimate Assumptions				**Maximum Project Growth**		**25%**
EST-1	Real Estate	NA	NA	Negligible	Unlikely	0
EST-2	Dredging	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing. Cost estimate has been updated to account for current conditions and market volatility, especially in fuel prices, partially reducing the risk of further cost increases.	Marginal	Unlikely	0
EST-3	PED	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing. Cost estimate has been updated to account for current conditions and market volatility,	Marginal	Unlikely	0
EST-4	Const. Man.	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing. Cost estimate has been updated to account for current conditions and market volatility,	Marginal	Unlikely	0
External Project Risks				**Maximum Project Growth**		**20%**
EX-1	Real Estate	NA	NA	Negligible	Unlikely	0
EX-2	Dredging	Potential for severe adverse weather	* Adverse weather could increase sand requirement and project duration. Cannot predict all probabilities such as storm events	Marginal	Possible	1
EX-3	PED	Potential for severe adverse weather	* Adverse weather could increase sand requirement and project duration. Cannot predict all probabilities such as storm events	Marginal	Possible	1
EX-4	Const. Man.	Potential for severe adverse weather	* Adverse weather could increase sand requirement and project duration. Cannot predict all probabilities such as storm events	Marginal	Possible	1

Abbreviated Risk Analysis

Project (less than $40M): **461161-Galveston Beach Nourishment CAP sec 204** — **Alternative:** **Alternative 2**
Project Development Stage/Alternative: **Feasibility (Recommended Plan)**
Risk Category: **Low Risk: Typical Construction, Simple** — **Meeting Date:** **10/9/2021**

Total Estimated Construction Contract Cost = **$ 16,705,000**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	**$ 59,000**		**25%**	$ 14,750	$ 73,750
1					0%	$ -	$ -
2	**12 NAVIGATION, PORTS AND HARBORS**	**Dredging**	**$ 14,401,000**		26%	$ 3,810,886	$ 18,211,886
3	**30 PLANNING, ENGINEERING, AND DESIGN**	**PED**	**$ 1,440,000**		26%	$ 381,062	$ 1,821,062
4	**31 CONSTRUCTION MANAGEMENT**	**Const. Man.**	**$ 864,000**		26%	$ 228,637	$ 1,092,637
5			$ -		0%	$ -	$ -
6			$ -		0%	$ -	$ -
7			$ -		0%	$ -	$ -
8			$ -		0%	$ -	$ -
9			$ -		0%	$ -	$ -
10			$ -		0%	$ -	$ -
11			$ -		0%	$ -	$ -
12	All Other	**Remaining Construction Items**	$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ -		0%	$ -	$ -
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ -		0%	$ -	$ -
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals				
Real Estate	$ 59,000	25%	$ 14,750	$ 73,750.00
Total Construction Estimate	$ 16,705,000	26%	$ 4,420,585	$ 21,125,585
Total Planning, Engineering & Design	$ -	0%	$ -	$ -
Total Construction Management	$ -	0%	$ -	$ -
Total Excluding Real Estate	**$ 16,705,000**	**26%**	**$ 4,420,585**	**$ 21,125,585**

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$16,705k	$19,358k	$21,126k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

461161-Galveston Beach Nourishment CAP sec 204 Alternat

Feasibility (Recommended Plan)

Abbreviated Risk 14305994

Meeting Date: 9-Oct-21

Risk Level

	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				Maximum Project Growth		**40%**
PS-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
PS-2	Dredging	USACE Funding Constraint	If FED cost share exceeds $10M, reduce scope of sand placement or sponsor pays excess	Marginal	Possible	1
PS-3	PED	USACE Funding Constraint	If FED cost share exceeds $10M, reduce scope of sand placement or sponsor pays excess	Marginal	Possible	1
PS-4	Const. Man.	USACE Funding Constraint	If FED cost share exceeds $10M, reduce scope of sand placement or sponsor pays excess	Marginal	Possible	1
Acquisition Strategy				Maximum Project Growth		**30%**
AS-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
AS-2	Dredging	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	No LERRD - no project. Texas GLO is an active study participant, supports this project as well as previous ones	Significant	Unlikely	2
AS-3	PED	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	No LERRD - no project. Texas GLO is an active study participant, supports this project as well as previous ones	Significant	Unlikely	2
AS-4	Const. Man.	LERRD Provision - NFS requires a PCA with GLO to provide the capacity	No LERRD - no project. Texas GLO is an active study participant, supports this project as well as previous ones	Significant	Unlikely	2
Construction Elements				Maximum Project Growth		**15%**
CON-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
CE-2	Dredging	Hopper Dredge(s) not available	Can postpone sand placement as required sail time increases need for the limited number of hopper dredges	Moderate	Possible	2
CE-3	PED	Hopper Dredge(s) not available	Can postpone sand placement as required sail time increases need for the limited number of hopper dredges	Moderate	Possible	2

CE-4	Const. Man.	Hopper Dredge(s) not available	Can postpone sand placement as required sail time increases need for the limited number of hopper dredges	Moderate	Possible	2
Specialty Construction or Fabrication				**Maximum Project Growth**		**50%**
SC-1	0	NA	NA	Negligible	Unlikely	0
SC-2	Dredging	NA	NA	Negligible	Unlikely	0
SC-3	PED	NA	NA	Negligible	Unlikely	0
SC-4	Const. Man.	NA	NA	Negligible	Unlikely	0
Technical Design & Quantities				**Maximum Project Growth**		**20%**
T-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
T-2	Dredging	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Can limit sand scope/ increase schedule. Re: schedule, NFS could alter the order of its placement locations	Marginal	Possible	1
T-3	PED	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Can limit sand scope/ increase schedule. Re: schedule, NFS could alter the order of its placement locations	Marginal	Possible	1
T-4	Const. Man.	Sand quality and/or quantity not available on schedule due to HSC O&M requirements	Can limit sand scope/ increase schedule. Re: schedule, NFS could alter the order of its placement locations	Marginal	Possible	1
Cost Estimate Assumptions				**Maximum Project Growth**		**25%**
EST-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
EST-2	Dredging	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing	Marginal	Possible	1
EST-3	PED	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing	Marginal	Possible	1
EST-4	Const. Man.	Cost increases	Storm events can increase costs via fuel inflation & market volatility impacting competition & pricing	Marginal	Possible	1
External Project Risks				**Maximum Project Growth**		**20%**
EX-1	0	NA	RE Contingency to be developed internally in RE Section	Negligible	Unlikely	0
EX-2	Dredging	Potential for severe adverse weather	* Adverse weather would increase sand requirement and project duration. Assumed shoreline change between 2019 and 2038 will continue at a similar rate. Cannot predict all probabilities such as storm events	Marginal	Possible	1
EX-3	PED	Potential for severe adverse weather	* Adverse weather would increase sand requirement and project duration. Assumed shoreline change between 2019 and 2038 will continue at a similar rate. Cannot predict all probabilities	Marginal	Possible	1
EX-4	Const. Man.	Potential for severe adverse weather	* Adverse weather would increase sand requirement and project duration. Assumed shoreline change between 2019 and 2038 will continue at a similar rate. Cannot predict all probabilities	Marginal	Possible	1

WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 461161

SWG – Section 204 Regional Sediment Management,
Beneficial Use of Dredged Material
Galveston Island Coastal Erosion Gulf of Mexico

The Galveston Island Coastal Erosion Section 204 project, as presented by Galveston District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of August 11, 2022, the Cost MCX certifies the estimated total project cost:

FY23 Project First Cost:	$14,427,000
Fully Funded Amount:	$15,115,000
Federal Cost of Project:	$10,000,000

Cost Certification assumes Efficient Implementation (Funding). It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management through the period of Federal Participation.

2022.08.11
10:57:52 -07'00'

Michael P. Jacobs, PE, CCE
Chief, Cost Engineering MCX
Walla Walla District

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: **Galveston Island Coastal Erosion (CAP Sec 204)**
PROJECT NO: **461161**
LOCATION: **Galveston, Texas**

DISTRICT: **Galveston District**
PREPARED: **3/25/2022**
POC: **CHIEF, COST ENGINEERING, Martin Regner, PE, CCE**

This Estimate reflects the scope and schedule in report; Draft Report, Nov 2021

Civil Works Work Breakdown Structure		**ESTIMATED COST**				**PROJECT FIRST COST (Constant Dollar Basis)**						**TOTAL PROJECT COST (FULLY FUNDED)**			
							Program Year (Budget EC):			2023					
							Effective Price Level Date:			1-Oct- 22					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	REMAINING COST ($K)	Spent Thru: 1-Oct-15 ($K)	TOTAL FIRST COST ($K)	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
12	NAVIGATION PORTS & HARBORS	$8,799	$3,072	35%	$11,871	4.2%	$9,171	$3,202	$12,373		$12,373	4.7%	$9,604	$3,353	$12,957
			-			-						-			
			-			-						-			
			-			-						-			
	CONSTRUCTION ESTIMATE TOTALS:	$8,799	$3,072		$11,871	4.2%	$9,171	$3,202	$12,373		$12,373	4.7%	$9,604	$3,353	$12,957
01	LANDS AND DAMAGES	$59	$15	25%	$74	4.2%	$61	$15	$77		$77	4.7%	$64	$16	$80
30	PLANNING, ENGINEERING & DESIGN	$880	$307	35%	$1,187	4.1%	$916	$320	$1,236		$1,236	5.1%	$963	$336	$1,299
31	CONSTRUCTION MANAGEMENT	$528	$184	35%	$712	4.1%	$550	$192	$742		$742	5.1%	$578	$202	$779
	PROJECT COST TOTALS:	$10,266	$3,578	35%	$13,844		$10,698	$3,729	$14,427		**$14,427**	4.8%	$11,208	$3,907	$15,115

REGNER.MARTIN.B.1367377794 Digitally signed by REGNER.MARTIN.B.1367377794 Date: 2022.08.15 08:37:38 -05'00'
CHIEF, COST ENGINEERING, Martin Regner, PE, CCE

TREVINO.REUBEN.ANDREW.1589563766 Digitally signed by TREVINO.REUBEN.ANDREW.1589563766 Date: 2022.08.15 14:39:46 -05'00'
PROJECT MANAGER, Reuben Trevino

NELSON.TIMOTHY.J.1230372922 Digitally signed by NELSON.TIMOTHY.J.1230372922 Date: 2022.08.24 10:10:04 -05'00'
CHIEF, REAL ESTATE, Timothy Nelson

CHIEF, PLANNING, Brian Harper (Vacant)

CHIEF, ENGINEERING, Willie Joe, PE

CHIEF, OPERATIONS, Chris Frabota

CHIEF, CONSTRUCTION, Don Carelock, PE

CHIEF, CONTRACTING, Shamekia Chapman

CHIEF, PM-PB, Nicholas Laskowski, PG, PWS

CHIEF, DPM, Byron Williams, PE

ESTIMATED PROJECT COST:		**$15,115**
ESTIMATED FEDERAL COST:	63%	$9,550
ESTIMATED NON-FEDERAL COST:	37%	$5,565
22 - FEASIBILITY STUDY (CAP studies):		**$450**
ESTIMATED FEDERAL COST:	100%	$450
ESTIMATED NON-FEDERAL COST:		
ESTIMATED FEDERAL COST OF PROJECT		**$10,000**

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Galveston Island Coastal Erosion (CAP Sec 204)
LOCATION: Galveston, Texas
This Estimate reflects the scope and schedule in report; Draft Report, Nov 2021

DISTRICT: Galveston District
POC: CHIEF, COST ENGINEERING, Martin Regner, PE, CCE
PREPARED: 3/25/2022

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 27-Oct-21 Estimate Price Level: 1-Oct-21				Program Year (Budget EC): 2023 Effective Price Level Date: 1 -Oct-22								
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	RISK BASED CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	ESC (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	CONTRACT 1: Dredging and Beach Placement													
12	NAVIGATION PORTS & HARBORS	$14,401	$3,744	26.0%	$18,146	4.2%	$15,010	$3,902	$18,912	2025Q1	4.7%	$15,718	$4,087	$19,805
	CONSTRUCTION ESTIMATE TOTALS:	$14,401	$3,744	26.0%	$18,146		$15,010	$3,902	$18,912			$15,718	$4,087	$19,805
01	LANDS AND DAMAGES	$59	$15	25.0%	$74	4.2%	$61	$15	$77	2025Q1	4.7%	$64	$16	$80
30	PLANNING, ENGINEERING & DESIGN													
1.00%	Project Management	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
0.50%	Planning & Environmental Compliance	$72	$19	26.0%	$91	4.1%	$75	$19	$94	2025Q1	5.1%	$79	$20	$99
3.75%	Engineering & Design	$540	$140	26.0%	$680	4.1%	$562	$146	$708	2025Q1	5.1%	$591	$154	$744
1.00%	Reviews, ATRs, IEPRs, VE	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
0.50%	Life Cycle Updates (cost, schedule, risks)	$72	$19	26.0%	$91	4.1%	$75	$19	$94	2025Q1	5.1%	$79	$20	$99
0.50%	Contracting & Reprographics	$72	$19	26.0%	$91	4.1%	$75	$19	$94	2025Q1	5.1%	$79	$20	$99
1.00%	Engineering During Construction	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
1.00%	Planning During Construction	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
0.50%	Adaptive Management & Monitoring	$72	$19	26.0%	$91	4.1%	$75	$19	$94	2025Q1	5.1%	$79	$20	$99
0.25%	Real Estate In-House Labor	$36	$9	26.0%	$45	4.1%	$37	$10	$47	2025Q1	5.1%	$39	$10	$50
31	CONSTRUCTION MANAGEMENT													
4.00%	Construction Management	$576	$150	26.0%	$726	4.1%	$600	$156	$756	2025Q1	5.1%	$630	$164	$794
1.00%	Project Operation:	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
1.00%	Project Management	$144	$37	26.0%	$181	4.1%	$150	$39	$189	2025Q1	5.1%	$158	$41	$199
	CONTRACT COST TOTALS:	$16,764	$4,358		$21,122		$17,470	$4,541	**$22,011**			$18,303	$4,758	**$23,061**

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Galveston Island Coastal Erosion (CAP Sec 204)
LOCATION: Galveston, Texas
This Estimate reflects the scope and schedule in report; Draft Report, Nov 2021

DISTRICT: Galveston District
POC: CHIEF, COST ENGINEERING, Martin Regner, PE, CCE
PREPARED: 3/25/2022

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 27-Oct-21 Estimate Price Level: 1-Oct-21				Program Year (Budget EC): 2023 Effective Price Level Date: 1 -Oct-22								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	RISK BASED CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	Base Plan													
12	NAVIGATION PORTS & HARBORS	-$5,602	-$672	12.0%	-$6,274	4.2%	-$5,839	-$701	-$6,539	2025Q1	4.7%	-$6,114	-$734	-$6,848
	CONSTRUCTION ESTIMATE TOTALS:	-$5,602	-$672		-$6,274		-$5,839	-$701	-$6,539			-$6,114	-$734	-$6,848
01	LANDS AND DAMAGES													
30	PLANNING, ENGINEERING & DESIGN													
1.00%	Project Management	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
0.50%	Planning & Environmental Compliance	-$28	-$3	12.0%	-$31	4.1%	-$29	-$3	-$33	2025Q1	5.1%	-$31	-$4	-$34
3.75%	Engineering & Design	-$210	-$25	12.0%	-$235	4.1%	-$219	-$26	-$245	2025Q1	5.1%	-$230	-$28	-$257
1.00%	Reviews, ATRs, IEPRs, VE	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
0.50%	Life Cycle Updates (cost, schedule, risks)	-$28	-$3	12.0%	-$31	4.1%	-$29	-$3	-$33	2025Q1	5.1%	-$31	-$4	-$34
0.50%	Contracting & Reprographics	-$28	-$3	12.0%	-$31	4.1%	-$29	-$3	-$33	2025Q1	5.1%	-$31	-$4	-$34
1.00%	Engineering During Construction	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
1.00%	Planning During Construction	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
0.50%	Adaptive Management & Monitoring	-$28	-$3	12.0%	-$31	4.1%	-$29	-$3	-$33	2025Q1	5.1%	-$31	-$4	-$34
0.25%	Real Estate In-House Labor	-$14	-$2	12.0%	-$16	4.1%	-$15	-$2	-$16	2025Q1	5.1%	-$15	-$2	-$17
31	CONSTRUCTION MANAGEMENT													
4.00%	Construction Management	-$224	-$27	12.0%	-$251	4.1%	-$233	-$28	-$261	2025Q1	5.1%	-$245	-$29	-$274
1.00%	Project Operation:	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
1.00%	Project Management	-$56	-$7	12.0%	-$63	4.1%	-$58	-$7	-$65	2025Q1	5.1%	-$61	-$7	-$69
	CONTRACT COST TOTALS:	-$6,498	-$780		-$7,278		-$6,772	-$813	**-$7,584**			-$7,095	-$851	**-$7,946**

Galveston Island Coastal Erosion
CAP 204 Project

Environmental Appendix C FINAL

Gulf of Mexico
Galveston, Texas

October 2022

US Army Corps of Engineers®
Galveston District

GALVESTON Texas EST. 1839
IT'S ISLAND TIME

TABLE OF CONTENTS

Appendix C-1 Fish and Wildlife Coordination Act Compliance

Fish and Wildlife Coordination Act

for

Galveston Island Coastal Erosion CAP 204 Project

Galveston, Texas

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
PHONE: 281/286-8282
FAX: 281/488-5882

In Reply Refer To:
2022-0070276

December 16, 2022

Colonel Rhett A. Blackmon, P.E.
District Commander
Galveston District, U.S. Army Corps of Engineers
Attention: Mr. Jeffrey Pinsky
Environmental Branch
Regional Planning and Environmental Center
Post Office Box 1229
Galveston Texas 77553-1229

Dear Colonel Blackmon:

The Fish and Wildlife Coordination Act (FWCA) (Public Law 85-624; 16 U.S.C. 661 - 666) requires that the U.S. Army Corps of Engineers (Corps) coordinate with the Department of Interior - U.S. Fish and Wildlife Service (Service) where waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified including navigation and drainage to consult for the purpose of "preventing loss of or damage to wildlife resources."

This letter provides Service comments on the Continuing Authorities Program (CAP) project titled: Galveston Island Coastal Erosion Section 204 Regional Sediment Management project, in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq) and the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 661 et seq). This project was initiated by the Corps Galveston District in partnership with the Galveston Park Board of Trustees of the City of Galveston (GPBTCG) to utilize beneficial use of dredged material generated during operations and maintenance dredging of the Galveston Harbor and Channel Federal Navigation Project as nourishment for Galveston Island beaches. Specifically, the Corps proposes the placement of approximately 530,000 cubic yards (CY) of beach quality sand along a 1.7 mile long by 300-foot-wide section of Galveston Island beach adjacent to the Gulf of Mexico, seaward of Texas Highway 3005, between

Sunbather Lane to 11 Mile Road. This study was authorized as part of the Water Resources Development Act of 2007 under Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326). Please reference 2022-0070276 when responding to these comments.

In letter dated August 30, 2022, the Service reviewed fish and wildlife resources in the project area and provided recommendations for a biological assessment of the effects of the project on the listed species and proposed critical habitats not fully addressed in the Draft Detailed Project Report and Environmental Assessment (DDPR-EA). On October 11, 2022, the Service provided a letter of agreement to the Corps request to use and adhere to all the terms and conditions of the Regulatory Permit SWG-2007-01025 and accompanying Biological Opinion (BO) that was issued to the GPBTCG on August 22, 2019, which authorizes "beach nourishment activities along approximately 81,454 linear feet of beachfront on Galveston Island utilizing multiple sand sources including the beneficial use of dredged beach quality sand from Federal projects." As the 2019 BO does not consider the effects to proposed critical habitat (pCH) for Rufa red knot (*Calidris canutus rufa*), published in the Federal Register (FR) on July 15, 2021 (86 FR 37410-37668), we recommended that if pCH is designated within the timeframe of this project, the Corps would need to evaluate the effects of the project on pCH TX-2 unit related to adverse modification by the proposed actions in order to be in compliance with the ESA.

As ESA compliance has been addressed, this letter serves as the Service's acknowledgement that Corps' FWCA responsibilities for this project have been met. We look forward to assisting where possible with the implementation of this project. Should you have any questions regarding our comments, please contact Jan Culbertson at 281-212-1516 or Jan_Culbertson@fws.gov.

Sincerely,

Charles Ardizzone
Field Supervisor

From:	Culbertson, Jan C
To:	Pinsky, Jeffrey F CIV USARMY CESWF (USA); Wadlington, Brandon E CIV USARMY CESWF (USA)
Cc:	Blakeway, Raven D CIV (USA); Hoth, David; Ardizzone,Charles
Subject:	[Non-DoD Source] Galveston Island CAP 204 FWCA
Date:	Friday, December 16, 2022 3:55:54 PM
Attachments:	2022-0070276_Galveston CAP 204 FWCA 12-16-2022_signed.pdf

Good Afternoon Jeff,

Enclosed is the Service's letter for the Continuing Authorities Program (CAP) project titled: Galveston Island Coastal Erosion Section 204 Regional Sediment Management project, in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq).

If you have any questions please let me know.

Best regards, Jan

Jan Culbertson, Ph.D.
Fish and Wildlife Biologist
Texas Coastal Ecological Services Field Office
U.S. Fish & Wildlife Service
17629 El Camino Real, Ste 211
Houston, TX 77058
281-212-1516 In Office on Friday/Telecommuting Monday - Thursday

Appendix C-2 Magnuson-Stevens Fisheries Conservation and Management Act Compliance

Magnuson-Stevens Fisheries Conservation and Management Act

for

Galveston Island Coastal Erosion CAP 204 Project

Galveston, Texas

Response to DDPR/EA

Received via email 3 August 2022

Dear Ms. Raven Blakeway,

The National Marine Fisheries Service Habitat Conservation Division has reviewed the Joint Public Notice (JPN) for the Draft Detailed Project Report and Environmental Assessment (DDPR-EA) for the proposed U. S. Army Corps of Engineers (USACE) Galveston Island Coastal Erosion, Galveston, Texas Study dated July 15, 2022. The JPN is requesting review of the DDPR-EA and Finding of No Significant Impact (FONSI) for the Galveston Island Coastal Erosion, Galveston, Texas, continuing authorities study as authorized by Section 204 of the Water Resources Development Act of 2016. The proposed study is located on Galveston Island, Galveston County, Texas.

The NMFS has reviewed the Draft DDPR-EA and FONSI under the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297). We concur with the "No Significant Adverse Effect" determination and have no objections to the issuance of this permit provided the applicant adheres to the best management practices listed in the DDPR-EA. We appreciate your coordination with our office on this project. 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

From:	charrish stevens - NOAA Federal
To:	Blakeway, Raven SWF; _NMFS ser HCDconsultations
Cc:	Swafford, Rusty
Subject:	[URL Verdict: Neutral][Non-DoD Source] Re: Galveston Island Erosion CAP 204 Available for Public Review
Date:	Wednesday, August 3, 2022 10:13:00 AM

Dear Ms. Raven Blakeway,

The National Marine Fisheries Service Habitat Conservation Division has reviewed the Joint Public Notice (JPN) for the Draft Detailed Project Report and Environmental Assessment (DDPR-EA) for the proposed U. S. Army Corps of Engineers (USACE) Galveston Island Coastal Erosion, Galveston, Texas Study dated July 15, 2022. The JPN is requesting review of the DDPR-EA and Finding of No Significant Impact (FONSI) for the Galveston Island Coastal Erosion, Galveston, Texas, continuing authorities study as authorized by Section 204 of the Water Resources Development Act of 2016. The proposed study is located on Galveston Island, Galveston County, Texas.

The NMFS has reviewed the Draft DDPR-EA and FONSI under the provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297). We concur with the “No Significant Adverse Effect” determination and have no objections to the issuance of this permit provided the applicant adheres to the best management practices listed in the DDPR-EA. We appreciate your coordination with our office on this project. 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 Thu, Jul 21, 2022 at 3:49 PM Blakeway, Raven SWF <Raven.Blakeway@usace.army.mil> wrote:

> Good afternoon everyone,

Appendix C-3 Endangered Species Act Compliance

Fish and Wildlife Service Biological Assessment

for

Galveston Island Coastal Erosion CAP 204 Project

Galveston, Texas

FWS Consultation No: 2022-0070276

NMFS Memorandum for the Record

USFWS Letter of Agreement for Use of Galveston Parks Board Permit

Galveston Parks Board Biological Opinion (Consultation No: 02ETTX00-2018-F-2491)

USFWS Response to DDPR/EA

CESWF-PEE-C 14 September 2022

MEMORANDUM FOR THE RECORD

SUBJECT: Galveston Island Coastal Erosion CAP 204 Project: Detailed Project Report and Environmental Assessment, Galveston County, Texas – Endangered Species Act

1. PURPOSE: The purpose of this memo is to document compliance of the subject U.S. Army Corps of Engineers, Galveston District (USACE) coastal storm risk reduction study with the Endangered Species Act for species within the National Marine Fisheries Service (NFMS) jurisdiction.

2. BACKGROUND: A complete consultation package was submitted to NMFS on September 12, 2022. The package included a cover sheet signed by Jeff Pinsky on September 12, 2022 and a Biological Assessment Dated September 2022.

   The Biological Assessment (BA) concluded that use of dredged material to nourish beach on the West End of Galveston Island would not induce affects to listed species or critical habitat beyond those which were described in the *Gulf of Mexico Regional Biological Opinion on Hopper Dredge use for Maintenance Dredging of Channels and Sand Mining by the four USACE Gulf of Mexico Districts (GRBO)* (Consultation #F/SER/2000/01287). Implementation of the TSP would not trigger re-initiation of consultation under this BO. An additional four listed or candidate species (two whales and two fish species), within NMFS jurisdiction, were also considered in the BA that were not covered in the BO. USACE made a no effect determination for all four species due to the lack of suitable habitat or the action area was outside the species known range.

3. COMPLIANCE GUIDANCE: NOAA Fisheries released a policy effective January 13, 2017 regarding the agencies consultative responsibilities under Section 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1536, and associated regulations at 50 C.F.R. part 402, for "no effects" determination. The policy states "NOAA Fisheries will not provide formal written responses to requests for concurrence with a federal action agency's determination that its actions will not affect any ESA-listed species or designated critical habitat ("no effect" determination)". It is prudent, however, that USACE document in the project records the rationale for the no effect determinations, as this will act as the official ESA consultation.

4. DETERMINATION: Since there was no significant change to the actions described in the existing BO and a no effect determination was made for the additional four species, a consultation number will not be issued and there is no need for NMFS to review further. Section 7 Consultation requirements for marine species have been met for this study. NMFS will not be providing documentation of consultation, as the TSP would not trigger re-initiation of consultation on the GRBO.

Dr. Raven D. Blakeway

Dr. Raven Blakeway
Biologist, Environmental Branch
Regional Planning & Environmental Center

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
PHONE: 281/286-8282
FAX: 281/488-5882

In Reply Refer To:
2022-0070276

October 11, 2022

Mr. Jeff Pinsky
Environmental Branch
Regional Planning and Environmental Center
Galveston District, U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Dear Mr. Pinsky:

The U.S. Fish and Wildlife Service (Service) has reviewed your request to use the U.S. Army Corps of Engineers' (Corps) Regulatory Permit SWG-2007-01025 and accompanying Biological Opinion (BO) that was issued to the Galveston Park Board of Trustees of the City of Galveston (GPBTCG) on August 22, 2019, which authorizes "beach nourishment activities along approximately 81,454 linear feet of beachfront on Galveston Island utilizing multiple sand sources including the beneficial use of dredged beach quality sand from Federal projects." The Continuing Authorities Program (CAP) project titled: Galveston Island Coastal Erosion Section 204 Regional Sediment Management project is a study being undertaken by the Corps at the request of the GPBTCG, the non-Federal sponsor to utilize beach quality sand material generated during operations and maintenance dredging of the Galveston Entrance Channel for beach nourishment on Galveston Island. Specifically, the Corps proposes the placement of approximately 530,000 cubic yards of beach quality sand material along a 1.7 mile long by 300-foot-wide section of Galveston Island beach from Sunbather Lane west (Figure 1). Full details of the CAP project were included in the Draft Environmental Assessment (DEA). The CAP project is authority under Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326). Section 204 provides the Corps authority to plan, design, and build projects in connection with dredging of authorized Federal navigation projects.

The Service provided comments on the DEA for the proposed beneficial use of dredge material associated with the maintenance of the Galveston Harbor and Channel, as referenced in our letter dated August 30, 2022. Following receipt of our comments, the Corps provided additional information in an email dated September 30, 2022, with their acknowledgement that the Service's acceptance of their request to utilize the referenced permit requires adherence to all the terms and conditions of the referenced permit and accompanying BO. The GPBTCG also provided an email dated September 30, 2022, providing their concurrence for the Corps to utilize the referenced permit and accompanying BO as a means to expedite the environmental compliance requirements for the CAP project.

The Service has reviewed the additional information provided and offers the following comments in accordance with the Endangered Species Act (Act) (87 Stat. 884, as amended, 16 U.S.C. 1531 et seq.).

Proposed Critical Habitat for Rufa Red Knot
The referenced permit and accompanying BO do not consider the effects to proposed critical habitat (pCH) for Rufa red knot (*Calidris canutus rufa*), published in the Federal Register (FR) on July 15, 2021 (86 FR 37410-37668; USFWS 2021a). The FR listing can be found at the following link: https://www.govinfo.gov/content/pkg/FR-2021-07-15/pdf/2021-14406.pdf. Currently the proposed critical habitat includes 120 units in Massachusetts, New York, New Jersey, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. A total of approximately 649,066 acres (ac) (262,667 hectares (ha) were proposed to be designated critical habitat. There were 11 proposed critical habitat units [approximately 186,241 ac (75,369 ha)] proposed to be designated in Texas. The pCH TX-2 unit consists of 590 ac (238 ha) of occupied habitat in Galveston County. The pCH TX-2 unit is located along the Gulf of Mexico with boundaries from the mean low-low water (MLLW) up to the vegetation line, including emergent lands and intertidal area characterized as highly dynamic beach/seashore that is covered at high tide and uncovered at low tide on Galveston Island. The northeastern boundary of this unit is the end of the Seawall Boulevard, and the southwestern boundary is San Luis Pass. The proposed project's beneficial use placement area occurs in approximately 7.6% (45.1 ac out of 590 ac) of the pCH TX-2 unit, and approximately 0.02% of Texas's pCH for Rufa red knot. Specific habitat types within this unit include marine sandy coastline beach that is irregularly or regularly inundated by tides, depending upon the location. Proposed critical habitat for this species is considered to contain the essential physical and biological elements for the conservation of Rufa red knots, and the physical features necessary for maintaining the natural processes that provides appropriate foraging, roosting, and sheltering habitat components for this species (USFWS 2021b). If designated within the timeframe of your project, the Corps would need to evaluate the effects of the project on pCH TX-2 unit related to adverse modification by the proposed actions in order to be in compliance with the Act.

Conclusions
The Corps' acceptance to abide by the conditions and conservation measures of the referenced permit and accompanying BO appears to meet the environmental compliance requirements of the Act. The Corps will need to abide by all terms and conditions of the permit as well as the associated BO referenced herein in order receive take coverage pursuant to Section 7 of the Act. A change in the listing status of any proposed or candidate species, proposed critical habitat may

require the Corps to reevaluate the effects of the project on these species and or critical habitat and initiate any necessary consultation procedures pursuant to Section 7 with the Service.

Should you have any questions regarding our comments, please contact Dr. Jan Culbertson at 281-212-1516 or Jan_Culbertson @fws.gov or David Hoth, Assistant Field Supervisor at 281-212-1504 or David_Hoth@fws.gov.

Sincerely,

DAVID HOTH

Digitally signed by DAVID HOTH
Date: 2022.10.11 15:02:09 -05'00'

David Hoth
for Charles Ardizzone
Field Supervisor

cc: Ms. Raven Blakeway

Literature Cited

[USFWS] U.S. Fish and Wildlife Service. 2021a. Endangered and threatened wildlife and plants: Designation of critical habitat for Rufa red knot (*Calidris canutus rufa*). Proposed Rule 86 FR 37410 37668. 1-259.

[USFWS] U.S. Fish and Wildlife Service. 2021b. Rufa red knot (*Calidris canutus rufa*) 5-year review: Summary and evaluation. Ecological Services New Jersey Field Office, Galloway, New Jersey. 1-35.

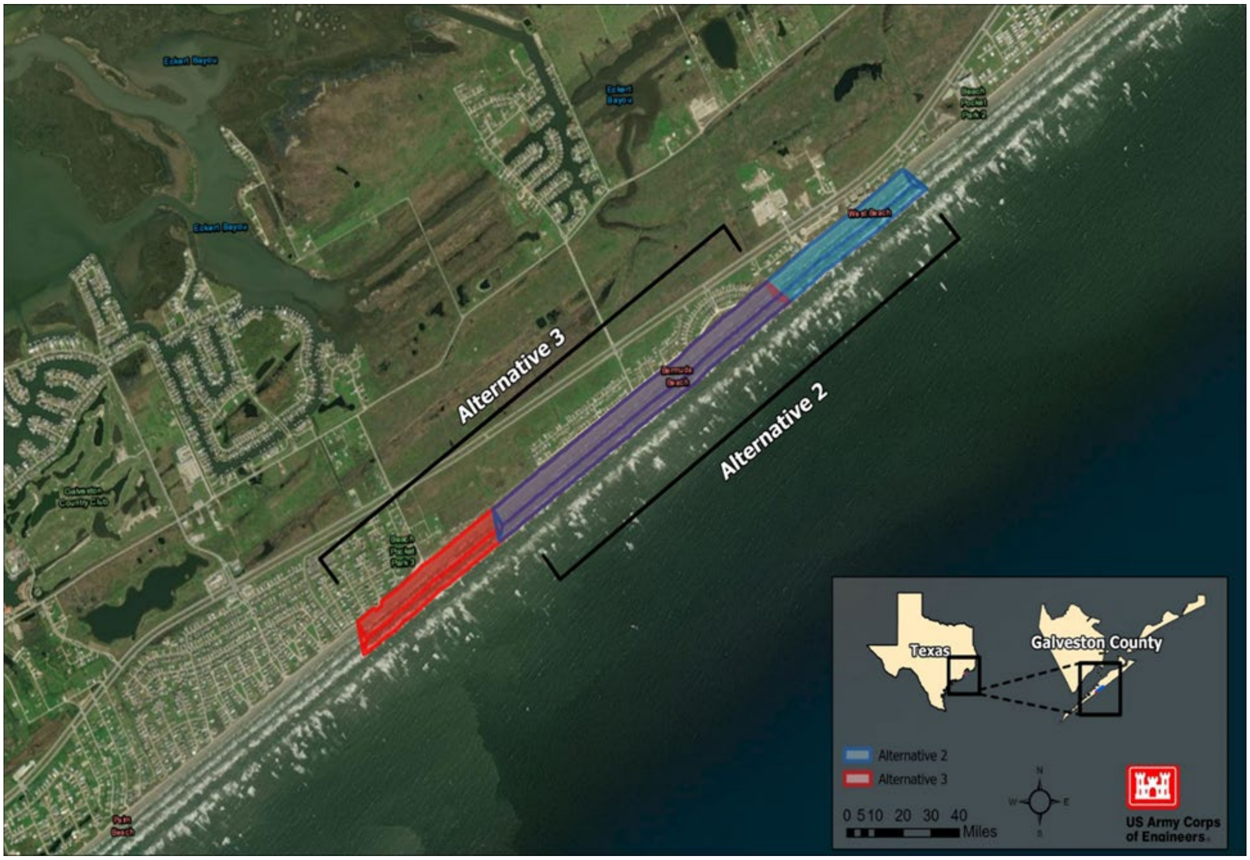


Figure 1. The study area evaluated two alternatives for beach renourishment on Galveston Island beach, which includes the Gulf of Mexico seaward of Texas Highway 3005. Alternative 2 is located along a 1.7 mile long by 300-ft wide section of Galveston Island beach south from Sunbather Lane west to 11-mile road (blue and purple), while Alternative 3 extends southwest from Hershey Beach to Fidler Crab Lake (red and purple). Alternative 2 was chosen as the Tentatively Selected Plan for this study.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
17629 El Camino Real, Suite 211
Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

In Reply Refer To:
FWS/R2/02ETT
X00-2018-F-
2491

June 17, 2019

Colonel Lars N. Zetterstrom
U.S. Army Corps of Engineers
Galveston District
Attn: Regulatory Branch, Steven Walls
P.O. Box 1229
Galveston, Texas 77553-1229

Consultation No. 02ETTX00-2018-F-2491

Dear Colonel Zetterstrom:

This transmits the United States (U.S.) Fish and Wildlife Service's (Service) biological opinion (BO) on the proposed re-issuance of the U.S. Army Corps of Engineers (Corps) permit SWG-2007-01025 for the Park Board of Trustees of the City of Galveston (Galveston Park Board) to perform beach nourishment on Galveston Island, in Galveston County, Texas. Specifically, this BO addresses the effects of the proposed permit action on the endangered Kemp's ridley sea turtle *Lepidochelys kempii*, threatened piping plover *Charadrius melodus*, and the threatened red knot *Calidris canutus rufa*, in accordance with Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. §1531 et seq.). Your letter dated August 28, 2018 requesting formal consultation was received on August 30, 2018.

The Corps determined that actions of the proposed project would have no effect on the threatened West Indian Manatee *Trichechus manatus,* the endangered Attwater's greater prairie chicken *Tympanuchus cupido attwateri,* and the endangered leatherback sea turtle *Dermochelys coriace.* No coordination or contact with the Service is necessary for no effect determinations. However, based on a review of project specifics, Service files, status of these species, conversations with species experts, and implementation of the conservation measures as documented in this BO, the Service concurs with the Corps determination that associated on-shore actions of the proposed project may affect, but are not likely to adversely affect the endangered green sea turtle *Chelonia mydas*, the endangered hawksbill sea turtle *Eretmochelys imbricate*, and the threatened loggerhead sea turtle *Caretta caretta* or adversely modify piping plover critical habitat unit TX-34.

This BO is based on information provided in Corp's Biological Assessment (BA), dated August 2018, consultation documents, meetings, telephone conversations, e-mails with project proponents, field investigations, correspondence with Service biologist and species experts, and other sources of information. A complete administrative record of this consultation is on file at the Texas Coastal Ecological Services Field Office (TXESFO) in Houston, Texas.

BIOLOGICAL OPINION

CONSULTATION HISTORY

July 17, 2018	Preliminary meeting involving the Service, Corps, Galveston Parks Board and their representatives Atkins consultants to discuss project.
August 30, 2018	Service received a letter from the Corps, dated August 28, 2018, initiating formal Section 7 consultation for SWG-2007-01025, along with a BA dated August 2018, evaluating potential impacts to listed species.
September 17, 2018	Meeting with Corps, Galveston Park Board, and Atkins to discuss BA and process for BO.
September 27, 2018	Service received an email from the Corps regarding correcting discrepancies in the original cover letter, dated August 28, 2018, correcting consultation determinations to match the BA.
October 14, 2018	Service received an email stating borrow "area 1" removed from project plans.
November 5, 2018	Email exchange between the Corps and Service, which provided consultation number and formal consultation timeline.
November 27, 2018	Conference call involving the Corps, Atkins, and Service to discuss data submitted from Atkins regarding piping plovers and red knots.
November 28, 2018	Email submitted from the Corps, clarifying definitions for nourishment sites locations.
November 29, 2018	Draft conservation measures and draft reasonable and prudent measures sent to the Corps for review.
December 04, 2018	Meeting with Corps, Galveston Park Board, Atkins, and the Texas General Land Office to discuss draft conservation measures and draft reasonable and prudent measures.
December 19, 2018	Meeting between National Marine Fisheries Service - Galveston Lab and the Service to discuss sea turtle stranding occurrences on Galveston Island.

February 7, 2019	Meeting with Corps and Atkins to discuss sea turtle stranding information and associated Section 7 determinations.
February 22, 2019	Email sent to Corps with revised BO timeline due to Federal government shutdown/furlough.
February 28, 2019	Email exchange between the Corps and Service with revised Section 7 determinations.
March 12, 2019	Email exchange between the Corps and the Service with 2nd revision of Section 7 determinations.
March 13, 2019	Email exchange between Atkins and the Service regarding additional information for Dellanera beach nearshore placement area.
April 29, 2019	Site visit and evaluation of proposed sand source property for piping plover and red knot suitable habitat.
May 8, 2019	Draft BO sent to Corps for review.

DESCRIPTION OF PROPOSED ACTION

The proposed issuance of permit SWG-2007-01025 would authorize the Galveston Park Board to perform beach nourishment activities along approximately 81,454 linear feet (LF) of beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park (approximately 30,603 LF) then from the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive (approximately 50,851 LF).

Beach quality sand used for beach nourishment activities would be obtained from multiple sand sources along and adjacent to Galveston Island. Project maps are provided in the BA, dated August 2018. The methods used for removal of sand from the borrow site and subsequent placement within the project area would include: 1) use of a hydraulic dredge to excavate the sand, which would then be pumped through pipes to a temporary dredge material placement area (DMPA) on the beach at Apffel Park, dewatered, and subsequently trucked to the nourishment area; 2) use of a hydraulic dredge to obtain the sand, then pumped through a temporary pipeline and placed directly on the beach; or 3) use of a hopper dredge to excavate the sand, which would then be pumped through temporary pipelines and transported directly onto the beach nourishment area. The pipelines used to transport the sand could be either upland, submerged or a combination of both. The upland pipelines would run parallel to the beach from Apffel Park to the west end of the seawall. In addition, sand placement may be hauled via truck from upland sand sources to beach nourishment locations and distributed using various types of heavy equipment as described in Section 1.2 of the BA.

The temporary DMPA will be constructed only if dredged material is to be trucked to the beach nourishment area. The DMPA will consist of a temporary containment levee that will allow the sediment to separate from the water before it is used for nourishment. The water will then be returned to the Gulf of Mexico as effluent. The temporary pipeline routes would run near the highest point of the un-vegetated beach and near the base of the seawall, and/or be submerged off-shore 1,000' to 2000' parallel to the shoreline then routed perpendicular to the beach, to the nourishment locations. The discharge point would be relocated as sections of beach nourishment are completed.

For the purposes of this biological opinion, maintenance activities refer to the addition of beach quality sand, as needed, in high erosion areas within the action area during the term of the permit. However, grooming and/or raking the nourished beach are not considered maintenance activities as identified above, and the effects of these activities were not evaluated by the Corps and have not been addressed in this BO.

Beach nourishment activities will occur on an as needed basis as described in the BA. The Corps permit, if issued, would be valid for five years. Likewise, this BO is only valid for five years from the date of the Service's signature. Any changes, additions or modifications to the permit, or any work conducted by the applicant or others in addition to the permitted activities, are not covered by this biological opinion. If activities are to continue beyond the expiration date of the Corps permit (SWG-2007-021025), the Galveston Parks Board would need to file for an extension of the permit and the Corps will need to re-initiate consultation pursuant to Section 7 of the Act with the Service.

It is important to note that this biological opinion only evaluates the effects of the proposed on-shore permit actions on those species under the Service's jurisdiction. A Memorandum of Understanding (MOU) was signed on July, 18, 1977 acknowledging joint administration of the Act by the Service and the National Marine Fisheries Service (NMFS) in regards to sea turtles. The MOU outlines jurisdiction for sea turtles under the Act and states" The Service shall have sole jurisdiction over sea turtles, including parts or products, when on land and National Marine Fisheries Service (NMFS) shall have sole jurisdiction over sea turtles, including parts or products when in the marine environment" (NMFS and Service 1977). Therefore, only those proposed actions that take place on land (beach sand placement, the temporary DMPA, and the land-based pipeline) were evaluated for effects to sea turtles. The Corps is working with NMFS to evaluate the effects of the proposed dredging and submerged pipeline on sea turtles in the water.

Action Area

The action area includes approximately 15 linear miles of beach and shallow water proposed for nourishment along west Galveston Island, from the western terminus of the seawall extending west to the eastern boundary of Galveston Island State Park (30,603 linear feet) then from the western edge of Jamaica beach to the west limits of Pointe West Subdivision at Salt Prairie Drive (50,851 linear feet), all proposed and authorized borrow sources, and includes the areas along Apffel Park as described in the BA dated August 2018.

Barrier Island Dynamics
The beaches of Gulf coastal barrier islands are highly dynamic systems that are shaped by the natural forces of the wind, waves, and sea. As a result, these beaches constantly change shape (i.e., width, slope, etc.) and position (i.e., retreat, erode, or accrete) over-time. Human actions can further alter the conditions of these beaches.

On abbreviated time scales (i.e., days, months, years, etc.), the ever-changing forces of the waves and currents (including longshore) can transport sediment onto the beach, laterally among beaches (i.e., longshore transport), or remove sediment from the beach. Episodic weather events (e.g., tropical storms, hurricanes, etc.) can cause erosion and alter sediment transport dynamics along the coast, but they can also wash sand towards the mainland (over wash) causing increases in beach width (Britton and Morton 1989, Gibeaut et al., 2000).

On a long-term scale (i.e., tens to thousands of years), ongoing sea-level rise drives beaches landward by eroding sand from the shore face and moving it landward (Anderson 2007). Where sea-level rise is constant, the width and profile of the beach is usually maintained during this migration. However, where the rate of sea-level rise changes or where human actions interfere with natural coastal processes of sediment transport (e.g., jetties, channels, etc.) and landward migration (e.g., seawalls, homes), the shoreline may begin to erode over the long-term (Anderson 2007). Geologists estimate that sea-level has risen at a rate of 0.022 feet per year over the last century along the upper Texas coast and that this rate will only increase under future global warming scenarios (Gibeaut et al. 2000). Furthermore, they estimate that long-term shoreline retreat has occurred at rates between 3 and 15 feet per year along the upper-Texas coast (Gibeaut et al. 2000, Anderson 2007).

Conservation Measures

When used in the context of the ACT, "conservation measures" represent actions pledged in the project description, correspondence and/or meetings that the action agency or the applicant will implement to further the conservation or recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. Since conservation measures are part of the proposed action, their implementation is required under the terms of the consultation. The Corps and the Park Board have proposed the following conservation measures to avoid and minimize impacts to listed species:

Training and Monitoring

1) The Galveston Park Board in coordination with the Corps and other project proponents will ensure crew chiefs, supervisors, and wildlife monitors attend training prior to the initiation of, or their participation in, project work activities. A Qualified biologist will conduct training and the scope of training will include 1) recognition of sea turtles, piping plovers and red knots, their habitats, and tracks 2) avoidance and minimization measures 3) reporting criteria and 4) contact information for different rescue agencies in the area; by use of the wildlife monitoring checklist (Appendix B of the BA dated 2018 and attached to BO).

2) Training will include a half-day training session coordinated by the Galveston Parks Board through the Corps, the Service, or the Padre Island National Seashore, on identification of sea turtles, nesting sea turtles, and bird identification. Documentation of this training, including a list of attendees, will be submitted to the Corps and the Service prior to the start of each nourishment project in the permit area and as new members are trained.

3) A minimum of one qualified wildlife monitor will be assigned to each active work area. The wildlife monitor will inspect the active work areas prior to the start of work and continuously throughout the work day. Wildlife monitor qualifications will be submitted to the Corps and the Service prior to start of each nourishment project.

4) The Galveston Park Board will provide the Corps with the name of a single point of contact (POC) responsible for communicating with the crew and the wildlife monitor(s) and reporting on endangered species issues during the project. The wildlife monitor(s) will be on-site to ensure listed species are not affected by beach nourishment activities.

5) Prior to the start of work, the Galveston Park Board will ensure that the wildlife monitor(s) inspect the beach adjacent to and along work areas before work begins each morning. Wildlife monitors will communicate all activities to the POC and the POC will coordinate that information with the Corps and Service as required.

6) Prior to the start of work each day, all contractors, work crews, drivers, etc., will attend a brief training on the recognition of sea turtle, piping plovers, red knots, and their habitats and updated on the previous days encounters, if any, with nesting or injured wildlife.

<u>Piping Plovers and Red Knots</u> - wintering season begins July 15 extending through May 15

7) The POC and/or wildlife monitor(s) will be on-site to ensure piping plovers and red knot are not affected by beach nourishment activities. The POC and/or monitor(s) will ensure that loafing and/or resting piping plovers and red knots are not in the project area during nourishment activities.

8) The POC and/or monitor(s) will check under and around vehicles and heavy equipment before they are moved. The POC and/or monitor(s) should be aware that piping plovers and red knots are especially vulnerable during periods of cold temperature, inclement weather, and when roosting at night. Construction workers will immediately notify the POC and/or monitor(s) if listed species occur in the immediate project area. If a piping plover and/or red knot are found in the active work area, work will be stopped within an area specified by the POC and/or the wildlife monitor until the bird(s) leaves the construction site. Equipment will remain powered off

until the bird(s) has left. If the bird does not relocate (e.g., injured bird), the Service will be contacted to solicit additional guidance.

9) Disturbed areas of the beach (e.g., ruts, tread marks) will be smoothed out and loosened upon the completion of each work day.

10) Prior to the construction of the DMPA at Apffel Park, the Galveston Park Board, in coordination with the Corps, will contact the Service to evaluate the area for piping plover and red knot use. Additional minimization guidance may be provided from the Service at this time.

Sea Turtles - peak nesting season begins March 15 extending through October 1

11) Placement of sand for beach nourishment will be conducted, when possible, outside of the sea turtle nesting season (March 15 to October 1).

12) The Galveston Park Board, in coordination, with the Corps, will ensure that daily turtle patrols of the proposed beach nourishment area by the wildlife monitor are conducted before beginning beach nourishment activities each day and continuously throughout the work day.

13) If a sea turtle or nest is located or identified, the siting will be documented on the Wildlife Monitoring Checklist to be provided by the Galveston Park Board (attached), and beach nourishment activities will immediately cease within 100 feet of the nest or turtle. The monitor will then call 1-866-TURTLE5 (1-866-887-8535) and notify the Service, Texas Coastal Ecologist Services Field Office (TCESFO), at 281-212-1512 (Moni Belton). Additional numbers can be found on the Wildlife Monitoring Checklist.

14) All turtles, turtle nests, or turtle eggs found during beach nourishment activities will be safeguarded until they can be re-located by properly permitted individual(s).

Construction, Equipment, and Designated Work Area

15) Beach nourishment activities will be conducted mechanically by means of trucks, front-end loaders, bulldozers, cranes, and/or UT/ATVs. Other equipment could include a dredge pipe, booster pumps, generators, lighting, and fuel trucks.

16) Materials and equipment required for the project will be staged in upland areas and transported as needed to the proposed work sites. Staging areas will be designated before work begins and will be solely within the construction footprint. Equipment may be fenced within these staging areas.

17) Construction vehicles will access the beach from public roads closest to the work sites to reduce the unnecessary vehicle traffic on the beach. Drive-overs, to facilitate ingress and egress from work sites, will be constructed of beach-quality sand.

18) Ingress/egress routes will be flagged/marked with wooden laths/stakes to ensure that work activities remain within the approved project area. These items will be removed once work is completed in designated areas.

19) The contractor will coordinate and sequence the work to minimize the frequency and density of vehicular traffic on the beach to the greatest extent practicable. Construction crews and vehicles will avoid the swash zone and the wrack line closest to the swash zone when possible. The swash zone is defined as the area of the beach intermittently covered and uncovered by wave run-up. The wrack line is defined as vegetative area made up of but not limited to sargassum, shell hash, vegetation, and some light trash and litter.

20) Sand material placement areas will be confined to a maximum 1,000-foot long segment within the active work corridor. Active vehicle access corridors could include up to an additional 2000 feet. Work activities will run parallel with the shoreline along the work corridor and active work area and will shift linearly along the work corridor as sections of the berm template are completed to allow for birds to migrate to undisturbed portions of the beach.

21) The ends of the 1,000-foot long segment or between groin jetty sections within the active work area will be clearly marked with orange wooden barricades (or other temporary barriers) for the duration of project construction. Barricades will be shifted down the active work area as work is completed.

22) The number of vehicles transiting from upland areas to the project sites will be kept to a minimum. All vehicles will use the same pathways and access will be confined to the closest access point to the immediate work area. Construction/nourishment activities will occur from the landward side of the beach nourishment area whenever possible.

23) Vehicles will adhere to a reduced speed of 15 miles per hour, the speed limit already prescribed for Texas beaches in the Texas Transportation Code #545.352(b)(5).

24) The 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.

Beach Quality Sand and Placement

25) Only sand that meets the specifications of the local beach quality sand (e.g., grain size, color, composition and mineralogy) will be used for beach nourishment activities. The Texas General Land Office provides Beach/Dune guidelines for placing sand and material seaward of the dune protection line in the Texas Administrative Code (TAC 2019); specifically, in 31TAC § 15.4 (c)(2) and (3). These rules specifically prohibit the placement of sand, soil, sediment or dredged is of an unacceptable mineralogy or grain size when compared to natural or native sediments found on the site. These rules also provide that material intended for beach placement must not contain hazardous substances as found in Volume 40 of the Code of Federal Regulations, Part 302.4.

26) Sand will be placed and maintained at a gradual slope to minimize scarping.

27) After project construction in an active work zone is complete for the day the project site will be graded, and all vehicular ruts removed.

Post Construction and Public Outreach

28) Prior to beach nourishment activities, public outreach will be initiated to educate surrounding residents about the project and piping plovers, red knots, and sea turtles. Public education signs will be installed at beach access points within the action area along Galveston Island.

29) Post construction, the Galveston Park Board will monitor changes to the project area and/or species usage so that potential adverse effects from construction can be identified.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Five species of sea turtles are found in U.S. waters and nest on U.S. beaches. These include the leatherback, hawksbill, loggerhead, green and Kemp's ridley sea turtles. The leatherback, hawksbill and green sea turtles rarely nest in the southeastern U.S., but offshore waters are important feeding, resting, and migratory corridors. All are known to nest in Texas. The Kemp's ridley are known to nest in the vicinity of the proposed action area. The Texas sea turtle nesting season is from March 15 to October 1 each year. In addition, Kemp's ridley, loggerhead, green, and hawksbill sea turtles are occasionally found stranded along the beachfront, usually within the sargassum wrack line.

Kemp's Ridley Sea Turtle

Species Description

The Kemp's ridley sea turtle was listed as endangered throughout its entire range on July 28, 1978 (43 FR 32800). Kemp's ridleys are the smallest of the sea turtles, reaching about 2 feet

(0.6 meters) in length and can weigh up to100 pounds (45 kilograms). The adult has an unusually broad, heart-shaped, keeled upper shell that is serrated behind the bridge or midsection, almost as wide as it is long, and is usually olive-gray. The upper shell has five pairs of scales or plates along the sides. In the bridge hooking the lower shell to the upper shell, there are four infra-marginal plates, each perforated by a pore. The lower shell is a light, yellowish color. The head has two pairs of prefrontal scales. The Kemp's ridley has a triangular-shaped head with a somewhat hooked beak with large crushing surfaces. Juveniles have a dark-charcoal colored shell that changes to olive-green or gray with age.

Critical Habitat
Critical habitat has not been designated for this species.

Distribution and Abundance
Kemp's ridleys occur in the Gulf of Mexico and along the Atlantic coast of the U.S., with nesting locations concentrated on coastal areas of Rancho Nuevo, Mexico. Approximately 99.9 percent of known nests are found on the coastal beaches of Tamaulipas and Veracruz, with approximately 21,000 nests protected in 2011. In 2017, approximately 27,000 nest were documented with 353 in Texas, 24,586 in Tamaulipas, and 2,000 located in Veracruz, Mexico (Gaskil 2018). Nesting decreased along the Texas coast to 250 in 2018 (Dr. D. Shaver, National Park Service, pers. comm 2018).

Habitat
Habitat includes areas that shelter the turtle from high winds and waves, with forage areas that include seagrass, oyster reefs, sandy bottoms, mud bottoms, and rock outcroppings. Their diet consists primarily of crabs, shrimp, snails, sea urchins, sea stars, fish and occasionally marine plants (TPWD 1995). Preferred habitat for this species is shallow coastal and estuarine waters and occurs in the bays on the middle and upper Texas coast with regularity.

Life History
Nesting occurs primarily on beaches around Rancho Nuevo, Tamaulipas, Mexico, from April to June each year; however, Kemp's ridley nests have been recorded in Mexico as early as March and as late as August (Gaskil 2018). During preferred nesting conditions, which are precipitated by strong winds, the females come ashore, often in groups called "arribadas." Kemp's ridleys are predominately daytime nesters. Although some females breed annually, this species is considered to nest biannually and may nest as many as three times in a single season (Service and NMFS 2011), producing an average of 2.5 clutches. Clutch size averages between 100-110 eggs. Hatchlings emerge after approximately 50 days of incubation. Sexual maturity is believed to be reached between 10 to 15 years of age. Some fidelity to nesting sites has been shown by Kemp's ridleys, both within one nesting season, and between nesting seasons (PIAS 2018; Burchfield, et. al. 2002). If conditions are unsuitable on a nesting beach or the female is disturbed, she may return to the water and attempt to nest elsewhere within several kilometers of the first site. The disturbance could also cause her to switch nesting beaches entirely (Dr. D. Shaver, National Park Service, PIAS 2018). After the nesting season, adults migrate to feeding areas in the Gulf of Mexico and remain there until the next reproductive season. Hatchlings that successfully emerge from the nest and enter the ocean are essentially pelagic for approximately two years (Ernst et. al. 1994).

Population Dynamics

Kemp's ridley sea turtle numbers have precipitously declined since 1947, when more than 40,000 nesting females were estimated in a single arribada (Service and NMFS 2011). The nesting population produced a low of 702 nests in 1985 (Service and NMFS 2011). Since the mid-1980s, the number of nests laid in a season has been steadily increasing, primarily due to nest protection efforts and implementation of regulations requiring the use of turtle excluder devices (TEDs) in commercial fishing trawls. Today, the population of Kemp's ridleys appears to be in the early stages of recovery, as can be seen along the Texas Coast (PAIS 2018)

Reasons for Listing/Threats to Survival

Several factors contributed to the decline of sea turtle populations along the Atlantic and Gulf coasts, including commercial over-utilization of eggs and turtle parts, incidental catches during commercial fishing operations, disturbance of nesting beaches by coastal housing, marine pollution, and entanglement and ingestion of debris (Service and NMFS 2011). Additional threats are expanding human populations adjacent to important nesting beaches, degradation of coastal foraging habitats, and the potential effects of global warming on sex ratios (NMFS and Service 2007).

Recovery Efforts

Conservation efforts to lessen threats include protection of major nesting beaches, use of TEDs in commercial fishery trawls, regulations for limiting incidental take among fisheries, and management of favorable coastal and marine habitat (NMFS and Service 1991b). Each year, Kemp's ridley nests at Rancho Nuevo and other major nesting beaches in the Mexican states of Tamaulipas and Vera Cruz. They are actively protected from human and mammalian predation, resulting in increased hatching success rates.

In 1978, a cooperative project involving the National Park Service's Padre Island National Seashore (PAIS), NMFS, the Service, the Texas Parks and Wildlife Department, the Gladys Porter Zoo (Brownsville, TX), and Mexican federal and state agencies was initiated to re-establish a nesting colony of Kemp's ridley sea turtles in the U.S. Eggs were collected in Mexico from 1978 to 1988 and transported to PAIS for incubation. Hatchlings were released onto the beach, allowed to enter the water, and then immediately recaptured and raised in "head start" facilities in Galveston, Texas for approximately 9 to11 months before being released into the Gulf of Mexico.

In 1986, the National Park Service initiated a program to detect, monitor, and protect sea turtle nests at PAIS. Detection involves patrols to look for nesting activity, public education, and investigation of reports from patrols, beach workers, and the public. Patrol efforts involving multiple federal, state, local, university and non-governmental agencies are now conducted on most Texas beaches from April 1 to July 15 each year.

Since 1996, some turtles experimentally imprinted to Padre Island or otherwise head-started have returned to PAIS and the nearby vicinity to lay eggs (Shaver 1997, 1998, 1999a, 1999b; Shaver and Caillouet 1998). However, the majority of Kemp's ridley sea turtles that nest in Texas each year are from wild stock.

Piping Plover

For the purpose of this action, discussions will be focused on the Texas wintering piping plover population and its designated critical habitat.

Species Description
The piping plover was federally listed as endangered in the Great Lakes watershed, and as threatened elsewhere in its range, on January 10, 1986 (50 FR 50726). The piping plover is a small North American shorebird approximately 7 inches (17.7 centimeters) long with a wingspread of about 15 inches (38.1 centimeters). Breeding birds have white under parts, light beige back and crown, white rump, and black upper tail with a white edge. In flight, each wing shows a single, white wing stripe with black highlights at the wrist joints and along the trailing edges. Breeding plumage characteristics are a single black breast band, which is often incomplete, and a black bar across the forehead. The black breast band and brow bar are generally more pronounced in breeding males than females. The legs and bill are orange in summer, with a black tip on the bill (Service 2003).

Critical Habitat
Critical habitat on the wintering grounds was designated July 10, 2001 (66 FR 36038). That designation included 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, to provide sufficient wintering habitat to support the piping plover at the population level and geographic distribution necessary for recovery of that species. A total of approximately 165,211 acres (66,881 hectares) and/or 1,798.3 miles (2,891.7 kilometers) were designated. There were 37 critical habitat units [approximately 62,454 acres (25,285 hectares), 797.3 miles (1,283.8 kilometers)] designated in Texas. These areas were believed to contain the essential physical and biological elements for the conservation of wintering piping plovers, and the physical features necessary for maintaining the natural processes that provides appropriate foraging, roosting, and sheltering habitat components.

The primary constituent elements for critical habitat are found in geologically dynamic coastal areas that contain intertidal ocean-facing and bay shoreline beaches and flats (between annual low tide and annual high tide); associated dune systems and flats above annual high tide; and seasonally-emergent sand bars, mud flats, and oyster reefs. The primary constituent elements for the wintering population of the piping plover are (Service 2015):

1) Intertidal sand beaches, including sand flats or mudflats, between annual low tide and annual high tide, with no or very sparse emergent vegetation for feeding. In some cases, these flats may be covered or partially covered by a mat of blue-green algae.

2) Un-vegetated or sparsely vegetated sand, mud, or algal flats above annual high tide for roosting. Such sites may have debris or detritus, and may have micro-topographic relief offering refuge from high winds and cold weather.

3) Surf-cast algae for feeding.

4) Sparsely vegetated back beach, which is the beach area above mean high tide seaward of the dune line; or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road. Back beach areas are used by plovers for roosting and refuge during storms.

5) Spits, especially sand, running into water for foraging and roosting.

6) Un-vegetated wash over areas with little or no topographic relief for feeding and roosting. Wash over areas are formed and maintained by the action of hurricanes, storm surges, or the extreme wave actions.

7) Natural conditions of sparse vegetation and little or no topographic relief mimicked in artificial habitat types (e.g. dredge spoil sites).

Distribution and Abundance

Piping plovers breed only in North America within three geographic regions that encompass three distinct breeding populations: the Northern Great Plains, the Great Lakes, and the Atlantic Coast. The winter ranges of the different breeding populations overlap, making it impossible to distinguish the source population of a wintering bird unless it has been banded or marked on the breeding grounds. The piping plover's primary winter range is along the Atlantic and Gulf coasts from North Carolina to Mexico, and into the Bahamas and West Indies (Service 1985). Southward migration to the wintering grounds along the southern Atlantic coast and Gulf of Mexico shoreline extends from late July, August, and September. Individuals can be found on their wintering grounds throughout the year, but sightings are rare in May, June, and early July (Service 2003).

Habitat

In most areas, wintering piping plovers depend on a mosaic of sites distributed through the landscape, as the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions (Drake 1999). Plovers move among sites as environmental conditions change. In general, wintering piping plovers forage mostly on benthic invertebrates, insects, and crustaceans found within the intertidal areas of ocean beaches, wash over areas with no or very sparse emergent vegetation, mudflats, sandflats, wrack lines; and shorelines of coastal ponds, lagoons or salt marshes. Roosting areas may be un-vegetated or sparsely vegetated and may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather.

Life History

Behavioral observations of piping plovers on the wintering grounds suggest that they spend the majority of their time foraging (Nicholls and Baldassarre 1990, Drake 1999, Service 2003). In general, wintering piping plovers forage mostly on benthic invertebrates, insects, and crustaceans found within the intertidal areas of ocean beaches; wash over areas with no or very sparse emergent vegetation, mudflats, sandflats, wrack lines; and shorelines of coastal ponds, lagoons or salt marshes. Roosting areas may be un-vegetated or sparsely vegetated and may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. When not foraging, plovers undertake various maintenance activities such as roosting, preening, bathing, aggressive encounters (with other piping plovers and other species), and moving among available habitat locations (Zonick and Ryan 1996). Individual plovers tend to return to the same wintering sites year after year (Nicholls and Baldassarre 1990, Drake 1999, Service 2003).

Population Dynamics
The Texas coast is a major wintering area for piping plovers, and may provide habitat for about 55 percent of birds found during winter censuses (Nicholls and Baldassarre 1990, Haig and Plissner 1993, Drake 1999, Elliott-Smith et. al. 2009). Since piping plovers spend 55 to 80 percent of their annual cycle associated with wintering areas, factors that affect their wellbeing on the wintering grounds could substantially affect their survival and recovery (Service 1996). A consistent finding of all analyses of the demographic factors affecting the persistence and/or extinction of piping plover populations is that vulnerability to extinction is greatly increased by even small declines in survival rates (Melvin and Gibbs 1994; Plissner and Haig 2000a) Modeling by Melvin and Gibbs (1994), for example, postulated approximately four-fold increases in the likelihood of extinction of the Atlantic Coast piping plover population when survival rates of adults and juveniles declined by as little as 5 and 10 percent, respectively, and other parameters were constant.

Reasons for Listing/Threats to Survival
Threats to piping plover populations and habitat are similar on the breeding and wintering ranges. Habitat destruction and degradation are pervasive and have reduced physically suitable habitat. Human disturbance and predators further reduce breeding and wintering habitat quality and affect survival. Contaminants, as well as genetic and geographic consequences of small population size, pose additional threats to piping plover survival and reproduction (Service 2003).

A variety of human-caused disturbance factors have been noted that may affect plover survival or utilization of wintering habitat. Those factors include human disturbance such as recreational activities, inlet and shoreline stabilization projects, dredging of inlets that can affect spit formation, beach maintenance and nourishment, and pollution (Nicholls and Baldassarre 1990, Haig and Oring 1985, Haig and Plissner 1993). In some areas, natural erosion of barrier islands may also result in habitat loss.

Recovery Efforts
The Atlantic Coast Piping Plover Recovery Plan (Service 1996) calls for the protection of all known wintering habitat by preventing habitat degradation and disturbance, including direct and indirect impacts of shoreline stabilization, navigation projects, development, disturbance by recreationists and their pets, and contamination and degradation due to oil or chemical spills. Factors that must be considered include: (1) disturbance depleting the birds' energy reserves, and (2) effects on prey availability that may last long after the completion of a given action. The Great Lakes and Northern Great Plains Piping Plover Recovery Plan (Service 1988) and the Recovery Plan for the Great Lakes Piping Plover (Service 2003) also call for protecting

wintering piping plovers and managing their habitats to promote survival and recovery.

Adult survival is key to the continued and long-term existence of the piping plover and to stepwise improvement toward meeting its recovery criteria. Protecting the wintering grounds allows adult piping plovers to maintain adequate body reserves so they survive the winter and can migrate back to nest in the spring. Broad management actions on the wintering grounds include protection of resting areas, designation of important shorebird wintering sites and regular shorebird surveys.

Red Knot

Species Description

There are six recognized subspecies of red knots (*Calidris canutus*), and on December 11, 2014, the Service published the final rule listing the rufa subspecies of red knot (*Calidris canutus rufa*) as a threatened species under the Act; that rule became effective on January 12, 2015. (Throughout this document, the "rufa red knot" will be referred to as the "red knot" unless there is specific reference to a distinct subspecies.) For the full, detailed discussion of the entire life history and biology of the species, please reference the Service's final rule for the listing of the species (Service 2014) and its supplemental document, *Rufa Red Knot Background Information and Threats Assessment*.

The red knot is a medium-sized shorebird about 9 to 11 inches in length. The red knot is easily recognized during the breeding season by its distinctive rufous (red) plumage. Nonbreeding plumage is dusky gray above and whitish below. Juveniles resemble nonbreeding adults, but the feathers of the scapulars and wing coverts are edged with white and have narrow, dark bands, giving the upperparts a scalloped appearance (Davis 1983).

Critical Habitat

Critical habitat has not been designated for this species.

Distribution and Abundance

The red knot's range spans 40 states, 24 countries, and their administrative territories or regions extend from their breeding grounds in the Canadian Arctic to migration stopover areas along the Atlantic and Gulf coasts of North America to wintering grounds throughout the Southeastern U.S., the Gulf coast, and South America (reaching as far south as Tierra del Fuego at the southern tip of South America). In Delaware Bay and Tierra del Fuego, the era of modern surveys for the red knot and other shorebird species began in the early 1980s. Systematic red knot surveys of other areas began later, and for many portions of the knot's range, available survey data are patchy. Prior to the 1980s, numerous natural history accounts were available and provide mainly qualitative or localized population estimates. Nonetheless, a consistent narrative emerges across many historical accounts that red knots were extremely abundant in the early 1800s, decreased sharply starting in the mid-1800s, and may have begun to recover by the mid-1900s. Most writers agree the cause of that historical decline was intensive sport and market hunting. It is unclear whether the red knot population fully recovered its historical numbers following the period of unregulated hunting (Harrington 2001).

Habitat

Habitats used by red knots in migration and wintering areas are generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In many wintering and stopover areas, quality high-tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited (Kalasz 2012 pers. comm.; Niles 2012 pers. comm.). The supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated (Harrington 2008). In some localized areas, red knots will use artificial habitats that mimic natural conditions, such as nourished beaches, dredged spoil sites, elevated road causeways, or impoundments; however, there is limited information regarding the frequency, regularity, timing, or significance of red knots' use of such artificial habitats.

In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, peat banks, and shallow coastal impoundments, ponds, and lagoons along the Atlantic coast (Cohen et al. 2010; Cohen et al. 2009; Niles et al. 2008; Harrington 2001; Truitt et al. 2001). In Florida, the birds also use mangrove and brackish lagoons. Along the Texas coast, red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides. Red knots also show some fidelity to particular migration staging areas between years (Duerr et al. 2011; Harrington 2001).

Life History

Little information is available about nonbreeding red knots. Unknown numbers of nonbreeding red knots remain south of the breeding grounds during the breeding season, and many, but not all, of these red knots are 1-year-old (i.e., immature) birds (Niles et al. 2008). Nonbreeding red knots, usually individuals or small groups, have been reported during June along the U.S. Atlantic and Gulf coasts, with smaller numbers around the Great Lakes and Northern Plains in both the United States and Canada (eBird.org 2012). There is also little information on where juvenile red knots spend their winter months (Service and Conserve Wildlife Foundation of New Jersey 2012), and there may be at least partial segregation of juvenile and adult red knots on the wintering grounds. All juveniles of the Tierra del Fuego wintering region are thought to remain in the Southern Hemisphere during their first year of life, possibly moving to northern South America, but their distribution is largely unknown (Niles et al. 2008). Because there is a lack of specific information on juvenile red knots, the Service uses the best available data from adult red knots to draw conclusions about juvenile foraging and habitat use.

Population Dynamics

Localized and regional red knot surveys have been conducted across the subspecies' range with widely differing levels of geographic, temporal, and methodological consistency. Available survey data are presented in detail in the Service's supplemental document to the December 11, 2014, final rule, *Rufa Red Knot Background Information and Threats Assessment* (Service 2014). However, some general characterizations of the available data are noted as follows:

- No population information exists for the breeding range because, in breeding habitats, red knots are thinly distributed across a huge and remote area of the Arctic. Despite some localized survey efforts, (e.g., Bart and Johnston 2012; Niles et al. 2008), there are no regional or comprehensive estimates of breeding abundance, density, or productivity (Niles et al. 2008).

- Few regular surveys are conducted in fall because southbound red knots tend to be less concentrated than during winter or spring.
- Some survey data are available for most wintering and spring stopover areas. For some areas, long-term data sets have been compiled using consistent survey methodology.
- Because there can be considerable annual fluctuations in red knot counts, longer-term trends are more meaningful. At several key sites, the best available data show that numbers of red knots declined and remain low relative to counts from the 1980s, although the rate of decline appears to have leveled off since the late 2000s.
- Inferring long-term population trends from various national or regional datasets derived from volunteer shorebird surveys and other sources, NPS (2013), Andres (2009) and Morrison et al. (2006) also concluded that red knot numbers declined, probably sharply, in recent decades.

Reasons for Listing/Threats to Survival
The Service has determined that the red knot is threatened due to loss of both breeding and nonbreeding habitat; likely effects related to disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (''mismatches'') in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions. Main threats to the red knot in the United States include: reduced forage base at the Delaware Bay migration stopover; decreased habitat availability from beach erosion, sea level rise, and shoreline stabilization in Delaware Bay; reduction in or elimination of forage due to shoreline stabilization, hardening, dredging, beach replenishment, and beach nourishment in Massachusetts, North Carolina, and Florida; and beach raking which diminishes red knot habitat suitability. These and other threats in Canada and South America are detailed in the final listing rule (Service 2014). Unknown threats may occur on the breeding grounds.

ENVIRONMENTAL BASELINE
The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early Section 7 consultation; and the impact of state and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area
The action area includes approximately 81,454 linear feet (LF) of beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park (approximately 30,603 LF) then from the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive (approximately 50,851 LF) on Galveston Island, Galveston County, Texas.

Kemp's Ridley Sea Turtle

The majority of Kemp's ridley sea turtles nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a very small number of Kemp's ridleys consistently nest along the Texas coast. Historic nesting frequency on the south Texas coast is poorly known and only six Kemp's ridley sea turtles were documented prior to 1979 (Shaver and Caillouet 1998). However, 1,185 Kemp's ridley nests were found on the Texas coast between 1979 and 2011(Dr. D. Shaver, National Park Service, pers. comm 2011). An additional 78 have been documented from 2012 to 2018 along the upper Texas Coast.

In 2002, Kemp's ridley sea turtles were documented nesting on Galveston Island and surrounding areas on the upper Texas coast, defined as the area from Matagorda Peninsula northward to Sabine Pass. In every subsequent year, Kemp's ridleys have nested on the upper Texas coast. In 2018, 250 Kemp's ridley nests were found in Texas, 15 of which were on the upper Texas coast with 2 of those occurring along Galveston Island. (Shaver 2018).

There have been 86 Kemp's ridley sea turtle nests recorded on Galveston Island since 2002, with the highest count of 15 in 2011 and lowest being zero in 2016 (Shaver 2018, PAIS 2018). The number of turtle nests that have occurred in the area proposed for beach nourishment in the proposed project area since 2012 is three. The entire 15-mile area proposed for beach nourishment is considered suitable habitat for nesting Kemp's ridley sea turtles.

Piping Plover

The piping plover is a regular winter resident along the upper Texas coast (Haig and Oring 1985, Haig and Plissner 1993). Piping plovers begin arriving in July; however, late-nesting birds on the breeding grounds can arrive as late as September. A few individuals can be found throughout the year but sightings are rare in late May, June, and early July. They begin leaving in late February to migrate back to the breeding sites, and by late May most birds have left (Haig and Elliott-Smith 2004).

Piping plovers may use the 15 miles of beach proposed for nourishment for foraging, resting or loafing. The western portion of the project located near San Luis Pass is designated critical habitat for the wintering piping plover (Texas Unit-34). Piping plovers use this critical habitat unit for foraging, resting and sheltering.

The exact number of piping plovers that winter in Texas and on Galveston Island is unknown. However, an international piping plover winter census counted 1,904 wintering piping plovers in Texas in 1991, 1,333 in 1996 and 1,042 in 2001 (Haig and Plissner 1993, Plissner and Haig 2000b, Haig et. al. 2005). In 2006, a range-wide census was again conducted for breeding and wintering plovers. The 2006 wintering census consisted of one-time counts by qualified observers during a designated two-week period of time (January 23-February 6, 2006). The 2006 wintering piping plover census recorded a total of 3,884 individual plovers range-wide, with 2,090 individuals recorded in Texas and 114 individuals recorded on the west end of

Galveston Island (Elliott-Smith et. al. 2009). The 2011 International Piping Plover Census (IPPC) recorded only 30 piping plovers on the east end of Galveston Island located and none along the west end. Although official numbers were low, weather conditions during the IPPC could have had an effect on the counts, and may not be indicative of actual piping plover activity on the island. In 2016, thirteen individuals were documented along the west end during IPPC census. Ebird observations for the piping plover document a range from one individual up to 25 individuals in one location. (Ebird 2018).

It is important to note that the presence or absence of piping plovers at any given location or time of year cannot be determined by this type of census, which is limited to a single observation within a specific period of time. Piping plovers may occur throughout the action area in varying numbers and concentrations depending on annual population fluctuations, time of year, and local weather and tidal conditions.

The entire 15-mile area proposed for beach nourishment is considered suitable habitat for wintering piping plovers.

Piping Plover Critical Habitat Unit TX-34

Piping Plover critical habitat unit TX-3, San Luis Pass, is located within and adjacent to the far western portion of the project area extending from the west side of Pointe West Subdivision towards San Luis Pass. The landward boundary is the line indicating the beginning of dense vegetation, and the gulf side boundary is the mean lower low water (MLLW).

Red Knot

Except for localized areas, there have been no long-term systematic surveys of red knots in Texas or Louisiana, and no information is available about the number of knots that winter in northeastern Mexico. From survey work in the 1970s, Morrison and Harrington (1992, p. 77) reported peak winter counts of 120 red knots in Louisiana and 1,440 in Texas, although numbers in Texas between December and February were typically in the range of 100 to 300 birds. Records compiled by Skagen *et al.* (1999) give peak counts of 2,838 and 2,500 red knots along the coasts of Texas and Louisiana, respectively, between January and June over the period from1980 to 1996, but these figures could include spring migrants. Morrison *et al.* (2006, p. 76) estimated only about 300 red knots winter along the Texas coast, based on surveys in January 2003 (Niles *et al.* 2008, p. 19). Higher counts of roughly 700 to 2,500 knots have been made on Padre Island, Texas, during October, which could include wintering birds (Newstead *et al.* 2013, p. 54; Niles *et al.* 2009, p. 1). There are no current estimates for the size of the Northwest Gulf of Mexico wintering group as a whole (Mexico to Louisiana). The best available current estimates for portions of this wintering region are about 2,000 in Texas (Niles 2012a), or about 3,000 in Texas and Louisiana, with about half in each State and movement between them (C. Hunter pers. comm. September 20, 2012).

Assessing the number of red knots within the action area during winter and migration periods is difficult as there is human disturbance throughout the year and the number of birds utilizing the area varies daily, monthly, seasonally, and from year to year. The number of red knots that winter in Texas and on Galveston Island is unknown. Ebird observations for the red knot document a range from one individual up to 19 individuals in one location. (Ebird 2018).

The entire 15-mile area proposed for beach nourishment is considered suitable habitat for wintering red knots.

Red Knot Critical Habitat
No critical habitat is designated for the red knot

Factors Affecting Species Environment within the Action Area

Galveston Island is a barrier island located along the upper Texas coast in the Gulf of Mexico. Barrier islands are traditionally dynamic systems, with wind, waves, storms, tidal and longshore currents moving sand along the beach (Britton and Morton 1989). A wide range of past, present and ongoing beach disturbance activities occur within the proposed action area. As storms and hurricanes have eroded Galveston beaches, nourishment activities have attempted to widen them. Nourishment activities can change the sediment color and composition, and may alter coastal processes. Beach nourishment occurred in the action area, albeit on a smaller scale, in 2003 under a previous Corps permit. Beach scraping and raking has increased in frequency in recent years; beach cleaning can artificially steepen beaches, and change sediment distribution patterns. Artificial dune systems are often constructed and maintained to protect beachfront structures. Excessive recreational use of beaches and flats may make these habitats unsuitable to the species that use these areas.

Residential development and recreational activities such as walking, jogging, walking unleashed pets, and operating vehicles on the beach increases the potential for wintering piping plovers to be impacted by loss of habitat, or could cause interference in roosting, resting and foraging activities. These types of activities could also disrupt sea turtle nesting habitat and activities.

Summary
Nesting Kemp's Ridley sea turtles, wintering piping plovers and red knots are known to occur in the action area. Galveston Island has been experiencing increased erosion in recent years, which was exacerbated by the recent hurricanes. Disturbances such as beach nourishment and beach raking are relatively common in the action area.

EFFECTS OF THE ACTION

Under section 7(a) (2) "effects of the action" refers to the direct and indirect effects of an action on a species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action. The effects of the proposed action are added to the environmental baseline to determine the future baseline that serves as the basis for the determination in this biological opinion. The impacts discussed below are the Service's evaluation of the direct and indirect effects of the proposed action. Indirect effects are those caused by the proposed action that occur later in time, but are still reasonably certain to occur (50 CFR 402.02). The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.

Kemp's Ridley

Beneficial Effects
Beach nourishment on approximately 15 miles of beach could provide additional nesting habitat for Kemp's Ridley sea turtles, particularly in light of the severe erosion that occurred in the action area as a result of Hurricane Ike in 2008 and Hurricane Harvey in 2017. In addition, the project would provide an opportunity to educate the public on the importance of beach habitats for nesting sea turtles.

Direct Effects
Schroeder (1994) found that even under the best of conditions, experienced sea turtle nest surveyors can misidentify about seven percent of nesting attempts as false crawls, in which a female turtle comes ashore to nest but returns to the water without digging a nest or laying eggs. Weather, tides, and off-road recreational vehicle tracks can obscure sea turtle tracks, especially after night nesting and before morning surveys. Turtle patrollers and/or monitors locate nests primarily by searching for the tracks left in the sand and locating females during their nesting activity. However, nesting turtles do not always leave visible tracks on the beach, particularly in areas with very hard packed sand, very soft and blowing sand, and thick seaweed. The passage of heavy equipment or construction vehicles could remove sea turtle tracks, making it difficult for the monitor to find a nest for investigation and protection. Therefore, even when turtle monitors are employed, sea turtles, hatchlings or eggs could be harmed by construction activities.

Burial of Sea Turtles, Eggs, or Hatchlings
Deposition of sand for beach nourishment on approximately 15 miles of beach could harm adult female sea turtles that attempt to nest in the action area during nourishment activities, but remain undetected by sea turtle monitors and/or construction crews. Likewise, undetected nests could be buried by sand resulting in crushing of eggs or hindering hatchlings from climbing out of the nest and reaching the ocean. Burying nests and the associated reduced hatching and emergence success are known impacts to sea turtle reproduction (Crain et al. 1995).

Collisions with Heavy Equipment and Vehicles
Operation of heavy equipment on the beach can crush nesting turtles, stranded turtles, hatchlings, and eggs (Mann 1977; NMFS and Service 1991a, 1991b, 1992, 1993; Ernest et al. 1998). Sea turtles on the beach at some stage of nesting may be difficult to see, and may be hit by vehicles or heavy equipment. Hatchlings may emerge at night or early in the morning from in-situ nests missed by sea turtle monitors. Because of their extremely small size, live hatchlings on the beach during the day are vulnerable to being run over.

Compaction of Undetected Nests
Mann (1977) reported that driving directly above incubating egg clutches can cause sand compaction, which may decrease nest success and directly kill pre-emergent hatchlings and eggs potentially by physical crushing or collapse of the nest chamber. Vehicles can also compact the sand, making it more difficult or impossible for nesting turtles to excavate a nest cavity. This can lead to increased false crawls and nests with shallow egg chambers (Fletemeyer 1996).

Compaction could also make it more difficult for hatchlings to emerge from an undetected nest.

Many factors, including speed, weight, and size of the vehicle, the timing of the event with respect to the incubation period, the depth of the eggs/hatchlings (below grade) at the time of impact, and the physical characteristics of the nest itself, will influence whether or not, and the extent to which, mortality or injury occurs. Further, there is no established relationship between the cumulative number of times a particular nests has been run over and the extent and duration of the mortality or injury event. Also confounding this analysis are other factors that may affect the viability of any particular sea turtle nest. For example, tidal inundation, storm events, predation, and accretion/erosion of sand could negatively influence a sea turtle nest deposited in areas where beach driving also occurs (NMFS and Service 1991a; 1991b; 1992; 1993).

Entrapment of Hatchlings in Vehicle Tire Ruts and Berms

It is reported that vehicular ruts and berms create obstacles for hatchlings moving from the nest to the ocean. Upon encountering a vehicle rut, hatchlings may be disoriented along the vehicle track rather than crossing over it to reach the water. Hatchlings become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon. Hatchlings detoured along vehicle ruts are at greater risk to vehicles, predators, fatigue and desiccation. If trapped for a period of time, this could cause them to weaken, become inverted, or succumb due to predation, disorientation, crushing, or dehydration (Hosier et al.1981; Fletemeyer 1996; Ernest et al. 1998). The depth and slope of the ruts influence the amount of impact, with deeper and more steeply sloped ruts causing a greater impact. Hosier et al. (1981) found that 3.9 to 5.9 inch (10 to 15 centimeter) deep tracks may serve as a significant impediment to loggerhead hatchlings. Berms may also create a barrier for adult nesting turtles causing and adverse effect by making them come ashore to nest and then abandon the nesting attempt or choose a less than suitable nesting area.

Vibration and Noise Impacts on Adults and/or Eggs

Vibrations and noise caused by heavy equipment, construction vehicles or temporary pipelines on the beach could frighten nesting turtles, harassing them, and possibly leading to a false crawl (NMFS and Service 1991a, 1991b, 1992; Ernest et al. 1998). Vibrations could also harm incubating eggs, but these effects are difficult to assess due to a lack of scientific data.

Lighting

Work lights can disorient loggerhead sea turtles that nest at night, possibly leading to an increase in false crawls. Lights can also disorient Kemp's ridley and loggerhead hatchlings from undiscovered nests; they could crawl in the wrong direction rather than enter the sea. This can make hatchlings more vulnerable to crushing, predation, and dehydration (NMFS and Service 1991a, 1991b; Fletemeyer 1996). Adult Kemp's ridley sea turtles are primarily daytime nesters, thus artificial work lights used at night should not affect them.

Pipeline

Even though the proposed pipelines are temporary, pipelines can cause nesting habitat to become inaccessible due to the pipeline acting as a barrier. Egg mortality can be increased where sea turtles are forced to nest in less suitable habitat due to the presence of barriers (Witherington et al. 2003). Both adults and hatchlings can be trapped behind the pipeline preventing them from reaching the ocean

Indirect Effects
Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur.

Change in Beach Sediment Composition
Sediments surrounding the egg chamber largely influence the incubation environment of the clutch. Temperature, moisture content, and gas exchange, all extremely important factors in the development of sea turtle embryos, are influenced by sediment characteristics (Ackerman et al. 1985). Thus, hatching success, emerging success, sex ratios, and hatchling fitness (size and vitality) may be different in compact sediments than in more loosely configured sediments of comparable grain size. Minute changes in the composition of beach sediment may affect sea turtle nesting frequency and success. Over time, these types of changes could result in the nourished beach becoming less suitable for use by nesting sea turtles and/or negatively impact the eggs and hatchlings.

Increased Beach Use and Residential Development
Beach nourishment in the action area would result in a wider beach profile, which would almost certainly encourage public use. This would increase the number of beach visitors to the area, increase recreational use in the action area (increasing vehicles, pedestrians, pets, and predators), and possibly expand beach grooming practices into additional areas. Beach maintenance activities such as raking and blading can modify sea turtle habitat by compacting the sand, and creating ruts, berms and escarpments.

Piping Plover and Red Knot

Piping plovers and red knots exhibit similar foraging and roosting behaviors and utilize similar coastal habitats. The factors affecting these species within the action are similar for both species; therefore, the following sections discuss the mutual effects of the action to both species.

Beneficial Effects
The project would provide an opportunity to educate the public on the importance of beach habitats for wintering piping plovers and red knots, primarily through the development and implementation of a public outreach program by the Galveston Park Board.

Direct Effects
Harm and Harassment from Construction Activities
Heavy equipment, construction vehicles, construction personnel, and temporary pipelines placed and operated on the beach could pose a hazard to roosting piping plovers and red knots, especially during cold temperatures or at night. The deposition of sand on approximately 15 miles of beach, the installation/removal of the temporary pipeline, and the construction of the DMPA at Apffel Park would temporarily affect the suitability of this area for wintering piping plovers and red knots. Benthic invertebrate and crustacean communities that these birds forage on would be temporarily disrupted, and the noise, human activity, and lighting associated with nourishment activities would result in harassment of the plovers and red knots.

Indirect Effects
Increased Public Use
Beach nourishment in the action area would result in a wider beach profile, which would almost certainly encourage public use. This would increase the number of beach visitors to the area, increase recreational use in the action area (increasing vehicles, pedestrians, pets, and predators), and possibly expand beach grooming practices into additional areas. Beach maintenance activities such as raking and blading can modify wintering piping plover and red knot habitat by removing debris, affecting prey species, and providing additional vehicle access points to the beach.

Summary

The proposed action has the potential to adversely affect the Kemp's ridley, migrating and wintering piping plover and their critical habitat, and migrating and wintering red knots within the action area. The construction activities may lead to temporarily diminished quantity and quality of sea turtle nesting habitat, feeding and roosting habitats for piping plovers and red knots within the action area. However, the proposed project could benefit Kemp's ridley sea turtles by providing additional nesting habitat, and could benefit sea turtles, wintering piping plovers and red knots through public education and outreach. However, direct effects may occur from burial of sea turtles, eggs, or hatchlings; collisions with heavy equipment or vehicles; compaction of undetected nests; vibration and noise impacts on adults and/or eggs; entrapment of hatchlings in vehicle tire ruts and berms; and lighting. Indirect effects to Kemp's ridley may occur from changes in beach sediment composition, and increased public use. Direct effects to piping plovers and red knots may occur in the form of harassment due to construction activities, and indirect effects could result from increased public use.

CUMULATIVE EFFECTS
Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

Beach nourishment in the action area would result in a wider beach profile, which would almost certainly make development or re-development in nearby upland areas more desirable. Additional development or other activities occurring within the action area may occur with or without Federal authorization. Continued development may further increase public users to the area (increasing vehicles, pedestrians, pets, and predators) which will have associated effects to listed species within the action area. Increased lighting from development may affect sea turtle nesting habitat on the beachfront; increased predators associated with people may affect wintering piping plovers.

We reasonably expect future state, local, or private entities to nourish segments of the beach that narrow or become degraded in the future. However, because beach nourishment activities require permitting by the U.S. Army Corps of Engineers, these actions are likely to require Section 7 consultation between the Corps and the Service and do not fall under the definition of future state, tribal, local, or private actions.

CONCLUSION
After reviewing the current status of the Kemp's ridley sea turtle, the piping plover and the red knot; the environmental baseline for the action area; the effects of the issuance of Department of Army permit SWG-2007-01025; and the cumulative effects; it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Kemp's ridley sea turtle, the piping plover and the red knot.

Kemp's Ridley Sea Turtle

The Service finds that the proposed action is not likely to jeopardize the Kemp's ridley sea turtle for the following reasons:

1. Although the number of Kemp's ridley nests in Texas has steadily increased in recent years, the majority of Kemp's ridley sea turtles continue to nest on beaches in the Mexican states of Tamaulipas and Vera Cruz. The number of Kemp's ridley nests found in Texas (12 on the upper Texas coast in 2017 and 15 in 2018), is significantly lower than the number of nests in Mexico (approximately 24,000 in 2017).

2. The conservation measures proposed by the Corps and the Galveston Park Board will reduce the likelihood that nesting Kemp's ridleys, their eggs or hatchlings are harmed during beach nourishment activities.

Piping Plover and Red Knot

The Service finds that the proposed action is not likely to jeopardize the wintering piping plover and Red Knot for the following reasons:

1. Beach nourishment activities would result in temporary harassment of piping plovers and red knots in and adjacent to the action area. Feeding opportunities would be temporarily disrupted due to benthic invertebrate and crustacean community loss. Invertebrate populations may take up to one year to fully recover. However, the proposed action would not permanently alter the suitability of these areas for the species.

2. The conservation measures proposed by the Corps and the Galveston Park Board will reduce the likelihood that wintering piping plovers are harmed during beach nourishment.

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the Galveston Park Board, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the Galveston Park Board to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps and the Galveston Park Board must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Kemp's Ridley Sea Turtle

Based on the information within our files and within the BA (including the conservation measures proposed by project proponents), the Service anticipates that 2 adult Kemp's ridley sea turtle and eggs or hatchlings from 4 sea turtle nests will be taken directly as a result of this action. Specifically, incidental take resulting from this project is expected to be in the form of harm and/or harassment from:

1. Disruption of breeding activities from noise, vibrations, heavy machinery and human presence on the beach.

2. Entrapment of adults and hatchlings in trenches and vehicle ruts and trenches.

3. Crushing, collision, and burial of sea turtles and/or nests and compaction of sand over nest with heavy equipment.

The Service anticipates that the incidental take of sea turtle hatchlings and/or eggs from these effects will be difficult to detect for the following reason(s):

1. Turtle nests are difficult to find. Natural factors, such as rainfall, wind, and tides and human-caused factors, such as pedestrian traffic, may obscure crawls, resulting in nests being destroyed because they were missed during monitoring surveys.

2. The total number of hatchlings and eggs per undiscovered nest is unknown.

3. The reduction in percent hatching and emerging success per nest over an undisturbed nest site is unknown.

4. An unknown number of females may avoid the project beaches and be forced to nest in less optimal areas.

Piping Plover and Red Knot

The Service anticipates harassment, in the form of noise and human disturbance, of 25 piping plovers and 19 red knots due to beach nourishment and construction activities action over the 5-year term of the permit. Effects on these species are expected to be temporary and non-lethal. Incidental take associated with this project is expected to be in the form of harm and/or harassment from:

1. Disruption of feeding and sheltering behaviors resulting from noise, vibrations, heavy machinery and human presence on the beach.

2. Reduction in feeding and sheltering opportunities or capabilities due to the loss and/or degradation of foraging and roosting habitat.

3. Temporary or permanent reduction in survivability of wintering piping plovers and red knots resulting from the lost and/or degradation of foraging and roosting habitat.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service has determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting and hatchling Kemp's ridley sea turtles, non-breeding piping plovers and red knots in the proposed Galveston Park Board beach nourishment project within the action area:

1) Implement all conservation measures in the BO, permit application and/or project plans.
2) Ensure that all parties involved in the project (i.e., contractors, work crews, monitors, etc.) fully understand the endangered species protection measures detailed in the incidental take statement

3) Prevent and/or reduce escarpment formations.
4) Indiscriminately leave wrack/sargassum in place for roosting and/or foraging piping plovers and red knots if possible.
5) Establish and implement a protocol to notify the Texas Coastal Ecological Service Field Office [TXCESFO (Houston office)] immediately of direct take of sea turtles, hatchlings, sea turtle eggs, or nests.
6) Notify TXCESFO in 2 weeks prior to the initiation and upon completion of work activities.
7) Submit an annual report describing beach nourishment locations, activity type, and "look this up on current report sheet".

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and the Galveston Park Board shall comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting or monitoring requirements. These terms and conditions are non-discretionary.

Sea Turtles and Piping Plovers and Red Knots

1) As detailed in the project description the Corps and Galveston Park Board will implement measures to avoid and minimize impacts to sea turtles, piping plovers and red knots. Conservation measures will be implemented and made part of the Corps permit.

2) Galveston Park Board in coordination with the Corps shall insure that contractors, work crews, and the sea turtle, piping plover and red knot monitors shall be properly trained to identify sea turtles, piping plovers and red knots prior to the commencement of work each time work is to be conducted.

3) Notify TXCESFO in writing two weeks prior to initiation of construction activities and within two weeks following the completion of project construction. Upon completion of the project, a report describing any deviations from the description of the proposed action (see description of proposed action section above), conservation measures implemented during project activities, the success of such measures, any incidents that may have occurred, and any recommendations on improvements to those measures shall be submitted to TXCESFO. Reports should be sent to U.S. Fish and Wildlife Service, ATTN: Field Supervisor, 17629 El Camino Real Suite 211, Houston, Texas 77058.

4) In the event that activities result in the direct take (killing, harming, or maiming) of a sea turtle, hatchlings, or eggs, the person(s) responsible for monitoring sea turtles shall notify TXCESFO (281/286-8282, 281/212-1512) and Dr. Donna

Shaver (National Park Service/PAIS), and the Texas Sea Turtle Stranding Coordinator (361/949-8173, ext. 226). The Corps and other project proponents will develop a standard methodology for notifying the aforementioned contacts. The handling of dead or stranded sea turtles found during the monitoring program will be established by the Sea Turtle Coordinator and the Service.

5) Provide updated summary table to the TXCESFO by December 31st of each year. The summary table should include, location of activities, conservation measures implemented, success of such measures, species take, incidences, and any recommendations on improvements to those measures (example attached).

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

For the benefit of nesting sea turtles and wintering piping plovers, the Service recommends the following:

1. Work with the Service to design and fund a research program to determine the long-term effects of beach nourishment activities on sea turtle nesting success and/or wintering piping plover critical habitat components. This includes annual beach (sand survey) monitoring, and 1-year post-nourishment threatened and endangered species monitoring to provide data that indicates the completed project is species impact neutral.

2. Work with the Service to develop a plan to monitor and survey benthic organism recovery associated with beach nourishment activities along Galveston Island.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your request for issuance of SWG-2007-01025 As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded;

(2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates the Corps' efforts to identify and minimize effects to listed species from this project. For further information, please contact staff biologist Moni Belton at 281/212-1512. Please refer to the consultation number Consultation No. 02ETTX00-2018-F-2491 in future correspondence concerning this project.

Sincerely,

Chuck Ardizzone
Field Supervisor

cc: Steve Walls, Corps of Engineers, Galveston District
cc: Rhonda Gregg-Hirsch, Atkins
cc: Reuben Trevino, Galveston Parks Board

LITERATURE CITED

Ackerman, R.A., R.C. Seagrave, R. Dmi'el, and A. Ar. 1985. Water and heat exchange between parchment-shelled reptile eggs and their surroundings. Copeia 1985:703-711.

Anderson, J.D. 2007. The formation and future of the upper Texas coast: a geologist answers questions about sand, storm, and living by the sea. Texas A&M University Press, College Station, TX.

Andres, B.A. 2009. Analysis of shorebird population trend datasets. Unpublished report by the U.S. Fish and Wildlife Service, Denver, CO.

Bart, J., and V. Johnston editors. 2012. Arctic shorebirds in North America: A decade of monitoring. University of California Press, Berkeley, CA.

Britton, J.C. and B. Morton. 1989. Shore Ecology of the Gulf of Mexico. University of Texas Press, Austin, Texas, U.S.A.

Burchfield, P., J. L. Pena, and B. Arroyo. 2002. Report on the Mexico/United States of America population restoration project for the Kemp's Ridley sea turtle (*Lepidochelys kempii*) on the coasts of Tamaulipas and Veracruz, Mexico.

Crain, D. A., A.B. Bolten, and K.A. Bjorndal. 1995. Effects of beach nourishment on sea turtles: review and research initiatives. Restoration Ecology 3(2):95-104.

Cohen, J.B., S.M. Karpanty, J.D. Fraser, B.D. Watts, and B.R. Truitt. 2009. Residence probability and population size of red knots during spring stopover in the mid-Atlantic region of the United States. Journal of Wildlife Management 73(6):939-945.

Cohen, J.B., S.M. Karpanty, J.D. Fraser, and B.R. Truitt. 2010. The effect of benthic prey abundance and size on red knot (*Calidris canutus*) distribution at an alternative migratory stopover site on the US Atlantic Coast. Journal of Ornithology 151:355-364.

Davis, T.H. 1983. 1, Loons to sandpipers. Pages 372-375 *In* J. Farrand, ed. The Audubon Society master guide to birding, Knopf, New York

Duerr, A.E., B.D. Watts, and F.M. Smith. 2011. Population dynamics of red knots stopping over in Virginia during spring migration. Center for Conservation Biology technical report series. College of William and Mary & Virginia Commonwealth University, CCBTR-11-04, Williamsburg, VA.

eBird.org. 2018. eBird: An online database of bird distribution and abundance (web application). Cornell Lab of Ornithology, Ithaca, New York. , available at http://www.ebird.org/.

Elliott-Smith, E., Haig, S.M., and Powers, B.M., 2009, Data from the 2006 International Piping Plover Census: U.S. Geological Survey Data Series 426.

Ernest, R.G., R.E. Martin, and K.A. Duhring. 1998. Beach Driving and Sea Turtles: What Kind of Risk? In: Proceedings of the Seventeenth Annual Symposium on Sea Turtle Biology and Conservation, March 4-8, 1997, Orlando, Florida, p. 50-53. S.P. Epperly and J. Braun (compilers). NOAA Tech. Memo. NMFS-SEFSC-415.

Fletemeyer, J.R. 1996. Guest editorial: The shot heard around the world—Volusia Sea Turtle Suit. Marine Sea Turtle Newsletter 72: 16-17.

Gaskil, Melissa. "The 40 Year Rescue." *Texas Shores*, Winer/Spring 2018-2019, pp. 14-17.

Gibeaut, J.C., W. A. White, and T.A. Tremblay. 2000. Coastal hazards atlas of Texas: a tool for hurricane preparedness and coastal management-volume 1, the Southeast coast: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the Texas Coastal Coordination Council, pursuant to National Oceanic and Atmospheric Administration Award No. NA77OZ0202. <http://www.beg.utexas.edu/ coastal/presentations_reports/hazardsatlas_v1_2000.pdf>

Haig, S.M. and L.W. Oring. 1985. The distribution and status of the piping plover throughout the annual cycle. Journal of Field Ornithology 56:334-345.

Haig, S.M., and J.H. Plissner 1993. Distribution and abundance of Piping Plovers: results and implications of the 1991 international census. Condor 95:145-156.

Haig, S.M., and E. Elliott-Smith. 2004. Piping Plover. In A. Poole (eds.), The Birds of North America Online. Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Piping_Plover/.

Haig, S.M., Ferland, C.L., Cuthbert, F.J., Dingledine, J., Goossen, J.P., Hecht, A., and McPhillips, N., 2005, A complete species census and evidence for regional declines in Piping Plovers. Journal of Wildlife Management 69: 160-173.

Harrington, B.A. 2001. Red knot (*Calidris canutus*). *In* A. Poole, and F. Gill, eds. The birds of North America, No. 563, The Birds of North America, Inc., Philadelphia, PA.

Harrington, B.A. 2008. Coastal inlets as strategic habitat for shorebirds in the southeastern United States. DOER technical notes collection. ERDC TN-DOERE25. U.S. Army Engineer Research and Development Center, Vicksburg, MS, available at http://el.erdc.usace.army.mil/elpubs/pdf/doere25.pdf.

Hosier, P.E., M. Kochhar, and V. Thayer. 1981. Off-road vehicle and pedestrian track effects on the sea-approach of hatchling loggerhead turtles. Environmental Conservation 8(2): 158-161.

Hughes, A.L., and E.A. Caine. 1994. The effect of beach features on hatchling loggerhead sea turtles. Page 237 in Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation, March 1B5, 1994, Hilton Head, South Carolina. National Oceanic and

Atmospheric Administration, Technical Memorandum NMFS-SEFSC-351.

Kalasz, K. 2008. Delaware shorebird conservation plan. Version 1.0. Delaware Natural Heritage and Endangered Species Program Division of Fish and Wildlife, Delaware Department of Natural Resources & Environmental Control, Smyrna, DE.

Mann, T.M. 1977. Impact of developed coastline on nesting and hatchling sea turtles in southeastern Florida. Unpublished M.S. Thesis. Florida Atlantic University, Boca Raton.

Melvin, SM. and J.P. Gibbs. 1994. Viability analysis for the Atlantic Coast population of piping plovers. Unpublished report to the U.S. Fish and Wildlife Service, Sudbury, Massachusetts.

Morrison, R.I.Guy, B.J. McCaffery, R.E. Gill, S.K. Skagen, S.L. Jones, W. Gary, C.L. Gratto-Trevor,and B.A. Andres. 2006. Population estimates of North American shorebirds. Wader Study Group Bulletin 111:67-85.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1977. Memorandum of Understanding Defining the Roles of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in Joint Administration of the Endangered Species Act of 1973 as to Marine Turtles.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991a. Recovery Plan for U.S. Population of Atlantic Green sea turtle (*Chelonia mydas*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991b. Recovery plan for U.S. population of loggerhead turtle (*Caretta caretta*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992. Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1993. Recovery Plan for Hawksbill Turtles (*Eretmochelys imbricate*) in the U.S. Caribbean Sea, Atlantic Ocean, and Gulf of Mexico. National Marine Fisheries Service, St. Petersburg, Florida.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2007. Kemp's ridley sea turtle (*Lepidochelys kempii*) 5-year review: summary and evaluation. National Marine Fisheries Service Silver Spring, MD and U.S. Fish and Wildlife Service, Albuquerque, NM.

Newstead, D.J., L.J. Niles, R.R. Porter, A.D. Dey, and J. Burger. (2013). Geolocation reveals midcontinent migratory routes and Texas wintering areas of red knots (*Calidris canutus rufa*). Wader Study Group Bulletin.

Nicholls, J.L. and G.A. Baldassarre. 1990. Habitat associations of piping plovers wintering in the United States. Wilson Bulletin 102:581-590.

Niles, L. 2009. Red knots wintering on the Florida Gulf Coast 2005-2009. Unpublished final report (Report on Red Knot Surveys in Florida 2008-2009) Neotropical Migrant Bird Conservation Act. Project #3556, Agreement #NJ-N31.

Niles, L.J. 2012. Blog - a rube with a view: Unraveling the Texas knot, available at http://arubewithaview.com/2012/05/01/unraveling-the-texas-knot/.

PAIS 2018 https://www.nps.gov/pais/learn/nature/current-nesting-season.htm

Plissner J.H. and S.M. Haig. 2000a. Metapopulation models for piping plovers (*Charadrius melodus*). Biological Conservation 92:163-173.

Plissner, J.H., and Haig, S.M., 2000b, Status of a broadly-distributed endangered species: Results and implications of the Second International Piping Plover Census: Canadian Journal of Zoology, v. 78.

Schroeder, B.A. 1994. Florida index nesting beach surveys: Are we on the right track? Pages 132-133 in Bjorndal, K.A., A.B. Bolten, D.A. Johnson, and P.J. Eliazar (compilers). Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351. Press, Washington, D.C.

Shaver, D.J. 1997. Kemp's ridley turtles from an international project return to Texas to nest. In: Proceedings of the Sixteenth Annual Gulf of Mexico Information Transfer Meeting, December 10-12, 1996, New Orleans, Louisiana, p. 38-40. University of New Orleans, Office of Conference Services (compiler). U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region MMS 97-0038.

Shaver, D.J. 1998. Kemp's ridley sea turtle nesting on the Texas coast, 1979-1996. In: Proceedings of the Seventeenth Annual Symposium on Sea Turtle Biology and Conservation, March 4-8, 1997, Orlando, Florida, p. 91-94. S.P. Epperly and J. Braun (compilers). NOAA Tech. Memo. NMFS-SEFSC-415.

Shaver, D.J. 1999a. Kemp's ridley sea turtle project at Padre Island National Seashore, Texas. In: Proceedings of the Seventeenth Annual Gulf of Mexico Information Transfer Meeting, December 16-18, 1997, New Orleans, Louisiana, p. 342-347. M. McKay and J. Nides (editors). U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, MMS 99-042.

Shaver, D.J. 1999b. Padre Island National Seashore Kemp's ridley sea turtle project and sea turtle strandings 1998 report. U.S. Department of the Interior, U.S. Geological Survey.

Shaver, D.J., and C.W. Caillouet, Jr. 1998. More Kemp's ridley turtles return to south Texas to nest. Marine Turtle Newsletter 82:1-5

Shaver, D.J. 2011. Texas coast *Kemp's ridley* nesting data. Unpublished data.

Texas Administrative Code. 2019. http://txrules.elaws.us/rule/title31_chapter15_sec.15.4

Texas Transportation Code. https://texas.public.law/statutes/tex._transp._code_section_545.352

U.S. Army Corps of Engineers. 2018. Biological Assessment of Potential Impacts to Threatened and Endangered Species, Beach Nourishment Project: 10th to 103rd Street, Galveston County, Texas

U.S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants: Determination of endangered and threatened status for the piping plover: Final rule. Federal Register 50(238):50726-50734.

U.S. Fish and Wildlife Service. 1988. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. Twin Cities, MN.

U.S. Fish and Wildlife Service. 1996. Piping plover (Charadrius melodus), Atlantic Coast population, revised recovery plan. Hadley, Massachusetts.

U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota.

U.S. Fish and Wildlife Service (Service). 2014. Final rule for the threatened status for the Rufa Red Knot (*Calidris canutus rufa*). Federal Register 79:73706-73748.

U.S. Fish and Wildlife Service. 2015. Volume II: Draft Revised Recovery Plan for the Wintering Range of the Northern Great Plains Piping Plover and Comprehensive Conservation Strategy for the Piping Plover in its Coastal Migration and Wintering Range in the Continental United States.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) Second Revision. National Marine Fisheries Service, St. Petersburg, Florida.

Vale, K. 2016. Investigation of Factors Influencing Piping Plover Distribution Along the Upper Texas Coast. Thesis - Master of Science, University of Houston-Clear Lake. Thesis Chair: George Guillen.

Witherington, B.; Hirama, S., and Mosier, A., 2003. Responses of Sea Turtles to Barriers on Their Nesting Beach. Unpublished final project report to the U.S. Fish and Wildlife Service.

Zonick, C. and M. Ryan. 1996. The ecology and conservation of piping plovers (*Charadrius melodus*) wintering along the Texas Gulf Coast. Department of Fisheries and Wildlife, University of Missouri, Columbia, Missouri 65211. 1995 Annual Report.

WILDLIFE MONITORING CHECKLIST

Project Name: ____

Objective: Report sightings of protected species- piping plover, red knot, and various species of sea turtles (dead or alive), hatchlings, tracks, eggs or nests. In addition to reporting any birds observed injured or nesting.

DO NOT DISTURB OR TOUCH A SEA TURTLE, PIPING PLOVER OR RED KNOT.

Date:_ Start Time:____am/pm Finish Time:__am/pm

Weather: ☐ Sunny ☐ Fair ☐ Partly Cloudy ☐ Cloudy ☐ Windy ☐ Calm ☐ Rain

Reach of Beach Monitored:___

Observations:

- Piping Plover; ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- Red Knot; ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- Injured Birds (any species) ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- Nesting Birds (any species) ☐ Nest location identified and reported

- **To report injured Piping Plover, Red Knot and/or any species of injured or nesting bird, Call U.S. Fish and Wildlife Service (281) 212-1512** if on upper Texas coast and **361-994-9005** if on lower Texas coast.

- Sea Turtle; Species common name(s):________________________________
- Leaving Water ☐ Entering Water ☐ Laying Eggs ☐ Dead on Beach
- Metal Flipper Tag Identification:__________________(Letters and/or Numbers);
  - Take Photographs, **Call 1-866-TURTLE5 (1-866-887-8535)** for Instructions,
  - Await Arrival of Officials.

- Living Tissue Tag (White Mark on one Scute of Shell); Take Photographs,
  - Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions, Await Arrival of Officials.

- If Laying Eggs; Turtle is Facing ☐ North ☐ South ☐ East ☐ West,
  - Mark Nest(do not penetrate sand), Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions,
  - Take Photographs, Time/clock Laying Event, Await Arrival of Officials.

- Hatchlings; Take Photographs, Call **1-866-TURTLE5 (1-866-887-8535)** for instructions
  - Await Arrival of Officials, Guard Against Predators.

- Tracks; Measure Width:________________________, Take Photographs,
  - Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions, Await Arrival of Officials.

- Eggs/Nest; Mark Nest(do not penetrate sand), **Call 1-866-TURTLE5 (1-866-887-8535)** for Instructions,
  - Take Photographs, Await Arrival of Officials.

- Stranded Marine Mammals if observed call Texas Marine Mammal Stranding Network at
  - **1-800-9MAMMAL (1-800-962-6625)** for instructions.

- No Sightings; None of the Above.

Additional Comments:

____

Special Note: All sea turtles, piping plovers and red knots are protected by law as threatened or endangered species. No one, unless permitted, can remove sea turtle eggs, handle turtles, or disturb any of these species. Otherwise, one may be liable to fines up to $20,000 and criminal sentencing.

*Monitor Name:*______________________________ *Telephone:*______________________________

Please Print Clearly (Area Code) and Phone Number

Example: Annual Summary Table

Galveston Park Board of Trustees
U.S. Army Corps of Engineers
Beach Nourishment / Dune Restoration
Permit Summary Table 2014 – 2019 Authorization Period

U.S. Army Corps of Engineers Permit Number:	**SWG-2007-01025**
U.S. Army Corps of Engineers Authorization Date:	May 6, 2014
U.S. Army Corps of Engineers Permitted Authorization Term:	Five (5) Years
U.S. Army Corps of Engineers Permitted Activities Date Range:	May 6, 2014 to December 31, 2019
U.S. Army Corps of Engineers Authorized Permit Area:	Galveston Island, Texas from the western terminus of the Galveston seawall to the eastern boundary of Galveston Island State Park

Annual Report of Activities USACE Permit #SWG-2007-01025

Year	Species Trainer / Subject	Date	Location- Lat / Lon- Volume	Project Sponsor(s)	Dates of Construction	Construction Activities	Conservation Measures Implemented	Success	Species Take	Incidents (Construction / Project Related)	Improvements
							Yes or No	Yes or No	Number		
2014 05/06 to 12/31/2014			Dellanera Park / Seascape / End of Seawall Total Project ~113,000 yd^3	Galveston Park Board, FEMA, City of Galveston, City of Galveston IDC, Texas General Land Office	Begin at Upland Sand Source 11/28/2014. Begin beach work 12/01/2014	Beach Nourishment, dune restoration, vegetation planting, dune walkover	Yes USACE authorized Special Conditions were followed	Yes	0	Debris found in material	Park Board staff monitor beach area, implement daily patrols and removal of foreign material.
2015 01/01 to 12/31/2015			(Continuation) Dellanera Park / Seascape / End of Seawall- Total Project ~113,000 yd^3	Galveston Park Board, FEMA, City of Galveston, City of Galveston IDC, Texas General Land Office	(Continued) 01/01/2015 to 03/15/2015	Beach Nourishment, dune restoration, Vegetation planting, dune walkover	Yes USACE authorized Special Conditions were followed	Yes	0	Injured Gannett washed ashore-not project related	Bird transported for medical assistance. Park Board staff monitoring beach post construction for debris, continued daily patrols
2016 01/01 to 12/31/2016	Dr. Metz Seaturtles / birds	March 31, 2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2017 01/01 to 12/31/2017			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2018 01/01 to 12/31/2018			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2019 01/01 to 12/31/2019			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DEPARTMENT OF THE ARMY PERMIT

Permittee Galveston Park Board of Trustees

Permit No. SWG-2007-01025

Issuing Office Galveston District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To extend the time to conduct beach nourishment activities along approximately 81,454 linear feet of beachfront on Galveston Island. Beach quality sand will be obtained from authorized local upland and submerged sand sources, as well as beneficial use of dredged beach quality sand from Federal projects.

The methods used for removal of sand and subsequent transport and placement within the action area will include: use of a hydraulic dredge to obtain the sand, which will be pumped through a temporary pipeline and placed directly on the beach; use of a hopper dredge to excavate the sand, which will then be pumped through temporary pipelines and transported directly onto the beach nourishment area; or the use of trucks to haul the sand excavated from the upland borrow sites, using a backhoe or other excavation technique. Once on site, the beach quality sand is distributed to fill the appropriate area using other heavy equipment (e.g., bulldozers, backhoes, etc.).

Beach nourishment activities will be divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Beach quality sand will not be placed in multiple cells/areas at the same time. It is anticipated that the beach quality sand will be obtained by hopper, hydraulic, and/or mechanical dredge methodologies, depending upon site conditions present at the borrow areas and beach quality sand available for nourishment.

Construction operations consisting of truck hauling of sand for beach nourishment are associated with the use of upland borrow sources. Beach quality sand will be excavated from the upland borrow site, using a backhoe or other excavation technique, and placed in dump trucks to be hauled to the disposal locations. Sand will be placed on-site and distributed to fill the appropriate area using other heavy equipment (e.g., bulldozers, backhoes, etc.).

The temporary pipelines used to transport the sand will be either upland, submerged or a combination of upland and submerged pipelines. The upland pipelines will parallel the beach from the western terminus of the seawall to the eastern boundary of Galveston Island State Park where it will terminate. The upland pipeline will then again commence at the western edge of Jamaica Beach and continue to the western limits of Galveston Island. The submerged offshore pipeline will parallel Galveston Island's beach frontage, beginning at East Beach and continuing to the western limits of Galveston Island. The temporary pipeline routes will run near the highest point of the unvegetated beach and near the base of the seawall, and/or be submerged off-shore approximately 1,000 feet to 2,000 feet parallel to the shoreline then routed perpendicular to the beach, to the nourishment location. The discharge point will be relocated as beach nourishment is accomplished.

A temporary, previously-authorized Dredged Material Placement Area (DMPA) will be constructed at Apffel Park, on the east end of Galveston Island. Dredged material from Borrow areas 2 and 3 will be pumped into the site and dried. The material will then be trucked to designated and permitted beach nourishment areas. The DMPA will consist of a temporary containment levee that will allow the sand to dewater before it is used for beach nourishment. The water will then be returned to the Gulf as effluent.

Measures which apply to beach quality sand placement during beach nourishment activities are as follows: sand placed on the beach will be of beach quality sand, consistent in grain size, color, and composition as the existing beach and free of hazardous contaminants; sand will be placed and maintained at a gradual slope to minimize scarping; and after initial project construction, all project sites will be restored to pre-construction slope or contours, and all ruts leveled.

Beach nourishment will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Beach quality sand will not be placed in multiple cells/areas at the same time. It is anticipated that the beach quality sand will be obtained by hopper, hydraulic, and/or mechanical dredge methodologies depending upon site conditions present at the borrow areas and beach quality sand available for nourishment.

Construction operations consisting of truck hauling of sand for beach nourishment are proposed with the use of upland borrow sources. Beach quality sand is excavated from the upland borrow site, using a backhoe or other excavation technique, and placed in dump trucks to be hauled to the disposal locations. Sand will be placed on-site and distributed to fill the appropriate area using other heavy equipment (e.g., bulldozers, backhoes, etc.).

For hydraulic pipeline cutterhead and hopper dredge operations that include the placement of dredged beach quality sand on the beach, a pipeline route is extended from the borrow site to the beach placement location. Prior to the commencement of dredging, shore pipe will be mobilized to the beach in segments of varying sizes in length and diameter. The mobilization process usually requires the use of heavy equipment to transport and connect pipe segments from the beach access point to the designated placement area.

Within the active placement/nourishment area, heavy equipment is operating throughout the width of the beach to manage the outflow of sand and construct target elevations for the appropriate beach profile.

The beach building process typically involves the use of bulldozers and sometimes backhoes to distribute the sand as it falls out of suspension at the outflow end of the pipeline. The sand slurry will be defused as it is released from the terminal pipe to reduce the flow velocity onto the beach. Dikes will be constructed on one or two sides of the effluent area to allow for extended settlement time of suspended solids to reduce turbidity levels in the nearshore environment. The construction zone, which includes the active placement/nourishment area and associated heavy equipment used to redistribute sand, generally encompasses a fenced off area of approximately 500-1,000 feet on each side. The contractor will place stakes to mark station locations and elevational requirements for the project template. As sand falls out of suspension, equipment will be used to distribute sand and construct the desired beach template. Work will begin in an individual cell and continue until that cell is completed. As target elevations for a given project and station are achieved, the designated construction area will move down the beach to the next station. Upon completion of a given section (approximately 500- to 1,000-foot acceptance sections), stakes will be removed from the beach. Beach quality sand will not be placed in multiple areas at the same time.

In the event that all cost share funding is not available to participate in a beneficial use project for Dellanera Beach, a feeder beach placement area will be constructed using material that is be pumped into an approximate 42-acre area, extending from the west limits of the Galveston Seawall and continuing west for approximately 1,813 linear feet to the west limits of Dellanera Beach Park. Material will be placed in approximately 8 feet of water.

Throughout the duration of the pumping process, the contractor will inspect the pipeline route to check and fix pipe leaks. During all aspects of the construction operation, vehicles and heavy equipment including pickup trucks, all-terrain vehicles, bulldozers, etc. may traverse the beach; however, no driving or construction activity is allowed within existing dune vegetation or other environmentally sensitive locations identified prior to construction.

The following measures shall apply to construction access and equipment usage and staging during beach nourishment activities. Beach quality sand and equipment required for the project will be staged in upland areas and transported as needed to the proposed work sites. Construction vehicles will access the beach from public roads closest to the work sites to reduce unnecessary vehicle traffic on the beach. Drive-overs, to facilitate ingress and egress from work sites, will be constructed of beach quality sand at each access point. The number of vehicles transiting from upland areas to the project sites will be kept to a minimum, all vehicles will use the same pathways, and access will be confined to the closest access point to the immediate work area. Construction/nourishment activities will occur from the landward side of the beach nourishment area whenever possible. Use of night lights will be minimized, directed toward the construction activity area, and shielded from view outside of the construction activity area. The project will be conducted in accordance with the attached plans, in 22 sheets, and the US Fish and Wildlife Service (USFWS) Biological Opinion (BO), Attachment A, in 37 sheets.

Project Location: In the Gulf of Mexico and adjacent beaches, below the high tide line, beginning at the western terminus of the Seawall and extending west to the eastern boundary of Galveston Island State Park (approximately 30,603 feet) then from the western edge of Jamaica Beach to the west end of the island (approximately 50,851 feet)., in Galveston, Galveston County, Texas.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on ___31 December 2024___. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. The permittee understands and agrees that, if future operations by the United States (US) require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. When structures or work authorized by this permit are determined by the District Engineer to have become abandoned, obstructive to navigation or cease to be used for the purpose for which they were permitted, such structures or other work must be removed, the area cleared of all obstructions, and written notice given to the Corps of Engineers, Galveston District, Regulatory Division, within 30 days of completion.

3. The permittee must install and maintain, at the permittee's expense, any safety lights, signs and signals required by US Coast Guard, through regulations or otherwise, on the permittee's fixed structures. To receive a US Coast Guard Private Aids to Navigation marking determination, at no later than 30 days prior to installation of any fixed structures in navigable waters and/or prior to installation of any floating private aids to navigation, you are required to contact the Eighth Coast Guard District (dpw), 500 Poydras St., Suite 1230, New Orleans, LA 70130, (504) 671-2328 or via email to: D8oanPATON@uscg.mil. For general information related to Private Aids to Navigation please visit the Eighth Coast Guard District web site at: http://www.uscg.mil/d8/waterways/PATON.Home.asp

4. The enclosed U.S. Fish and Wildlife Service (USFWS) BO dated 17 June 2019, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with the incidental take of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, will constitute an unauthorized take, and it will also constitute non-compliance with your Corps permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

5. The permittee shall establish the following avoidance zones in order to ensure potential historic properties are not impacted by project activities. No project activities shall occur within these avoidance zones:

Site	Lat (NAD 27)	Long (NAD 27)	Avoidance Zone (meters)
41GV90	29.25492	-94.83665	88
41GV126	29.31677	-94.74228	85
41GV127	29.31846	-94.73631	85

Anomaly	Easting – 15 N	Northing – 15 N	Avoidance Zone (meters)
M1	332127	3246729	80
M2	332203	3246817	100
M3	332513	3246977	100
M4	332533	3246621	35
M5	332873	3246786	75
M7	333407	3246954	75
M9	334076	3246765	75
M10	333660	3246029	75
M11	334024	3246204	75
M12	333936	3245985	80
M13	333936	3245884	125
M14	334862	3245815	75
M15	328555	3248010	150
M16	328591	3247902	150
M17	329437	3247820	150
M18	330035	3248171	125
M19	327750	3248462	150
M2	321883	3243208	110
M3	322185	3243661	80

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

   (X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

   (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

   ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

   a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

   b. This permit does not grant any property rights or exclusive privileges.

   c. This permit does not authorize any injury to the property or rights of others.

   d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE)	8/22/2019 *(DATE)*
GALVESTON PARK BOARD OF TRUSTEES	

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Janet Thomas Botello *(DISTRICT ENGINEER)*	22 August 2019 *(DATE)*
JANET THOMAS BOTELLO	
ACTING CHIEF, POLICY ANALYSIS BRANCH	
FOR COLONEL TIMOTHY R. VAIL	

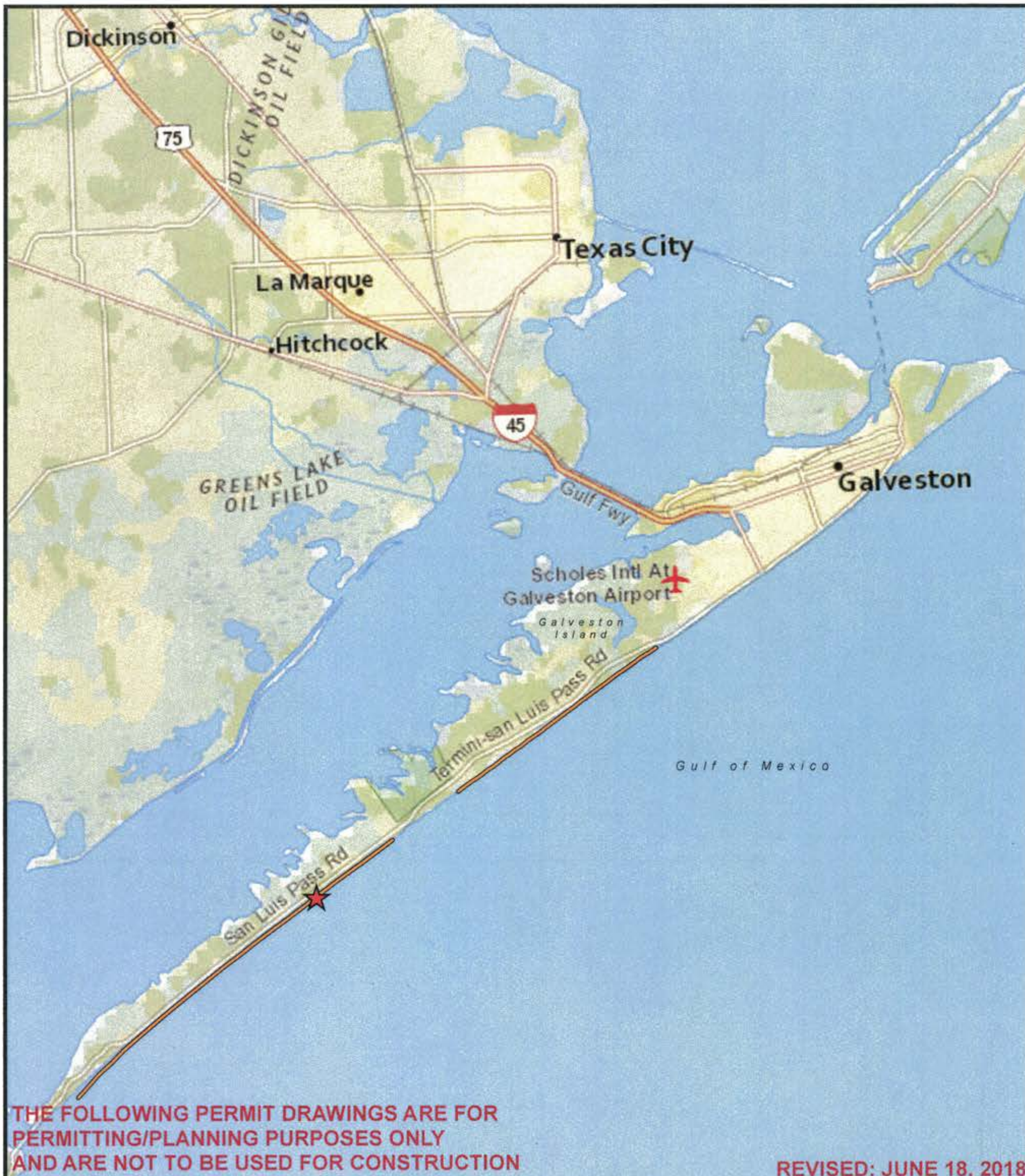
When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_______________________________ *(TRANSFEREE – Typed/Printed Name)*

_______________________________ *(DATE)*

_______________________________ *(TRANSFEREE - Signature)*

_______________________________ *(Mailing Address)*



Project Location is
N:13627782.47164
E: 3242955.090057
Galveston Quadrangle
NAD 83 State Plane Texas South Central

★ Project Location

Approximate Limits of Beach Nourishment

ATKINS

Sheet 1 of 22

Galveston Beach Nourishment
Vicinity Map

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 in = 4 miles
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

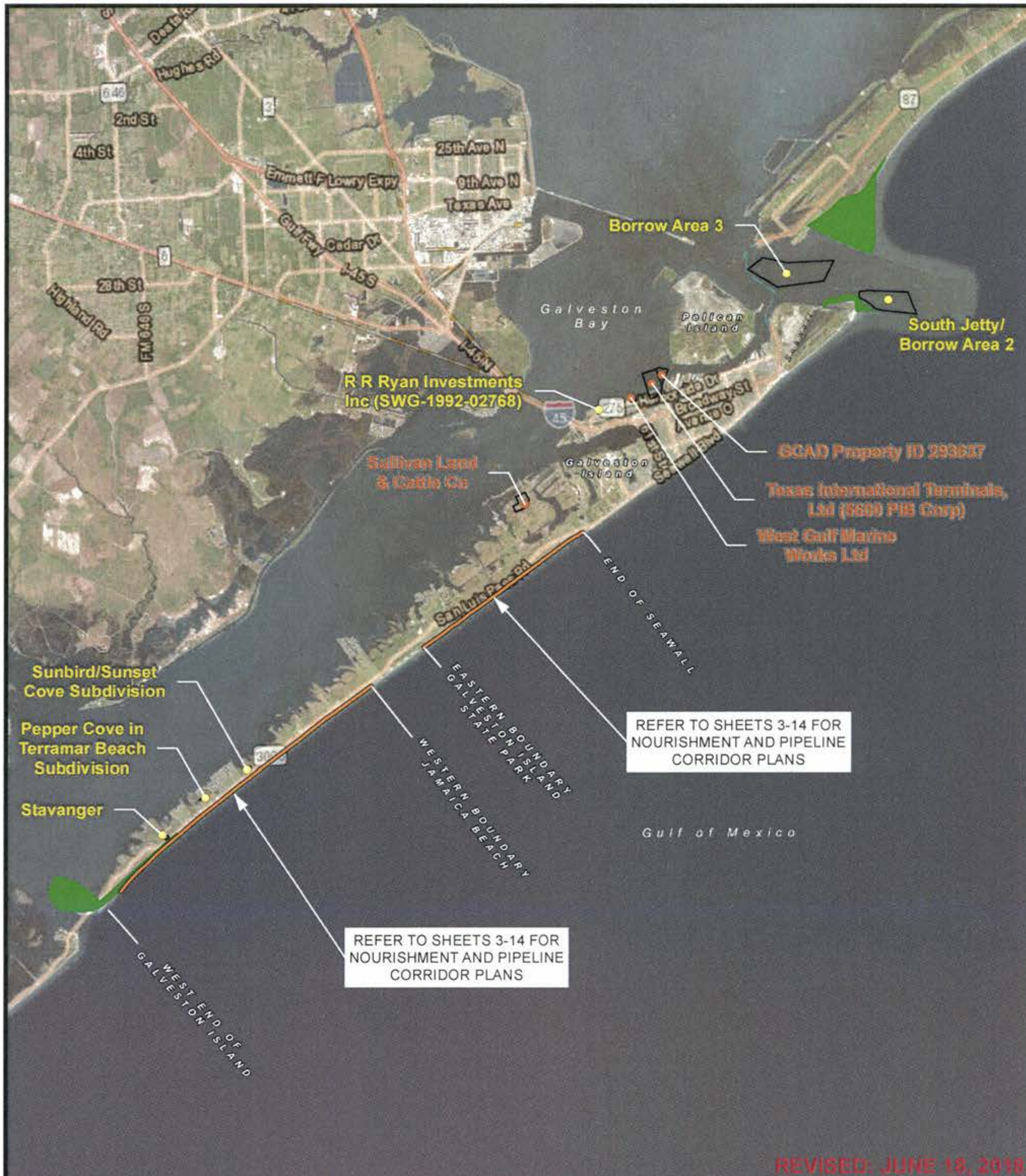
N:\Clients\G_H\Galveston_Park_Board\100054530\geo\figs\SWG_2007_01025\Permit\Vicinity\Vicinity_map_01025_v5.mxd

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: Nat Geo World

0 2 4 Miles

N

National Geographic, ESRI, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. Nat Geo. March 2015 1:229,200; generated by Atkins; using ArcMap.
<http://services.arcgisonline.com/ArcGIS/rest/services/NatGeo_World_Map/MapServer> (13 June 2018)



- Authorized Borrow Area[1]
- Proposed Borrow Area[1]
- Approximate Limits of Beach Nourishment
- Borrow Area Boundary
- Piping Plover Critical Habitat Unit

1. See Sheets 15-18 for Borrow Area Details

Datum: NAD 1983
Projection: State Plane
Texas South Central
Units: Feet
Imagery: ESRI World Imagery

0 2.25 4.5 Miles

N

ATKINS

Sheet 2 of 22

Galveston Beach Nourishment
Nourishment and Borrow Areas

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

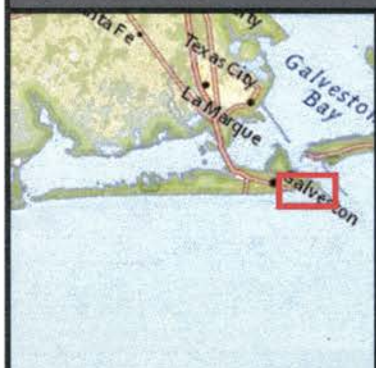
Job No.: 100059281	Scale: 1 in = 4.5 miles
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

N:\Clients\G_H\Galveston_Park_Board\100054530\geo\figs\SWG_2007_01025\Permit\SiteMap\Site_map_01025_v6.mxd

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:286,002; generated by Atkins; using ArcMap. <http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (19 October 2018)

MAGNETOMETER ANOMALIES				
Name	SiteNo	Avoidance Radius (m)	Northing	Easting
Unknown 19th Century	41GV126	85	13,687,493	3,324,891
Unknown 19th Century	41GV127	85	13,688,177	3,326,769

*Received 2018 Texas Historical Commission
Coordinates provided in NAD27, converted to NAD83



- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Galveston Channel
- 5,000 ft Stationing
- Authorized Borrow Area
- Piping Plover Critical Habitat
- Magnetometer Anomaly
- Avoidance Radius

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 1,500 3,000 Feet

ATKINS

Sheet 3 of 22

Galveston Beach Nourishment
Pipeline Routes

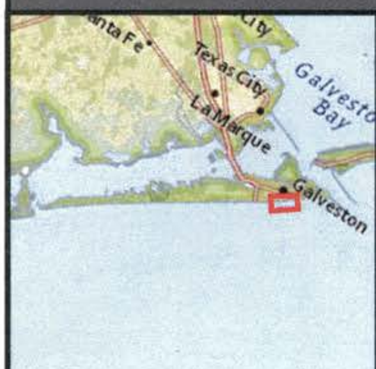
Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100052981	Scale: 1" = 3,000'
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

N:\Clients\G_H\Galveston_Park_Board\100054530\geo\figs\SWG_2007_01025\PermitPipelines\East_pipeline_landscape_v7.mxd

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (19 October 2018)



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 4 of 22

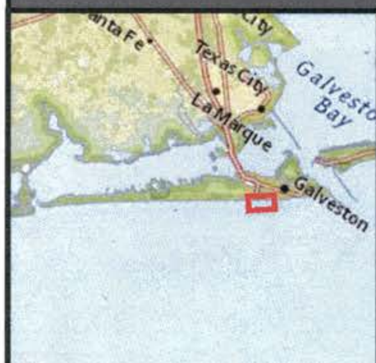
Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 5 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

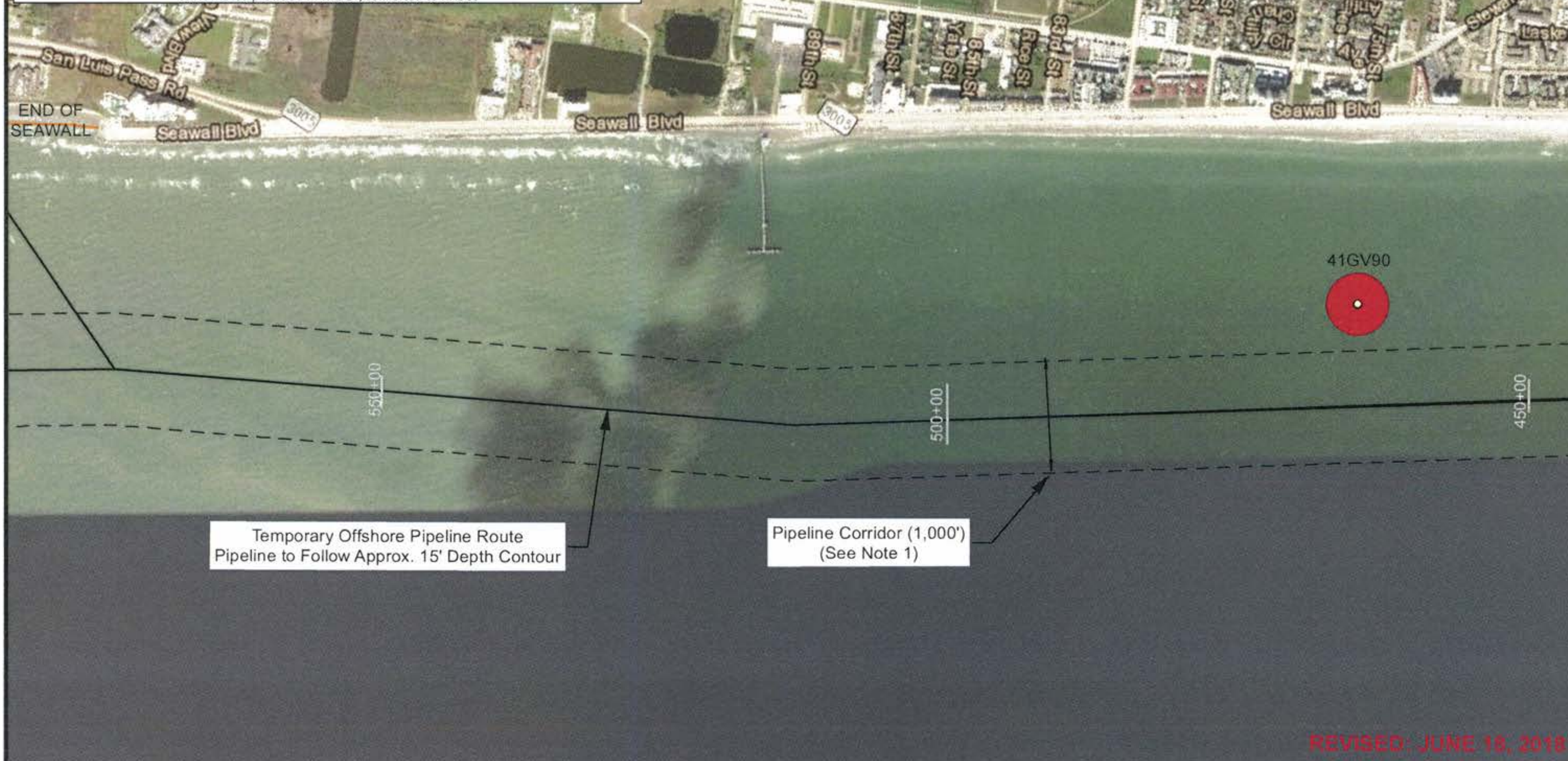
Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000, generated by Atkins; using ArcMap; < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)

Name	SiteNo	Avoidance Radius (m)	Northing	Easting
Unknown Civil War Shipwreck	41GV90	88	13,663,937	3,295,638

*Received 2018 Texas Historical Commission
Coordinates provided in NAD27, converted to NAD83



- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Approximate Proposed Beach Nourishment Area
- 5,000 ft Stationing
- Magnetometer Anomaly
- Avoidance Radius

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 6 of 22

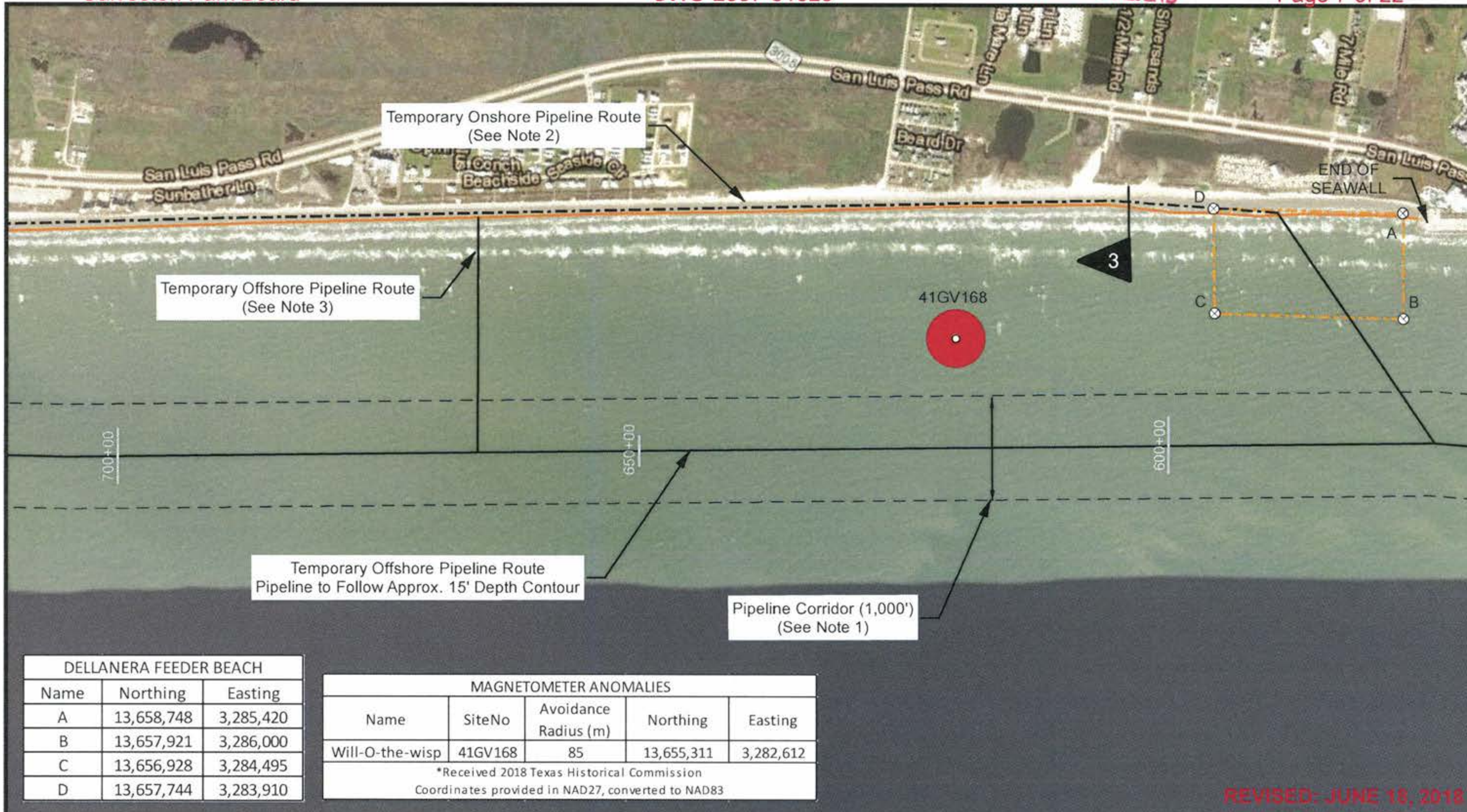
Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (16 June 2018)



DELLANERA FEEDER BEACH		
Name	Northing	Easting
A	13,658,748	3,285,420
B	13,657,921	3,286,000
C	13,656,928	3,284,495
D	13,657,744	3,283,910

MAGNETOMETER ANOMALIES				
Name	SiteNo	Avoidance Radius (m)	Northing	Easting
Will-O-the-wisp	41GV168	85	13,655,311	3,282,612

*Received 2018 Texas Historical Commission
Coordinates provided in NAD27, converted to NAD83

- Coordinates
- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Approximate Proposed Beach Nourishment Area
- Approximate Proposed Limits of Dellanera Feeder Beach Nourishment Area
- 5,000 ft Stationing
- Magnetometer Anomaly
- Avoidance Radius
- Typical Section Indicator

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

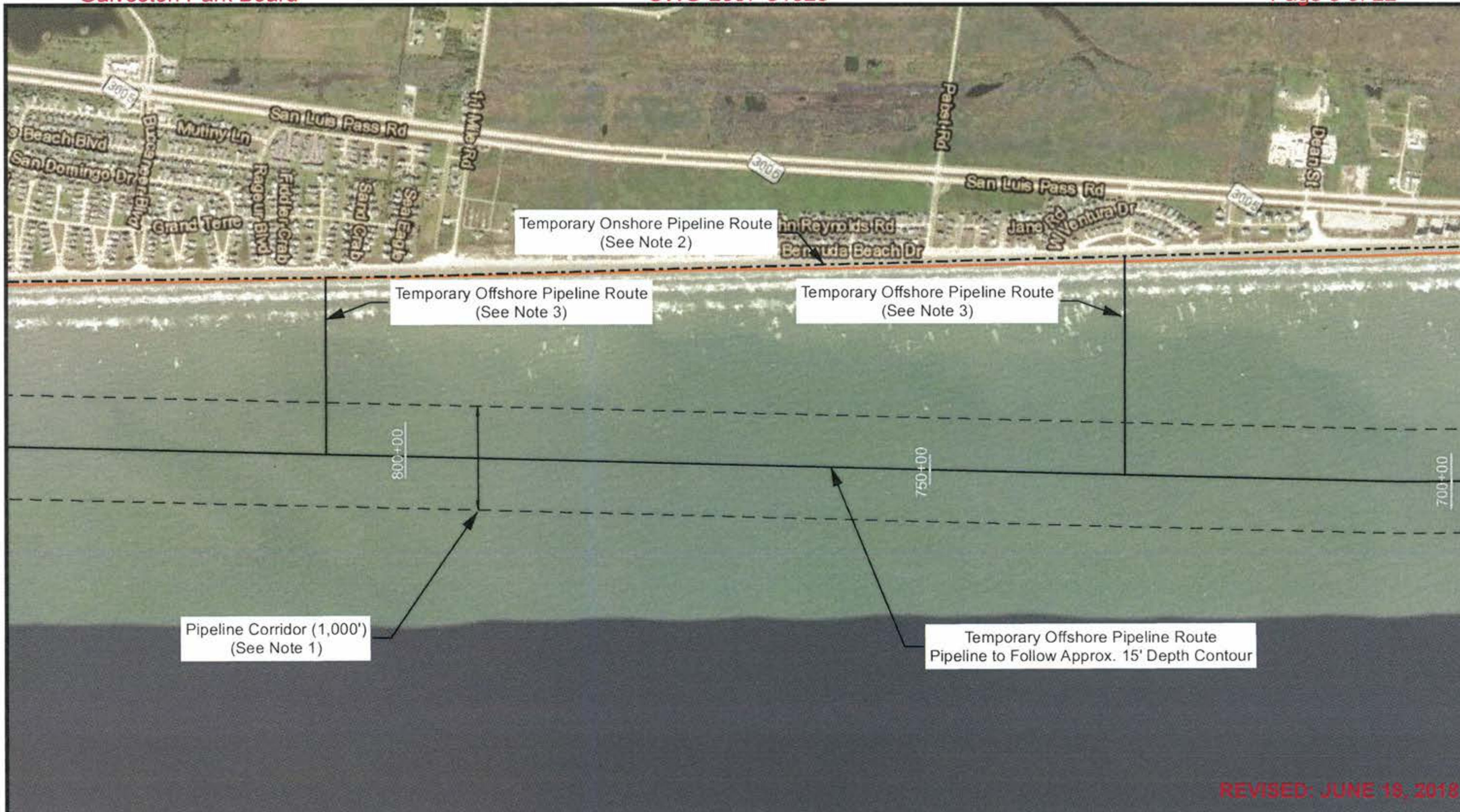
Sheet 7 of 22

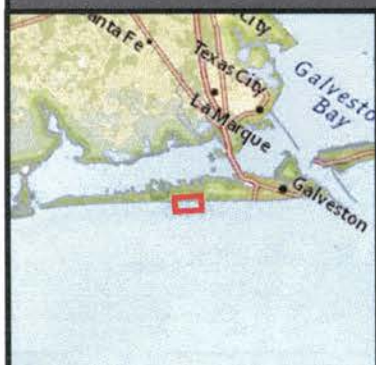
Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1" = 1,400'
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017





- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Approximate Proposed Beach Nourishment Area
- 5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

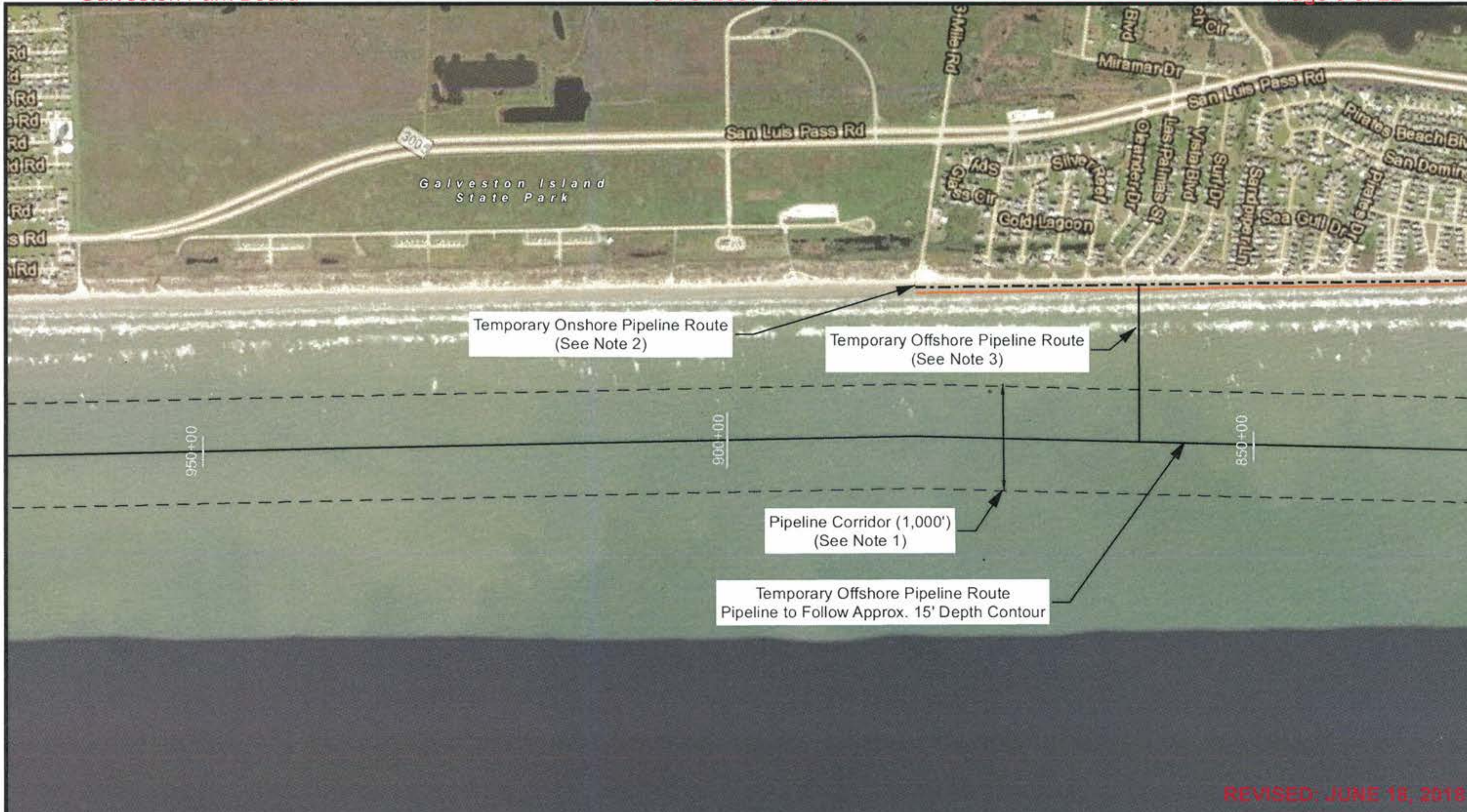
Sheet 8 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 9 of 22

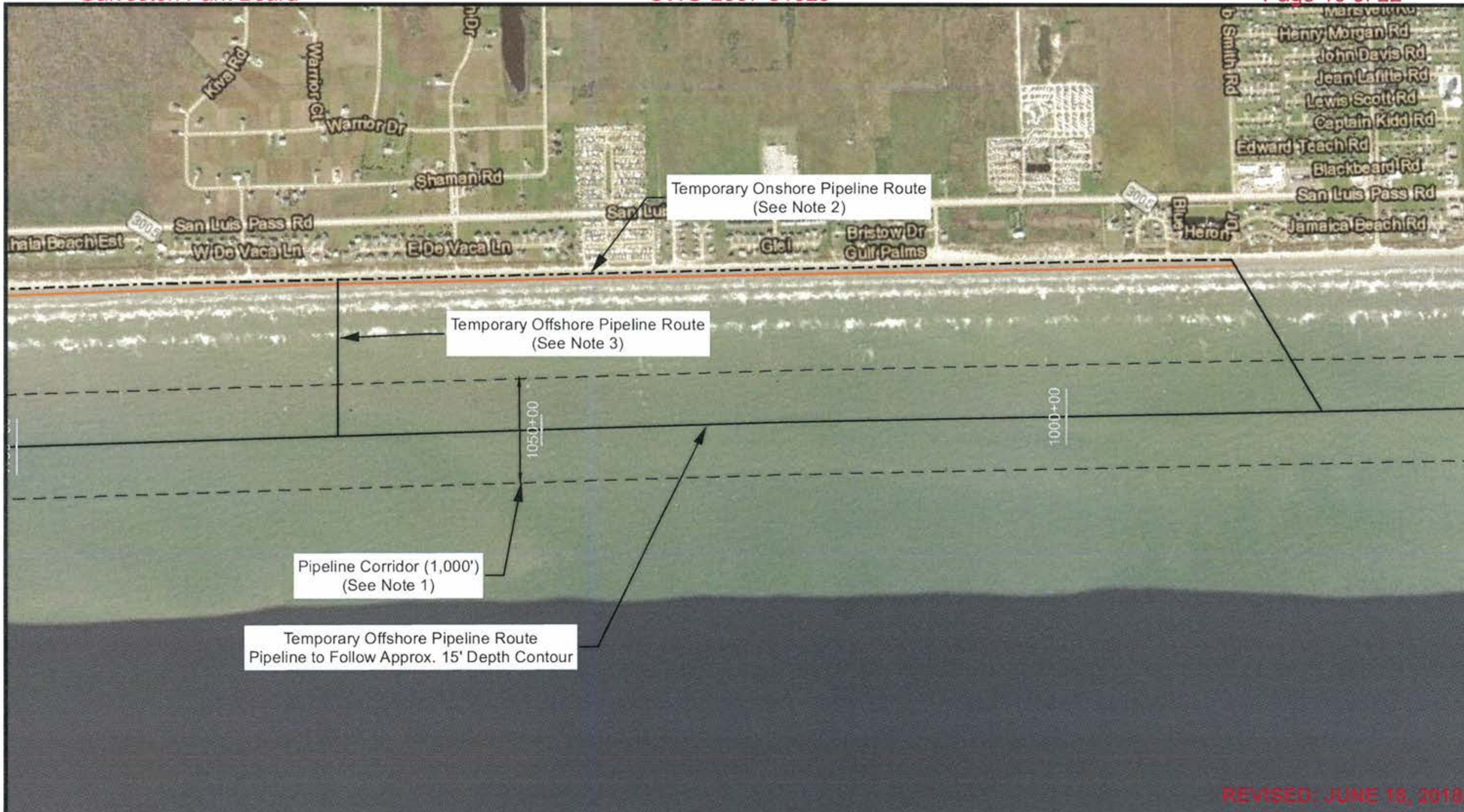
Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

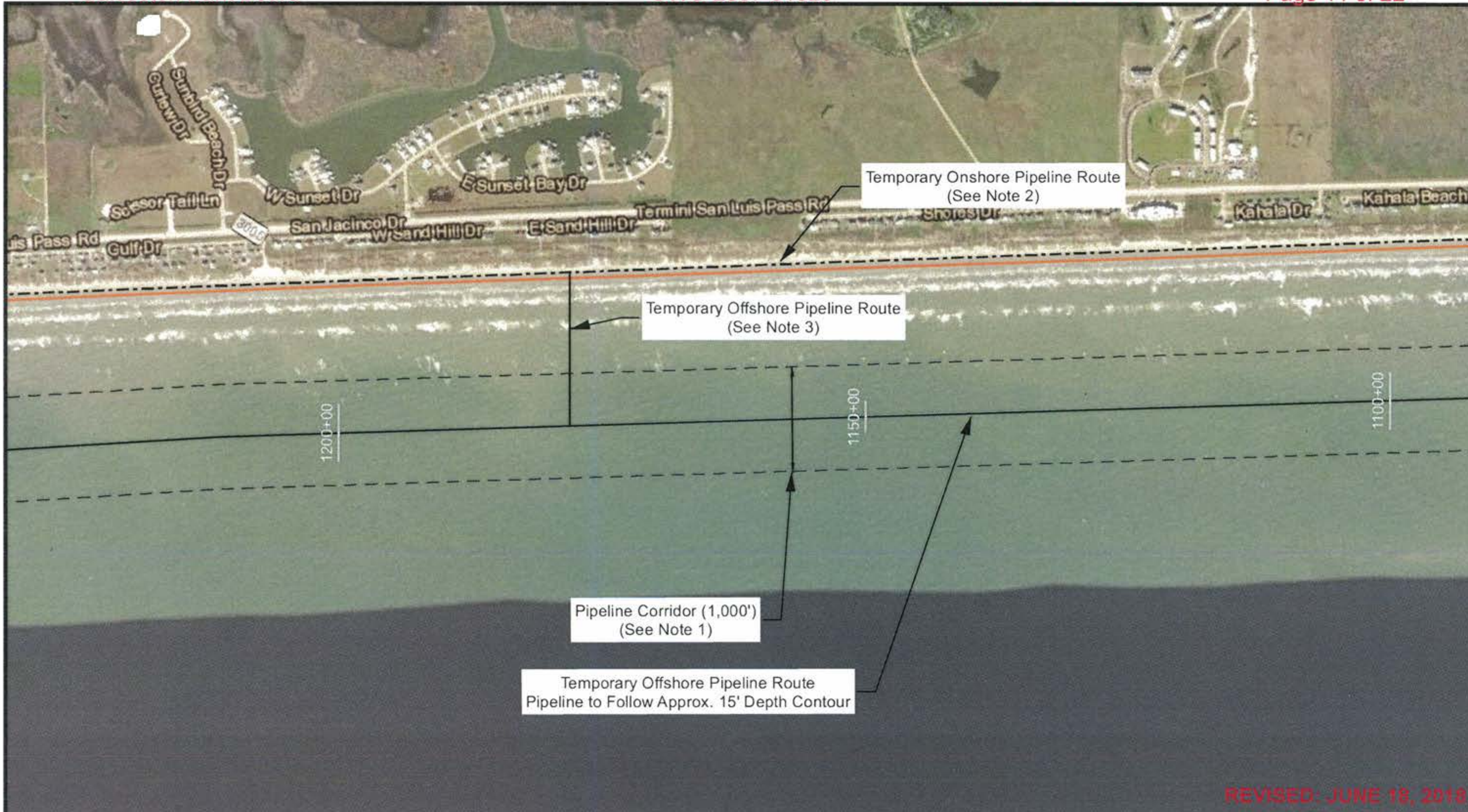
Sheet 10 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

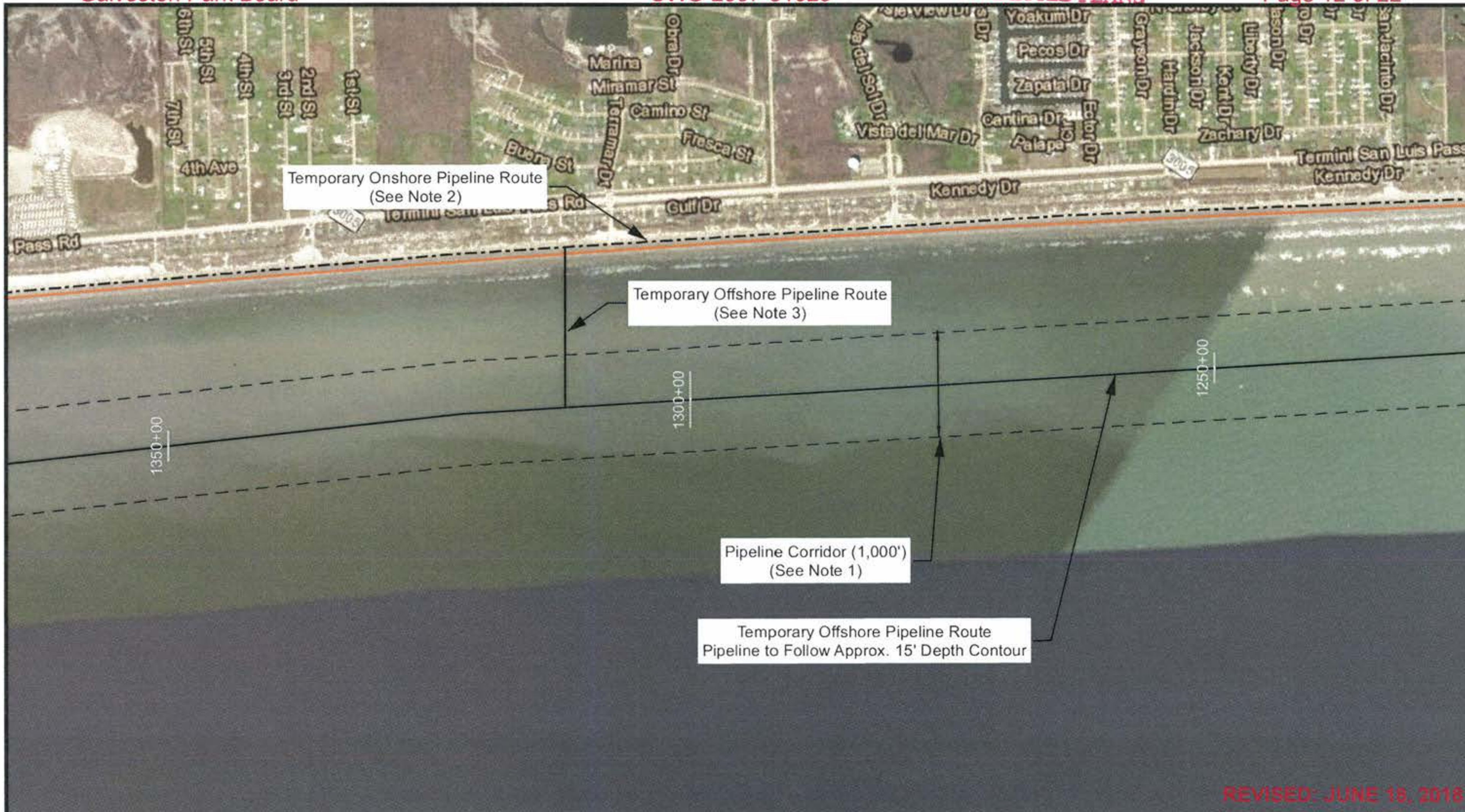
Sheet 11 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1" = 1,400'
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017



Temporary Offshore Pipeline Route
Temporary Onshore Pipeline Route
Pipeline Corridor (1,000')
Approximate Proposed Beach Nourishment Area
5,000 ft Stationing

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 12 of 22

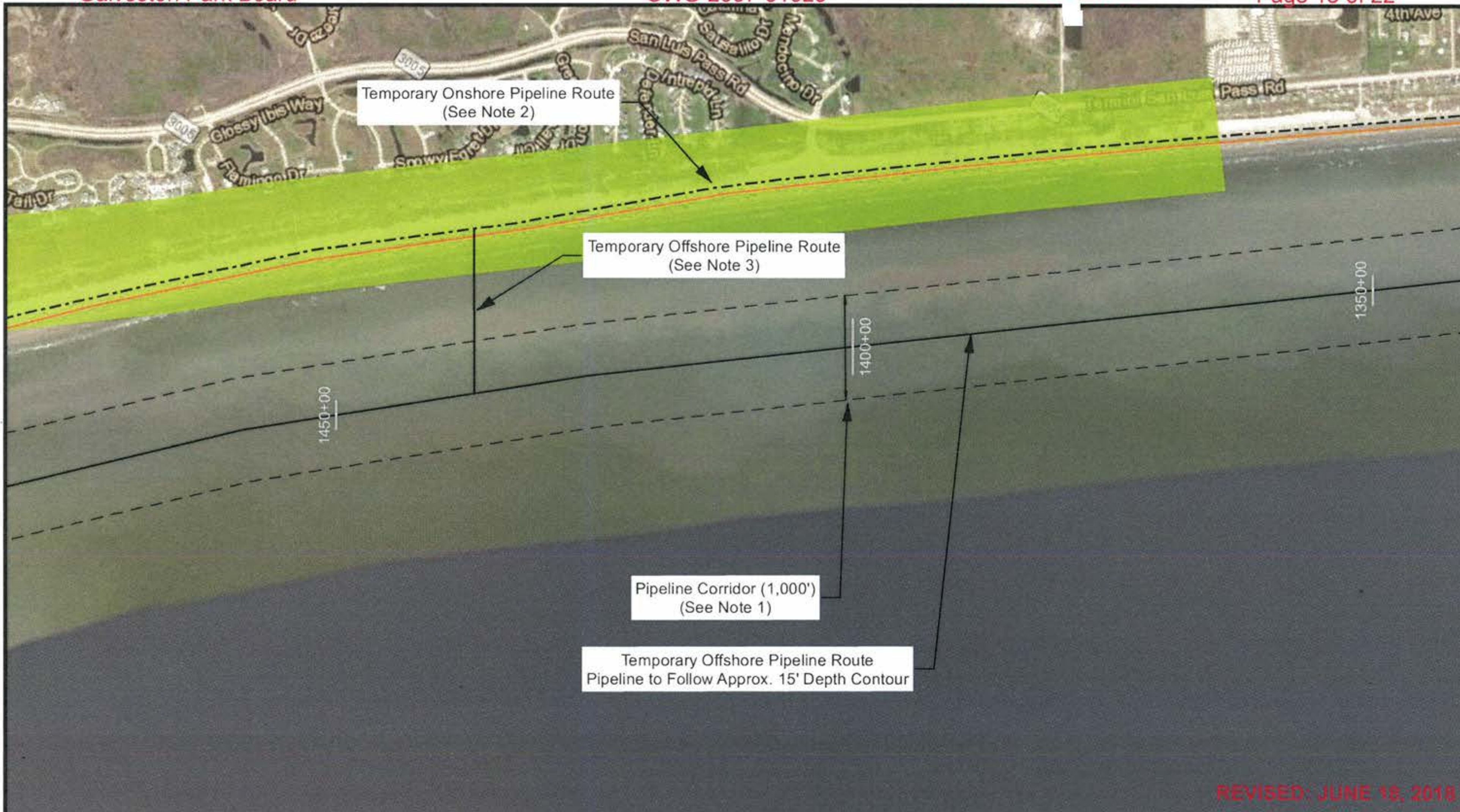
Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)



- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Approximate Proposed Beach Nourishment Area
- 5,000 ft Stationing
- Piping Plover Critical Habitat

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 13 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)

- Temporary Offshore Pipeline Route
- Temporary Onshore Pipeline Route
- Pipeline Corridor (1,000')
- Approximate Proposed Beach Nourishment Area
- 5,000 ft Stationing
- Piping Plover Critical Habitat

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

NOTES:
1. OFFSHORE PIPELINE WILL BE SUBMERGED WITHIN PROPOSED CORRIDOR AND MARKED IN ACCORDANCE WITH U.S. COAST GUARD REQUIREMENTS
2. PIPELINE ON BEACH WILL BE PLACED LANDWARD OF THE MHW LINE.
3. APPLICANT MAY UTILIZE COMBINATION OF ONSHORE AND OFFSHORE METHODS FOR BRINGING DREDGE PIPE TO BEACH NOURISHMENT AREAS. PIPELINES POSITIONED NEARLY PERPENDICULAR TO THE BEACH WOULD BE UTILIZED TO CONVEY MATERIAL FROM THE OFFSHORE ROUTE AND/OR HOPPER DREDGE TO THE BEACH NOURISHMENT AREAS. LOCATIONS MAY VARY. HOPPER DREDGE DISTANCE FROM SHORE IS DEPENDENT ON BOTTOM CONTOURS, THIS MAY VARY.

0 700 1,400 Feet

ATKINS

Sheet 14 of 22

Galveston Beach Nourishment
Pipeline Routes

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

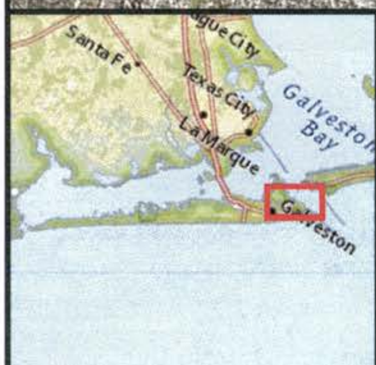
Job No.: 100059281	Scale: 1 " = 1,400 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (16 June 2018)

BORROW AREA 3		
Name	Northing	Easting
U	13,701,529	3,313,675
V	13,700,705	3,317,508
W	13,701,111	3,324,856
X	13,697,830	3,323,274
Y	13,696,945	3,316,066
Z	13,699,650	3,311,415

MAGNETOMETER ANOMALIES			
Point	UTM 15N Northing	UTM 15N Easting	Avoidance Radius (m)
M15	328,555	3,248,010	150
M16	328,591	3,247,902	150
M17	329,437	3,247,820	150
M18	330,035	3,248,171	125
M19	327,750	3,248,462	150

*2009 AMENDMENT TO TAC PERMIT NO. 4750
Coordinates provided in UTM15N



Coordinates
Authorized Borrow Area
Galveston Channel
Typical Section Indicator
Magnetometer Anomaly
Avoidance Radius

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

0 1,500 3,000 Feet

ATKINS

Sheet 15 of 22

Galveston Beach Nourishment
Borrow Areas 1 and 3

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1" = 3,000'
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (19 October 2018)

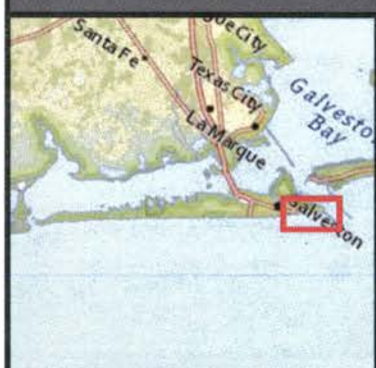
MAGNETOMETER ANOMALIES			
Point	UTM 15N Northing	UTM 15N Easting	Avoidance Radius (m)
M1	332,127	3,246,729	80
M2	332,203	3,246,817	100
M3	332,513	3,246,977	100
M4	332,533	3,246,621	35
M5	332,873	3,246,786	75
M7	333,407	3,246,954	75
M9	334,076	3,246,765	75
M10	333,660	3,246,029	75
M11	334,024	3,246,204	75
M12	333,936	3,245,985	80
M13	333,936	3,245,884	125
M14	334,862	3,245,815	75

*2008 TAC PERMIT NO. 4750
Coordinates provided in UTM15N

SOUTH JETTY		
Name	Northing	Easting
I	13,696,434	3,330,395
J	13,696,162	3,336,429
K	13,692,769	3,337,805
L	13,693,282	3,332,723
M	13,693,492	3,331,448
N	13,694,395	3,330,426
O	13,695,190	3,329,078
P	13,695,521	3,328,798
Q	13,695,713	3,328,795
R	13,696,135	3,328,811
S	13,696,306	3,329,220

APFFEL TEMP PLACEMENT		
Name	Northing	Easting
A	13,693,227	3,327,972
B	13,692,720	3,328,850
C	13,692,361	3,328,266
D	13,692,630	3,327,545

REVISED: JUNE 18, 2018



Coordinates
Authorized Borrow Area
Temporary Placement Area
Piping Plover Critical Habitat
Galveston Channel
Magnetometer Anomaly
Avoidance Radius
Typical Section Indicator

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

0 1,500 3,000 Feet

ATKINS

Sheet 16 of 22

Galveston Beach Nourishment
South Jetty Borrow Area and Apffel Park Temp Placement

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 3,000 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

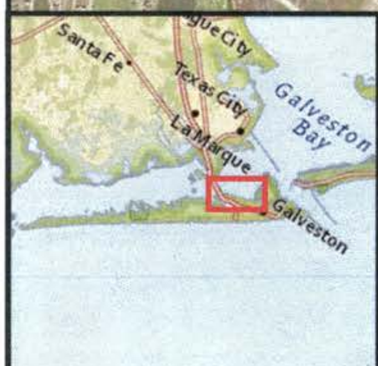
Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000. generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (19 October 2018)

R R RYAN INVESTMENTS INC (SWG-1992-02768)		
Name	Northing	Easting
A	13,678,158	3,287,415
B	13,678,445	3,287,976
C	13,677,510	3,288,455
D	13,677,223	3,287,894

WEST GULF MARINE WORKS LTD		
Name	Northing	Easting
E	13,680,000	3,292,560
F	13,680,261	3,293,427
G	13,679,217	3,293,962
H	13,679,079	3,293,052

TEXAS INTERNATIONAL TERMINALS LTD (5600 PIB Corp)		
Name	Northing	Easting
O	13,683,471	3,294,807
P	13,684,200	3,296,966
Q	13,681,328	3,297,934
R	13,680,284	3,297,948
S	13,679,889	3,297,118
T	13,679,533	3,296,133

GCAD PROPERTY ID 293637		
Name	Northing	Easting
U	13,684,200	3,296,966
V	13,684,392	3,297,535
W	13,684,091	3,299,010
X	13,681,202	3,298,008



⊗ Coordinates

Proposed Submerged Borrow Area

Authorized Submerged Borrow Area

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

0 1,500 3,000 Feet

ATKINS

Sheet 17 of 22

Galveston Beach Nourishment
Submerged Borrow Areas

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: 1 " = 3,000 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery, May 2015, 1:36,000, generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)

SUNBIRD/SUNSET COVE SUBDIVISION		
Name	Northing	Easting
Q	13,621,657	3,232,530
R	13,622,355	3,233,446
S	13,622,114	3,233,634
T	13,621,397	3,232,723

PEPPER COVE IN TERRAMAR BEACH SUBDIVISION		
Name	Northing	Easting
A	13,617,235	3,225,587
B	13,617,794	3,226,487
C	13,617,301	3,226,996
D	13,617,262	3,226,867
E	13,617,230	3,226,513
F	13,617,082	3,226,392
G	13,617,161	3,225,640

STAVANGER		
Name	Northing	Easting
K	13,610,925	3,220,297
L	13,611,797	3,219,617
M	13,611,875	3,219,724
N	13,611,356	3,220,111
O	13,611,654	3,220,495
P	13,611,302	3,220,752

SULLIVAN LAND & CATTLE CO		
Name	Northing	Easting
A	13,662,845	3,274,588
B	13,663,320	3,275,497
C	13,664,340	3,275,021
D	13,665,048	3,276,516
E	13,663,904	3,277,095
F	13,662,572	3,276,494
G	13,661,989	3,275,013

REVISED: JUNE 18, 2018

Coordinates

Proposed Borrow Area

Authorized Borrow Area

Datum: NAD 1983
Projection: State Plane Texas South Central
Units: Feet
Imagery: ESRI World Imagery

Sunbird/Sunset Cove Subdivision, Stavanger, Pepper Cove in Terramar Beach Subdivision, and Sullivan Land and Cattle Co Borrow Areas

0 1,500 3,000 Feet

ATKINS

Sheet 18 of 22

Galveston Beach Nourishment
Proposed and Authorized Borrow Areas

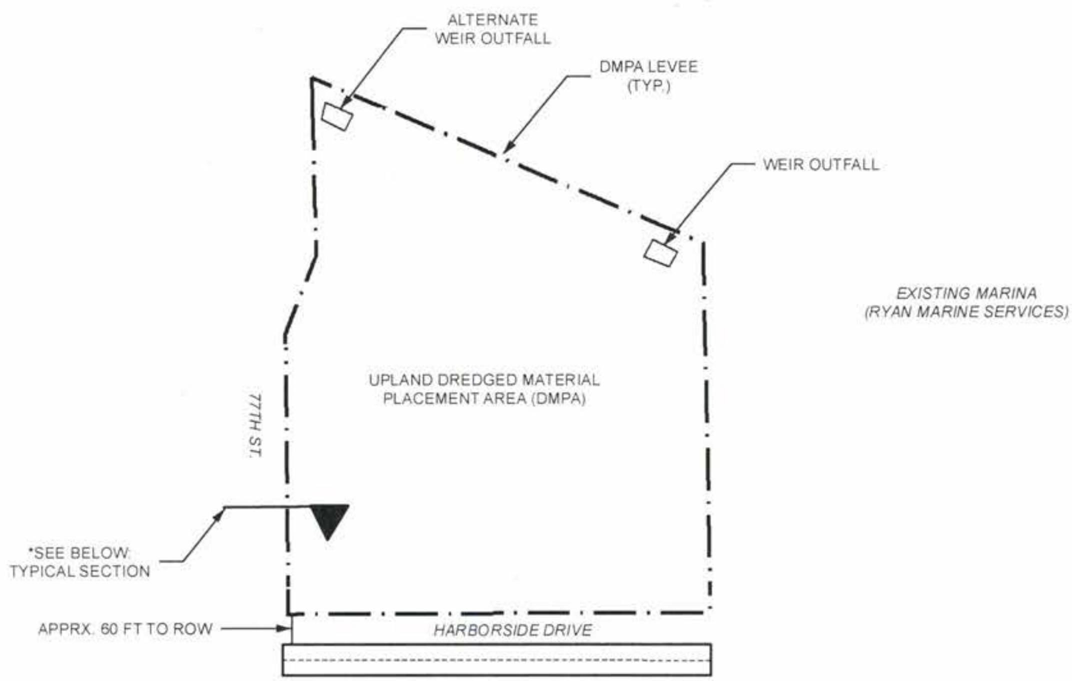
Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

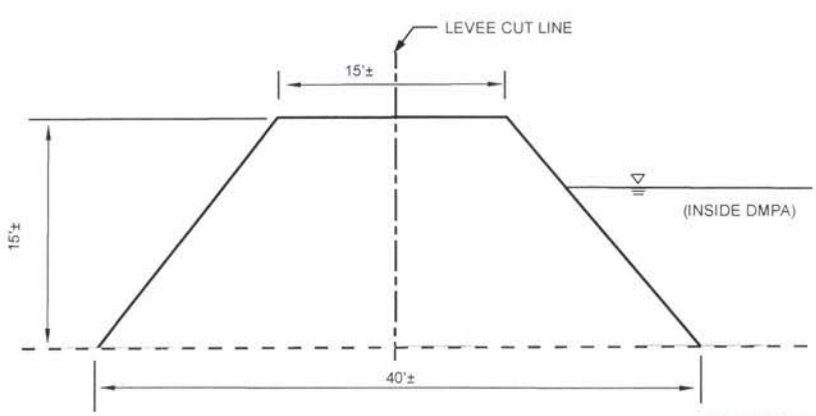
Job No.: 100059281	Scale: 1 " = 3,000 '
Prepared By: Atkins/WHIT6392	Date: Dec 06, 2017

Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community. World Imagery. May 2015. 1:36,000; generated by Atkins; using ArcMap. < http://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer> (13 June 2018)

UPLAND DREDGED MATERIAL PLACEMENT AREA (DMPA) PLAN
R R RYAN INVESTMENTS (SWG-1992-02768)



*TYPICAL SECTION - DMPA LEVEE



REVISED: JUNE 18, 2018

NOTES:

1. ALL ELEVATIONS ARE IN FEET AND REFER TO NAVD' 88

ATKINS

Sheet 19 of 22

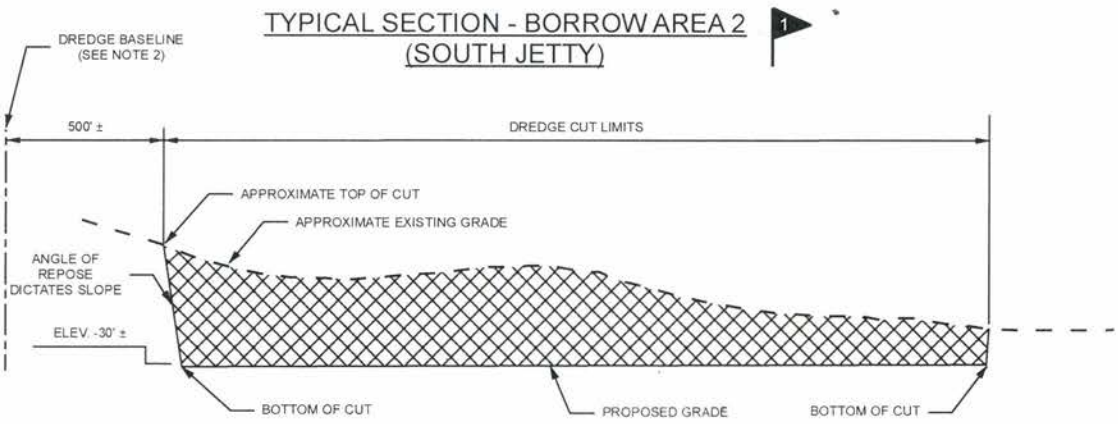
Galveston Beach Nourishment
Placement Area Typical Section

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

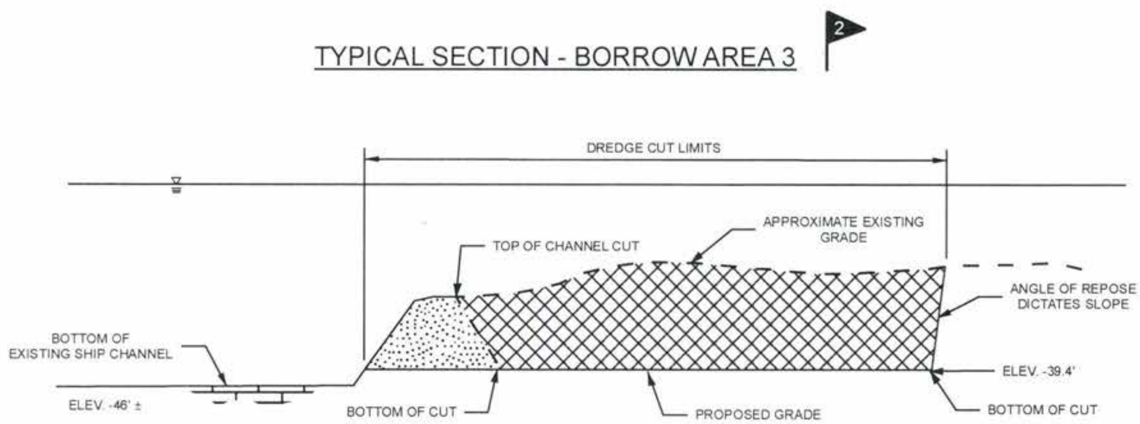
Galveston, Galveston County, Texas

Job No.: 100059281	Scale: Not to scale
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

TYPICAL SECTION - BORROW AREA 2 (SOUTH JETTY)



TYPICAL SECTION - BORROW AREA 3



REVISED: JUNE 18, 2018

NOTES:

1. ALL ELEVATIONS ARE IN FEET AND REFER TO NAVD' 88
2. DREDGE BASELINE IS APPROXIMATE CENTERLINE OF EXISTING SOUTH JETTY

ATKINS

Sheet 20 of 22

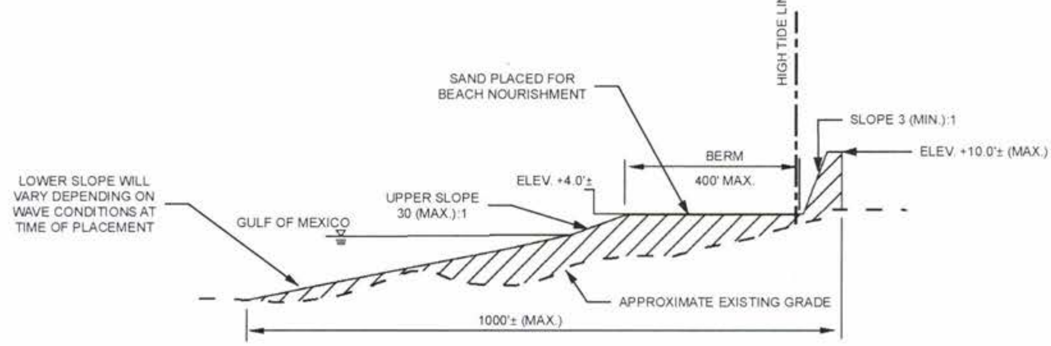
Galveston Beach Nourishment
Borrow Area Typical Sections

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

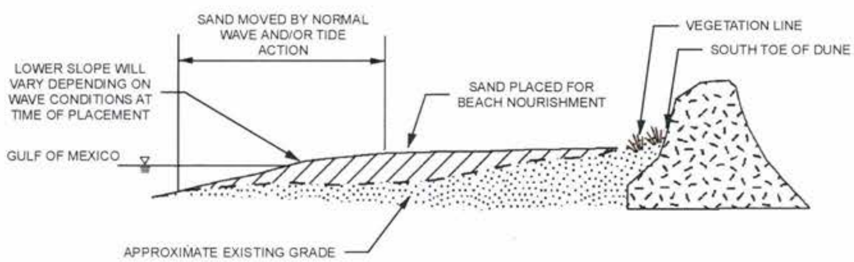
Galveston, Galveston County, Texas

Job No.: 100059281	Scale: Not to scale
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

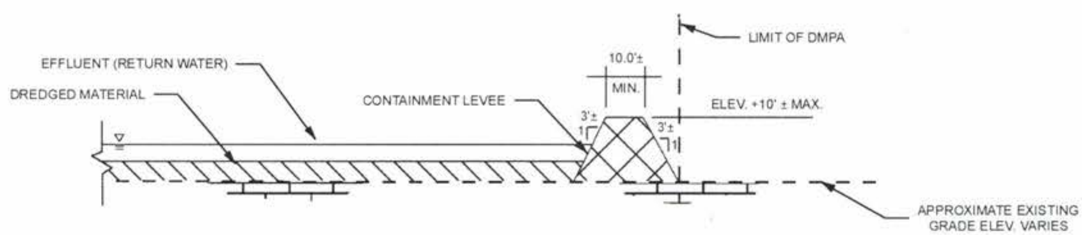
TYPICAL BEACH NOURISHMENT SECTION - DELLANERA



TYPICAL GALVESTON BEACH NOURISHMENT SECTION



TYPICAL SECTION - DMPA CONTAINMENT LEVEE



REVISED: JUNE 18, 2018

NOTES:

1. ALL ELEVATIONS ARE IN FEET AND REFER TO NAVD' 88

ATKINS

Sheet 21 of 22

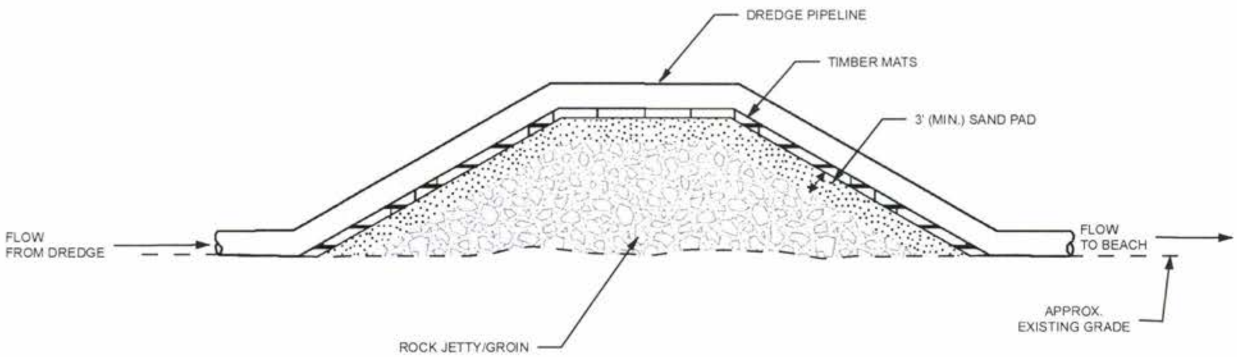
Galveston Beach Nourishment
Typical Sections

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: Not to scale
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

TYPICAL SECTION - SOUTH JETTY/GROIN DREDGE PIPELINE CROSSING 5



NOTES:

1. AT SOUTH JETTY AND 10TH ST. GROIN, DREDGE PIPELINE SHALL BE ROUTED SO THAT JETTY/GROIN CROSSING OCCURS AT A LOCATION WHERE MINIMAL SAND PLACEMENT IS REQUIRED TO ACCOMPLISH 3' COVER. WHERE ADDITIONAL SAND IS NEEDED, IT MAY BE REDISTRIBUTED FROM NON-VEGETATED AREAS IMMEDIATELY ADJACENT TO CROSSING. SAND SHALL BE RETURNED TO ITS ORIGINAL LOCATION AT COMPLETION OF PROJECT.
2. WEST OF 10TH STREET, SOURCE OF MATERIAL FOR SAND PAD SHALL BE DREDGED MATERIAL FROM DESIGNATED BORROW AREAS. SAND SHALL BE GRADED WITHIN BEACH NOURISHMENT TEMPLATE AT PROJECT COMPLETION.

REVISED: JUNE 18, 2018

ATKINS

Sheet 22 of 22

Galveston Beach Nourishment
Jetty/Groin Crossing Typical Section

Permit SWG-2007-01025
Galveston Island Park Board of Trustees

Galveston, Galveston County, Texas

Job No.: 100059281	Scale: Not to scale
Prepared By: ATKINS/WHIT6392	Date: Dec 06, 2017

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
17629 El Camino Real, Suite 211
Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

In Reply Refer To:
FWS/R2/02ETT
X00-2018-F-
2491

June 17, 2019

Colonel Lars N. Zetterstrom
U.S. Army Corps of Engineers
Galveston District
Attn: Regulatory Branch, Steven Walls
P.O. Box 1229
Galveston, Texas 77553-1229

Consultation No. 02ETTX00-2018-F-2491

Dear Colonel Zetterstrom:

This transmits the United States (U.S.) Fish and Wildlife Service's (Service) biological opinion (BO) on the proposed re-issuance of the U.S. Army Corps of Engineers (Corps) permit SWG-2007-01025 for the Park Board of Trustees of the City of Galveston (Galveston Park Board) to perform beach nourishment on Galveston Island, in Galveston County, Texas. Specifically, this BO addresses the effects of the proposed permit action on the endangered Kemp's ridley sea turtle *Lepidochelys kempii*, threatened piping plover *Charadrius melodus*, and the threatened red knot *Calidris canutus rufa*, in accordance with Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. §1531 et seq.). Your letter dated August 28, 2018 requesting formal consultation was received on August 30, 2018.

The Corps determined that actions of the proposed project would have no effect on the threatened West Indian Manatee *Trichechus manatus,* the endangered Attwater's greater prairie chicken *Tympanuchus cupido attwateri,* and the endangered leatherback sea turtle *Dermochelys coriace*. No coordination or contact with the Service is necessary for no effect determinations. However, based on a review of project specifics, Service files, status of these species, conversations with species experts, and implementation of the conservation measures as documented in this BO, the Service concurs with the Corps determination that associated on-shore actions of the proposed project may affect, but are not likely to adversely affect the endangered green sea turtle *Chelonia mydas*, the endangered hawksbill sea turtle *Eretmochelys imbricate*, and the threatened loggerhead sea turtle *Caretta caretta* or adversely modify piping plover critical habitat unit TX-34.

This BO is based on information provided in Corp's Biological Assessment (BA), dated August 2018, consultation documents, meetings, telephone conversations, e-mails with project proponents, field investigations, correspondence with Service biologist and species experts, and other sources of information. A complete administrative record of this consultation is on file at the Texas Coastal Ecological Services Field Office (TXESFO) in Houston, Texas.

BIOLOGICAL OPINION

CONSULTATION HISTORY

July 17, 2018	Preliminary meeting involving the Service, Corps, Galveston Parks Board and their representatives Atkins consultants to discuss project.
August 30, 2018	Service received a letter from the Corps, dated August 28, 2018, initiating formal Section 7 consultation for SWG-2007-01025, along with a BA dated August 2018, evaluating potential impacts to listed species.
September 17, 2018	Meeting with Corps, Galveston Park Board, and Atkins to discuss BA and process for BO.
September 27, 2018	Service received an email from the Corps regarding correcting discrepancies in the original cover letter, dated August 28, 2018, correcting consultation determinations to match the BA.
October 14, 2018	Service received an email stating borrow "area 1" removed from project plans.
November 5, 2018	Email exchange between the Corps and Service, which provided consultation number and formal consultation timeline.
November 27, 2018	Conference call involving the Corps, Atkins, and Service to discuss data submitted from Atkins regarding piping plovers and red knots.
November 28, 2018	Email submitted from the Corps, clarifying definitions for nourishment sites locations.
November 29, 2018	Draft conservation measures and draft reasonable and prudent measures sent to the Corps for review.
December 04, 2018	Meeting with Corps, Galveston Park Board, Atkins, and the Texas General Land Office to discuss draft conservation measures and draft reasonable and prudent measures.
December 19, 2018	Meeting between National Marine Fisheries Service - Galveston Lab and the Service to discuss sea turtle stranding occurrences on Galveston Island.

February 7, 2019	Meeting with Corps and Atkins to discuss sea turtle stranding information and associated Section 7 determinations.
February 22, 2019	Email sent to Corps with revised BO timeline due to Federal government shutdown/furlough.
February 28, 2019	Email exchange between the Corps and Service with revised Section 7 determinations.
March 12, 2019	Email exchange between the Corps and the Service with 2nd revision of Section 7 determinations.
March 13, 2019	Email exchange between Atkins and the Service regarding additional information for Dellanera beach nearshore placement area.
April 29, 2019	Site visit and evaluation of proposed sand source property for piping plover and red knot suitable habitat.
May 8, 2019	Draft BO sent to Corps for review.

DESCRIPTION OF PROPOSED ACTION

The proposed issuance of permit SWG-2007-01025 would authorize the Galveston Park Board to perform beach nourishment activities along approximately 81,454 linear feet (LF) of beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park (approximately 30,603 LF) then from the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive (approximately 50,851 LF).

Beach quality sand used for beach nourishment activities would be obtained from multiple sand sources along and adjacent to Galveston Island. Project maps are provided in the BA, dated August 2018. The methods used for removal of sand from the borrow site and subsequent placement within the project area would include: 1) use of a hydraulic dredge to excavate the sand, which would then be pumped through pipes to a temporary dredge material placement area (DMPA) on the beach at Apffel Park, dewatered, and subsequently trucked to the nourishment area; 2) use of a hydraulic dredge to obtain the sand, then pumped through a temporary pipeline and placed directly on the beach; or 3) use of a hopper dredge to excavate the sand, which would then be pumped through temporary pipelines and transported directly onto the beach nourishment area. The pipelines used to transport the sand could be either upland, submerged or a combination of both. The upland pipelines would run parallel to the beach from Apffel Park to the west end of the seawall. In addition, sand placement may be hauled via truck from upland sand sources to beach nourishment locations and distributed using various types of heavy equipment as described in Section 1.2 of the BA.

The temporary DMPA will be constructed only if dredged material is to be trucked to the beach nourishment area. The DMPA will consist of a temporary containment levee that will allow the sediment to separate from the water before it is used for nourishment. The water will then be returned to the Gulf of Mexico as effluent. The temporary pipeline routes would run near the highest point of the un-vegetated beach and near the base of the seawall, and/or be submerged off-shore 1,000' to 2000' parallel to the shoreline then routed perpendicular to the beach, to the nourishment locations. The discharge point would be relocated as sections of beach nourishment are completed.

For the purposes of this biological opinion, maintenance activities refer to the addition of beach quality sand, as needed, in high erosion areas within the action area during the term of the permit. However, grooming and/or raking the nourished beach are not considered maintenance activities as identified above, and the effects of these activities were not evaluated by the Corps and have not been addressed in this BO.

Beach nourishment activities will occur on an as needed basis as described in the BA. The Corps permit, if issued, would be valid for five years. Likewise, this BO is only valid for five years from the date of the Service's signature. Any changes, additions or modifications to the permit, or any work conducted by the applicant or others in addition to the permitted activities, are not covered by this biological opinion. If activities are to continue beyond the expiration date of the Corps permit (SWG-2007-021025), the Galveston Parks Board would need to file for an extension of the permit and the Corps will need to re-initiate consultation pursuant to Section 7 of the Act with the Service.

It is important to note that this biological opinion only evaluates the effects of the proposed on-shore permit actions on those species under the Service's jurisdiction. A Memorandum of Understanding (MOU) was signed on July, 18, 1977 acknowledging joint administration of the Act by the Service and the National Marine Fisheries Service (NMFS) in regards to sea turtles. The MOU outlines jurisdiction for sea turtles under the Act and states" The Service shall have sole jurisdiction over sea turtles, including parts or products, when on land and National Marine Fisheries Service (NMFS) shall have sole jurisdiction over sea turtles, including parts or products when in the marine environment" (NMFS and Service 1977). Therefore, only those proposed actions that take place on land (beach sand placement, the temporary DMPA, and the land-based pipeline) were evaluated for effects to sea turtles. The Corps is working with NMFS to evaluate the effects of the proposed dredging and submerged pipeline on sea turtles in the water.

Action Area

The action area includes approximately 15 linear miles of beach and shallow water proposed for nourishment along west Galveston Island, from the western terminus of the seawall extending west to the eastern boundary of Galveston Island State Park (30,603 linear feet) then from the western edge of Jamaica beach to the west limits of Pointe West Subdivision at Salt Prairie Drive (50,851 linear feet), all proposed and authorized borrow sources, and includes the areas along Apffel Park as described in the BA dated August 2018.

Barrier Island Dynamics
The beaches of Gulf coastal barrier islands are highly dynamic systems that are shaped by the natural forces of the wind, waves, and sea. As a result, these beaches constantly change shape (i.e., width, slope, etc.) and position (i.e., retreat, erode, or accrete) over-time. Human actions can further alter the conditions of these beaches.

On abbreviated time scales (i.e., days, months, years, etc.), the ever-changing forces of the waves and currents (including longshore) can transport sediment onto the beach, laterally among beaches (i.e., longshore transport), or remove sediment from the beach. Episodic weather events (e.g., tropical storms, hurricanes, etc.) can cause erosion and alter sediment transport dynamics along the coast, but they can also wash sand towards the mainland (over wash) causing increases in beach width (Britton and Morton 1989, Gibeaut et al., 2000).

On a long-term scale (i.e., tens to thousands of years), ongoing sea-level rise drives beaches landward by eroding sand from the shore face and moving it landward (Anderson 2007). Where sea-level rise is constant, the width and profile of the beach is usually maintained during this migration. However, where the rate of sea-level rise changes or where human actions interfere with natural coastal processes of sediment transport (e.g., jetties, channels, etc.) and landward migration (e.g., seawalls, homes), the shoreline may begin to erode over the long-term (Anderson 2007). Geologists estimate that sea-level has risen at a rate of 0.022 feet per year over the last century along the upper Texas coast and that this rate will only increase under future global warming scenarios (Gibeaut et al. 2000). Furthermore, they estimate that long-term shoreline retreat has occurred at rates between 3 and 15 feet per year along the upper-Texas coast (Gibeaut et al. 2000, Anderson 2007).

Conservation Measures

When used in the context of the ACT, "conservation measures" represent actions pledged in the project description, correspondence and/or meetings that the action agency or the applicant will implement to further the conservation or recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. Since conservation measures are part of the proposed action, their implementation is required under the terms of the consultation. The Corps and the Park Board have proposed the following conservation measures to avoid and minimize impacts to listed species:

Training and Monitoring

1) The Galveston Park Board in coordination with the Corps and other project proponents will ensure crew chiefs, supervisors, and wildlife monitors attend training prior to the initiation of, or their participation in, project work activities. A Qualified biologist will conduct training and the scope of training will include 1) recognition of sea turtles, piping plovers and red knots, their habitats, and tracks 2) avoidance and minimization measures 3) reporting criteria and 4) contact information for different rescue agencies in the area; by use of the wildlife monitoring checklist (Appendix B of the BA dated 2018 and attached to BO).

2) Training will include a half-day training session coordinated by the Galveston Parks Board through the Corps, the Service, or the Padre Island National Seashore, on identification of sea turtles, nesting sea turtles, and bird identification. Documentation of this training, including a list of attendees, will be submitted to the Corps and the Service prior to the start of each nourishment project in the permit area and as new members are trained.

3) A minimum of one qualified wildlife monitor will be assigned to each active work area. The wildlife monitor will inspect the active work areas prior to the start of work and continuously throughout the work day. Wildlife monitor qualifications will be submitted to the Corps and the Service prior to start of each nourishment project.

4) The Galveston Park Board will provide the Corps with the name of a single point of contact (POC) responsible for communicating with the crew and the wildlife monitor(s) and reporting on endangered species issues during the project. The wildlife monitor(s) will be on-site to ensure listed species are not affected by beach nourishment activities.

5) Prior to the start of work, the Galveston Park Board will ensure that the wildlife monitor(s) inspect the beach adjacent to and along work areas before work begins each morning. Wildlife monitors will communicate all activities to the POC and the POC will coordinate that information with the Corps and Service as required.

6) Prior to the start of work each day, all contractors, work crews, drivers, etc., will attend a brief training on the recognition of sea turtle, piping plovers, red knots, and their habitats and updated on the previous days encounters, if any, with nesting or injured wildlife.

<u>Piping Plovers and Red Knots</u> - wintering season begins July 15 extending through May 15

7) The POC and/or wildlife monitor(s) will be on-site to ensure piping plovers and red knot are not affected by beach nourishment activities. The POC and/or monitor(s) will ensure that loafing and/or resting piping plovers and red knots are not in the project area during nourishment activities.

8) The POC and/or monitor(s) will check under and around vehicles and heavy equipment before they are moved. The POC and/or monitor(s) should be aware that piping plovers and red knots are especially vulnerable during periods of cold temperature, inclement weather, and when roosting at night. Construction workers will immediately notify the POC and/or monitor(s) if listed species occur in the immediate project area. If a piping plover and/or red knot are found in the active work area, work will be stopped within an area specified by the POC and/or the wildlife monitor until the bird(s) leaves the construction site. Equipment will remain powered off

until the bird(s) has left. If the bird does not relocate (e.g., injured bird), the Service will be contacted to solicit additional guidance.

9) Disturbed areas of the beach (e.g., ruts, tread marks) will be smoothed out and loosened upon the completion of each work day.

10) Prior to the construction of the DMPA at Apffel Park, the Galveston Park Board, in coordination with the Corps, will contact the Service to evaluate the area for piping plover and red knot use. Additional minimization guidance may be provided from the Service at this time.

Sea Turtles - peak nesting season begins March 15 extending through October 1

11) Placement of sand for beach nourishment will be conducted, when possible, outside of the sea turtle nesting season (March 15 to October 1).

12) The Galveston Park Board, in coordination, with the Corps, will ensure that daily turtle patrols of the proposed beach nourishment area by the wildlife monitor are conducted before beginning beach nourishment activities each day and continuously throughout the work day.

13) If a sea turtle or nest is located or identified, the siting will be documented on the Wildlife Monitoring Checklist to be provided by the Galveston Park Board (attached), and beach nourishment activities will immediately cease within 100 feet of the nest or turtle. The monitor will then call 1-866-TURTLE5 (1-866-887-8535) and notify the Service, Texas Coastal Ecologist Services Field Office (TCESFO), at 281-212-1512 (Moni Belton). Additional numbers can be found on the Wildlife Monitoring Checklist.

14) All turtles, turtle nests, or turtle eggs found during beach nourishment activities will be safeguarded until they can be re-located by properly permitted individual(s).

Construction, Equipment, and Designated Work Area

15) Beach nourishment activities will be conducted mechanically by means of trucks, front-end loaders, bulldozers, cranes, and/or UT/ATVs. Other equipment could include a dredge pipe, booster pumps, generators, lighting, and fuel trucks.

16) Materials and equipment required for the project will be staged in upland areas and transported as needed to the proposed work sites. Staging areas will be designated before work begins and will be solely within the construction footprint. Equipment may be fenced within these staging areas.

17) Construction vehicles will access the beach from public roads closest to the work sites to reduce the unnecessary vehicle traffic on the beach. Drive-overs, to facilitate ingress and egress from work sites, will be constructed of beach-quality sand.

18) Ingress/egress routes will be flagged/marked with wooden laths/stakes to ensure that work activities remain within the approved project area. These items will be removed once work is completed in designated areas.

19) The contractor will coordinate and sequence the work to minimize the frequency and density of vehicular traffic on the beach to the greatest extent practicable. Construction crews and vehicles will avoid the swash zone and the wrack line closest to the swash zone when possible. The swash zone is defined as the area of the beach intermittently covered and uncovered by wave run-up. The wrack line is defined as vegetative area made up of but not limited to sargassum, shell hash, vegetation, and some light trash and litter.

20) Sand material placement areas will be confined to a maximum 1,000-foot long segment within the active work corridor. Active vehicle access corridors could include up to an additional 2000 feet. Work activities will run parallel with the shoreline along the work corridor and active work area and will shift linearly along the work corridor as sections of the berm template are completed to allow for birds to migrate to undisturbed portions of the beach.

21) The ends of the 1,000-foot long segment or between groin jetty sections within the active work area will be clearly marked with orange wooden barricades (or other temporary barriers) for the duration of project construction. Barricades will be shifted down the active work area as work is completed.

22) The number of vehicles transiting from upland areas to the project sites will be kept to a minimum. All vehicles will use the same pathways and access will be confined to the closest access point to the immediate work area. Construction/nourishment activities will occur from the landward side of the beach nourishment area whenever possible.

23) Vehicles will adhere to a reduced speed of 15 miles per hour, the speed limit already prescribed for Texas beaches in the Texas Transportation Code #545.352(b)(5).

24) The 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.

Beach Quality Sand and Placement

25) Only sand that meets the specifications of the local beach quality sand (e.g., grain size, color, composition and mineralogy) will be used for beach nourishment activities. The Texas General Land Office provides Beach/Dune guidelines for placing sand and material seaward of the dune protection line in the Texas Administrative Code (TAC 2019); specifically, in 31TAC § 15.4 (c)(2) and (3). These rules specifically prohibit the placement of sand, soil, sediment or dredged is of an unacceptable mineralogy or grain size when compared to natural or native sediments found on the site. These rules also provide that material intended for beach placement must not contain hazardous substances as found in Volume 40 of the Code of Federal Regulations, Part 302.4.

26) Sand will be placed and maintained at a gradual slope to minimize scarping.

27) After project construction in an active work zone is complete for the day the project site will be graded, and all vehicular ruts removed.

Post Construction and Public Outreach

28) Prior to beach nourishment activities, public outreach will be initiated to educate surrounding residents about the project and piping plovers, red knots, and sea turtles. Public education signs will be installed at beach access points within the action area along Galveston Island.

29) Post construction, the Galveston Park Board will monitor changes to the project area and/or species usage so that potential adverse effects from construction can be identified.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Five species of sea turtles are found in U.S. waters and nest on U.S. beaches. These include the leatherback, hawksbill, loggerhead, green and Kemp's ridley sea turtles. The leatherback, hawksbill and green sea turtles rarely nest in the southeastern U.S., but offshore waters are important feeding, resting, and migratory corridors. All are known to nest in Texas. The Kemp's ridley are known to nest in the vicinity of the proposed action area. The Texas sea turtle nesting season is from March 15 to October 1 each year. In addition, Kemp's ridley, loggerhead, green, and hawksbill sea turtles are occasionally found stranded along the beachfront, usually within the sargassum wrack line.

Kemp's Ridley Sea Turtle

Species Description

The Kemp's ridley sea turtle was listed as endangered throughout its entire range on July 28, 1978 (43 FR 32800). Kemp's ridleys are the smallest of the sea turtles, reaching about 2 feet

(0.6 meters) in length and can weigh up to100 pounds (45 kilograms). The adult has an unusually broad, heart-shaped, keeled upper shell that is serrated behind the bridge or midsection, almost as wide as it is long, and is usually olive-gray. The upper shell has five pairs of scales or plates along the sides. In the bridge hooking the lower shell to the upper shell, there are four infra-marginal plates, each perforated by a pore. The lower shell is a light, yellowish color. The head has two pairs of prefrontal scales. The Kemp's ridley has a triangular-shaped head with a somewhat hooked beak with large crushing surfaces. Juveniles have a dark-charcoal colored shell that changes to olive-green or gray with age.

Critical Habitat
Critical habitat has not been designated for this species.

Distribution and Abundance
Kemp's ridleys occur in the Gulf of Mexico and along the Atlantic coast of the U.S., with nesting locations concentrated on coastal areas of Rancho Nuevo, Mexico. Approximately 99.9 percent of known nests are found on the coastal beaches of Tamaulipas and Veracruz, with approximately 21,000 nests protected in 2011. In 2017, approximately 27,000 nest were documented with 353 in Texas, 24,586 in Tamaulipas, and 2,000 located in Veracruz, Mexico (Gaskil 2018). Nesting decreased along the Texas coast to 250 in 2018 (Dr. D. Shaver, National Park Service, pers. comm 2018).

Habitat
Habitat includes areas that shelter the turtle from high winds and waves, with forage areas that include seagrass, oyster reefs, sandy bottoms, mud bottoms, and rock outcroppings. Their diet consists primarily of crabs, shrimp, snails, sea urchins, sea stars, fish and occasionally marine plants (TPWD 1995). Preferred habitat for this species is shallow coastal and estuarine waters and occurs in the bays on the middle and upper Texas coast with regularity.

Life History
Nesting occurs primarily on beaches around Rancho Nuevo, Tamaulipas, Mexico, from April to June each year; however, Kemp's ridley nests have been recorded in Mexico as early as March and as late as August (Gaskil 2018). During preferred nesting conditions, which are precipitated by strong winds, the females come ashore, often in groups called "arribadas." Kemp's ridleys are predominately daytime nesters. Although some females breed annually, this species is considered to nest biannually and may nest as many as three times in a single season (Service and NMFS 2011), producing an average of 2.5 clutches. Clutch size averages between 100-110 eggs. Hatchlings emerge after approximately 50 days of incubation. Sexual maturity is believed to be reached between 10 to 15 years of age. Some fidelity to nesting sites has been shown by Kemp's ridleys, both within one nesting season, and between nesting seasons (PIAS 2018; Burchfield, et. al. 2002). If conditions are unsuitable on a nesting beach or the female is disturbed, she may return to the water and attempt to nest elsewhere within several kilometers of the first site. The disturbance could also cause her to switch nesting beaches entirely (Dr. D. Shaver, National Park Service, PIAS 2018). After the nesting season, adults migrate to feeding areas in the Gulf of Mexico and remain there until the next reproductive season. Hatchlings that successfully emerge from the nest and enter the ocean are essentially pelagic for approximately two years (Ernst et. al. 1994).

Population Dynamics
Kemp's ridley sea turtle numbers have precipitously declined since 1947, when more than 40,000 nesting females were estimated in a single arribada (Service and NMFS 2011). The nesting population produced a low of 702 nests in 1985 (Service and NMFS 2011). Since the mid-1980s, the number of nests laid in a season has been steadily increasing, primarily due to nest protection efforts and implementation of regulations requiring the use of turtle excluder devices (TEDs) in commercial fishing trawls. Today, the population of Kemp's ridleys appears to be in the early stages of recovery, as can be seen along the Texas Coast (PAIS 2018)

Reasons for Listing/Threats to Survival
Several factors contributed to the decline of sea turtle populations along the Atlantic and Gulf coasts, including commercial over-utilization of eggs and turtle parts, incidental catches during commercial fishing operations, disturbance of nesting beaches by coastal housing, marine pollution, and entanglement and ingestion of debris (Service and NMFS 2011). Additional threats are expanding human populations adjacent to important nesting beaches, degradation of coastal foraging habitats, and the potential effects of global warming on sex ratios (NMFS and Service 2007).

Recovery Efforts
Conservation efforts to lessen threats include protection of major nesting beaches, use of TEDs in commercial fishery trawls, regulations for limiting incidental take among fisheries, and management of favorable coastal and marine habitat (NMFS and Service 1991b). Each year, Kemp's ridley nests at Rancho Nuevo and other major nesting beaches in the Mexican states of Tamaulipas and Vera Cruz. They are actively protected from human and mammalian predation, resulting in increased hatching success rates.

In 1978, a cooperative project involving the National Park Service's Padre Island National Seashore (PAIS), NMFS, the Service, the Texas Parks and Wildlife Department, the Gladys Porter Zoo (Brownsville, TX), and Mexican federal and state agencies was initiated to re-establish a nesting colony of Kemp's ridley sea turtles in the U.S. Eggs were collected in Mexico from 1978 to 1988 and transported to PAIS for incubation. Hatchlings were released onto the beach, allowed to enter the water, and then immediately recaptured and raised in "head start" facilities in Galveston, Texas for approximately 9 to11 months before being released into the Gulf of Mexico.

In 1986, the National Park Service initiated a program to detect, monitor, and protect sea turtle nests at PAIS. Detection involves patrols to look for nesting activity, public education, and investigation of reports from patrols, beach workers, and the public. Patrol efforts involving multiple federal, state, local, university and non-governmental agencies are now conducted on most Texas beaches from April 1 to July 15 each year.

Since 1996, some turtles experimentally imprinted to Padre Island or otherwise head-started have returned to PAIS and the nearby vicinity to lay eggs (Shaver 1997, 1998, 1999a, 1999b; Shaver and Caillouet 1998). However, the majority of Kemp's ridley sea turtles that nest in Texas each year are from wild stock.

Piping Plover

For the purpose of this action, discussions will be focused on the Texas wintering piping plover population and its designated critical habitat.

Species Description
The piping plover was federally listed as endangered in the Great Lakes watershed, and as threatened elsewhere in its range, on January 10, 1986 (50 FR 50726). The piping plover is a small North American shorebird approximately 7 inches (17.7 centimeters) long with a wingspread of about 15 inches (38.1 centimeters). Breeding birds have white under parts, light beige back and crown, white rump, and black upper tail with a white edge. In flight, each wing shows a single, white wing stripe with black highlights at the wrist joints and along the trailing edges. Breeding plumage characteristics are a single black breast band, which is often incomplete, and a black bar across the forehead. The black breast band and brow bar are generally more pronounced in breeding males than females. The legs and bill are orange in summer, with a black tip on the bill (Service 2003).

Critical Habitat
Critical habitat on the wintering grounds was designated July 10, 2001 (66 FR 36038). That designation included 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas, to provide sufficient wintering habitat to support the piping plover at the population level and geographic distribution necessary for recovery of that species. A total of approximately 165,211 acres (66,881 hectares) and/or 1,798.3 miles (2,891.7 kilometers) were designated. There were 37 critical habitat units [approximately 62,454 acres (25,285 hectares), 797.3 miles (1,283.8 kilometers)] designated in Texas. These areas were believed to contain the essential physical and biological elements for the conservation of wintering piping plovers, and the physical features necessary for maintaining the natural processes that provides appropriate foraging, roosting, and sheltering habitat components.

The primary constituent elements for critical habitat are found in geologically dynamic coastal areas that contain intertidal ocean-facing and bay shoreline beaches and flats (between annual low tide and annual high tide); associated dune systems and flats above annual high tide; and seasonally-emergent sand bars, mud flats, and oyster reefs. The primary constituent elements for the wintering population of the piping plover are (Service 2015):

1) Intertidal sand beaches, including sand flats or mudflats, between annual low tide and annual high tide, with no or very sparse emergent vegetation for feeding. In some cases, these flats may be covered or partially covered by a mat of blue-green algae.

2) Un-vegetated or sparsely vegetated sand, mud, or algal flats above annual high tide for roosting. Such sites may have debris or detritus, and may have micro-topographic relief offering refuge from high winds and cold weather.

3) Surf-cast algae for feeding.

4) Sparsely vegetated back beach, which is the beach area above mean high tide seaward of the dune line; or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road. Back beach areas are used by plovers for roosting and refuge during storms.

5) Spits, especially sand, running into water for foraging and roosting.

6) Un-vegetated wash over areas with little or no topographic relief for feeding and roosting. Wash over areas are formed and maintained by the action of hurricanes, storm surges, or the extreme wave actions.

7) Natural conditions of sparse vegetation and little or no topographic relief mimicked in artificial habitat types (e.g. dredge spoil sites).

Distribution and Abundance

Piping plovers breed only in North America within three geographic regions that encompass three distinct breeding populations: the Northern Great Plains, the Great Lakes, and the Atlantic Coast. The winter ranges of the different breeding populations overlap, making it impossible to distinguish the source population of a wintering bird unless it has been banded or marked on the breeding grounds. The piping plover's primary winter range is along the Atlantic and Gulf coasts from North Carolina to Mexico, and into the Bahamas and West Indies (Service 1985). Southward migration to the wintering grounds along the southern Atlantic coast and Gulf of Mexico shoreline extends from late July, August, and September. Individuals can be found on their wintering grounds throughout the year, but sightings are rare in May, June, and early July (Service 2003).

Habitat

In most areas, wintering piping plovers depend on a mosaic of sites distributed through the landscape, as the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions (Drake 1999). Plovers move among sites as environmental conditions change. In general, wintering piping plovers forage mostly on benthic invertebrates, insects, and crustaceans found within the intertidal areas of ocean beaches, wash over areas with no or very sparse emergent vegetation, mudflats, sandflats, wrack lines; and shorelines of coastal ponds, lagoons or salt marshes. Roosting areas may be un-vegetated or sparsely vegetated and may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather.

Life History

Behavioral observations of piping plovers on the wintering grounds suggest that they spend the majority of their time foraging (Nicholls and Baldassarre 1990, Drake 1999, Service 2003). In general, wintering piping plovers forage mostly on benthic invertebrates, insects, and crustaceans found within the intertidal areas of ocean beaches; wash over areas with no or very sparse emergent vegetation, mudflats, sandflats, wrack lines; and shorelines of coastal ponds, lagoons or salt marshes. Roosting areas may be un-vegetated or sparsely vegetated and may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. When not foraging, plovers undertake various maintenance activities such as roosting, preening, bathing, aggressive encounters (with other piping plovers and other species), and moving among available habitat locations (Zonick and Ryan 1996). Individual plovers tend to return to the same wintering sites year after year (Nicholls and Baldassarre 1990, Drake 1999, Service 2003).

Population Dynamics

The Texas coast is a major wintering area for piping plovers, and may provide habitat for about 55 percent of birds found during winter censuses (Nicholls and Baldassarre 1990, Haig and Plissner 1993, Drake 1999, Elliott-Smith et. al. 2009). Since piping plovers spend 55 to 80 percent of their annual cycle associated with wintering areas, factors that affect their wellbeing on the wintering grounds could substantially affect their survival and recovery (Service 1996). A consistent finding of all analyses of the demographic factors affecting the persistence and/or extinction of piping plover populations is that vulnerability to extinction is greatly increased by even small declines in survival rates (Melvin and Gibbs 1994; Plissner and Haig 2000a) Modeling by Melvin and Gibbs (1994), for example, postulated approximately four-fold increases in the likelihood of extinction of the Atlantic Coast piping plover population when survival rates of adults and juveniles declined by as little as 5 and 10 percent, respectively, and other parameters were constant.

Reasons for Listing/Threats to Survival

Threats to piping plover populations and habitat are similar on the breeding and wintering ranges. Habitat destruction and degradation are pervasive and have reduced physically suitable habitat. Human disturbance and predators further reduce breeding and wintering habitat quality and affect survival. Contaminants, as well as genetic and geographic consequences of small population size, pose additional threats to piping plover survival and reproduction (Service 2003).

A variety of human-caused disturbance factors have been noted that may affect plover survival or utilization of wintering habitat. Those factors include human disturbance such as recreational activities, inlet and shoreline stabilization projects, dredging of inlets that can affect spit formation, beach maintenance and nourishment, and pollution (Nicholls and Baldassarre 1990, Haig and Oring 1985, Haig and Plissner 1993). In some areas, natural erosion of barrier islands may also result in habitat loss.

Recovery Efforts

The Atlantic Coast Piping Plover Recovery Plan (Service 1996) calls for the protection of all known wintering habitat by preventing habitat degradation and disturbance, including direct and indirect impacts of shoreline stabilization, navigation projects, development, disturbance by recreationists and their pets, and contamination and degradation due to oil or chemical spills. Factors that must be considered include: (1) disturbance depleting the birds' energy reserves, and (2) effects on prey availability that may last long after the completion of a given action. The Great Lakes and Northern Great Plains Piping Plover Recovery Plan (Service 1988) and the Recovery Plan for the Great Lakes Piping Plover (Service 2003) also call for protecting wintering piping plovers and managing their habitats to promote survival and recovery.

Adult survival is key to the continued and long-term existence of the piping plover and to stepwise improvement toward meeting its recovery criteria. Protecting the wintering grounds allows adult piping plovers to maintain adequate body reserves so they survive the winter and can migrate back to nest in the spring. Broad management actions on the wintering grounds include protection of resting areas, designation of important shorebird wintering sites and regular shorebird surveys.

Red Knot

Species Description

There are six recognized subspecies of red knots (*Calidris canutus*), and on December 11, 2014, the Service published the final rule listing the rufa subspecies of red knot (*Calidris canutus rufa*) as a threatened species under the Act; that rule became effective on January 12, 2015. (Throughout this document, the "rufa red knot" will be referred to as the "red knot" unless there is specific reference to a distinct subspecies.) For the full, detailed discussion of the entire life history and biology of the species, please reference the Service's final rule for the listing of the species (Service 2014) and its supplemental document, *Rufa Red Knot Background Information and Threats Assessment*.

The red knot is a medium-sized shorebird about 9 to 11 inches in length. The red knot is easily recognized during the breeding season by its distinctive rufous (red) plumage. Nonbreeding plumage is dusky gray above and whitish below. Juveniles resemble nonbreeding adults, but the feathers of the scapulars and wing coverts are edged with white and have narrow, dark bands, giving the upperparts a scalloped appearance (Davis 1983).

Critical Habitat

Critical habitat has not been designated for this species.

Distribution and Abundance

The red knot's range spans 40 states, 24 countries, and their administrative territories or regions extend from their breeding grounds in the Canadian Arctic to migration stopover areas along the Atlantic and Gulf coasts of North America to wintering grounds throughout the Southeastern U.S., the Gulf coast, and South America (reaching as far south as Tierra del Fuego at the southern tip of South America). In Delaware Bay and Tierra del Fuego, the era of modern surveys for the red knot and other shorebird species began in the early 1980s. Systematic red knot surveys of other areas began later, and for many portions of the knot's range, available survey data are patchy. Prior to the 1980s, numerous natural history accounts were available and provide mainly qualitative or localized population estimates. Nonetheless, a consistent narrative emerges across many historical accounts that red knots were extremely abundant in the early 1800s, decreased sharply starting in the mid-1800s, and may have begun to recover by the mid-1900s. Most writers agree the cause of that historical decline was intensive sport and market hunting. It is unclear whether the red knot population fully recovered its historical numbers following the period of unregulated hunting (Harrington 2001).

Habitat

Habitats used by red knots in migration and wintering areas are generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In many wintering and stopover areas, quality high-tide roosting habitat (i.e., close to feeding areas, protected from predators, with sufficient space during the highest tides, free from excessive human disturbance) is limited (Kalasz 2012 pers. comm.; Niles 2012 pers. comm.). The supra-tidal (above the high tide) sandy habitats of inlets provide important areas for roosting, especially at higher tides when intertidal habitats are inundated (Harrington 2008). In some localized areas, red knots will use artificial habitats that mimic natural conditions, such as nourished beaches, dredged spoil sites, elevated road causeways, or impoundments; however, there is limited information regarding the frequency, regularity, timing, or significance of red knots' use of such artificial habitats.

In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, peat banks, and shallow coastal impoundments, ponds, and lagoons along the Atlantic coast (Cohen et al. 2010; Cohen et al. 2009; Niles et al. 2008; Harrington 2001; Truitt et al. 2001). In Florida, the birds also use mangrove and brackish lagoons. Along the Texas coast, red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides. Red knots also show some fidelity to particular migration staging areas between years (Duerr et al. 2011; Harrington 2001).

Life History

Little information is available about nonbreeding red knots. Unknown numbers of nonbreeding red knots remain south of the breeding grounds during the breeding season, and many, but not all, of these red knots are 1-year-old (i.e., immature) birds (Niles et al. 2008). Nonbreeding red knots, usually individuals or small groups, have been reported during June along the U.S. Atlantic and Gulf coasts, with smaller numbers around the Great Lakes and Northern Plains in both the United States and Canada (eBird.org 2012). There is also little information on where juvenile red knots spend their winter months (Service and Conserve Wildlife Foundation of New Jersey 2012), and there may be at least partial segregation of juvenile and adult red knots on the wintering grounds. All juveniles of the Tierra del Fuego wintering region are thought to remain in the Southern Hemisphere during their first year of life, possibly moving to northern South America, but their distribution is largely unknown (Niles et al. 2008). Because there is a lack of specific information on juvenile red knots, the Service uses the best available data from adult red knots to draw conclusions about juvenile foraging and habitat use.

Population Dynamics

Localized and regional red knot surveys have been conducted across the subspecies' range with widely differing levels of geographic, temporal, and methodological consistency. Available survey data are presented in detail in the Service's supplemental document to the December 11, 2014, final rule, *Rufa Red Knot Background Information and Threats Assessment* (Service 2014). However, some general characterizations of the available data are noted as follows:

- No population information exists for the breeding range because, in breeding habitats, red knots are thinly distributed across a huge and remote area of the Arctic. Despite some localized survey efforts, (e.g., Bart and Johnston 2012; Niles et al. 2008), there are no regional or comprehensive estimates of breeding abundance, density, or productivity (Niles et al. 2008).

- Few regular surveys are conducted in fall because southbound red knots tend to be less concentrated than during winter or spring.
- Some survey data are available for most wintering and spring stopover areas. For some areas, long-term data sets have been compiled using consistent survey methodology.
- Because there can be considerable annual fluctuations in red knot counts, longer-term trends are more meaningful. At several key sites, the best available data show that numbers of red knots declined and remain low relative to counts from the 1980s, although the rate of decline appears to have leveled off since the late 2000s.
- Inferring long-term population trends from various national or regional datasets derived from volunteer shorebird surveys and other sources, NPS (2013), Andres (2009) and Morrison et al. (2006) also concluded that red knot numbers declined, probably sharply, in recent decades.

Reasons for Listing/Threats to Survival

The Service has determined that the red knot is threatened due to loss of both breeding and nonbreeding habitat; likely effects related to disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (''mismatches'') in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions. Main threats to the red knot in the United States include: reduced forage base at the Delaware Bay migration stopover; decreased habitat availability from beach erosion, sea level rise, and shoreline stabilization in Delaware Bay; reduction in or elimination of forage due to shoreline stabilization, hardening, dredging, beach replenishment, and beach nourishment in Massachusetts, North Carolina, and Florida; and beach raking which diminishes red knot habitat suitability. These and other threats in Canada and South America are detailed in the final listing rule (Service 2014). Unknown threats may occur on the breeding grounds.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early Section 7 consultation; and the impact of state and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The action area includes approximately 81,454 linear feet (LF) of beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park (approximately 30,603 LF) then from the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive (approximately 50,851 LF) on Galveston Island, Galveston County, Texas.

Kemp's Ridley Sea Turtle

The majority of Kemp's ridley sea turtles nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a very small number of Kemp's ridleys consistently nest along the Texas coast. Historic nesting frequency on the south Texas coast is poorly known and only six Kemp's ridley sea turtles were documented prior to 1979 (Shaver and Caillouet 1998). However, 1,185 Kemp's ridley nests were found on the Texas coast between 1979 and 2011(Dr. D. Shaver, National Park Service, pers. comm 2011). An additional 78 have been documented from 2012 to 2018 along the upper Texas Coast.

In 2002, Kemp's ridley sea turtles were documented nesting on Galveston Island and surrounding areas on the upper Texas coast, defined as the area from Matagorda Peninsula northward to Sabine Pass. In every subsequent year, Kemp's ridleys have nested on the upper Texas coast. In 2018, 250 Kemp's ridley nests were found in Texas, 15 of which were on the upper Texas coast with 2 of those occurring along Galveston Island. (Shaver 2018).

There have been 86 Kemp's ridley sea turtle nests recorded on Galveston Island since 2002, with the highest count of 15 in 2011 and lowest being zero in 2016 (Shaver 2018, PAIS 2018). The number of turtle nests that have occurred in the area proposed for beach nourishment in the proposed project area since 2012 is three. The entire 15-mile area proposed for beach nourishment is considered suitable habitat for nesting Kemp's ridley sea turtles.

Piping Plover

The piping plover is a regular winter resident along the upper Texas coast (Haig and Oring 1985, Haig and Plissner 1993). Piping plovers begin arriving in July; however, late-nesting birds on the breeding grounds can arrive as late as September. A few individuals can be found throughout the year but sightings are rare in late May, June, and early July. They begin leaving in late February to migrate back to the breeding sites, and by late May most birds have left (Haig and Elliott-Smith 2004).

Piping plovers may use the 15 miles of beach proposed for nourishment for foraging, resting or loafing. The western portion of the project located near San Luis Pass is designated critical habitat for the wintering piping plover (Texas Unit-34). Piping plovers use this critical habitat unit for foraging, resting and sheltering.

The exact number of piping plovers that winter in Texas and on Galveston Island is unknown. However, an international piping plover winter census counted 1,904 wintering piping plovers in Texas in 1991, 1,333 in 1996 and 1,042 in 2001 (Haig and Plissner 1993, Plissner and Haig 2000b, Haig et. al. 2005). In 2006, a range-wide census was again conducted for breeding and wintering plovers. The 2006 wintering census consisted of one-time counts by qualified observers during a designated two-week period of time (January 23-February 6, 2006). The 2006 wintering piping plover census recorded a total of 3,884 individual plovers range-wide, with 2,090 individuals recorded in Texas and 114 individuals recorded on the west end of

Galveston Island (Elliott-Smith et. al. 2009). The 2011 International Piping Plover Census (IPPC) recorded only 30 piping plovers on the east end of Galveston Island located and none along the west end. Although official numbers were low, weather conditions during the IPPC could have had an effect on the counts, and may not be indicative of actual piping plover activity on the island. In 2016, thirteen individuals were documented along the west end during IPPC census. Ebird observations for the piping plover document a range from one individual up to 25 individuals in one location. (Ebird 2018).

It is important to note that the presence or absence of piping plovers at any given location or time of year cannot be determined by this type of census, which is limited to a single observation within a specific period of time. Piping plovers may occur throughout the action area in varying numbers and concentrations depending on annual population fluctuations, time of year, and local weather and tidal conditions.

The entire 15-mile area proposed for beach nourishment is considered suitable habitat for wintering piping plovers.

Piping Plover Critical Habitat Unit TX-34

Piping Plover critical habitat unit TX-3, San Luis Pass, is located within and adjacent to the far western portion of the project area extending from the west side of Pointe West Subdivision towards San Luis Pass. The landward boundary is the line indicating the beginning of dense vegetation, and the gulf side boundary is the mean lower low water (MLLW).

Red Knot

Except for localized areas, there have been no long-term systematic surveys of red knots in Texas or Louisiana, and no information is available about the number of knots that winter in northeastern Mexico. From survey work in the 1970s, Morrison and Harrington (1992, p. 77) reported peak winter counts of 120 red knots in Louisiana and 1,440 in Texas, although numbers in Texas between December and February were typically in the range of 100 to 300 birds. Records compiled by Skagen *et al.* (1999) give peak counts of 2,838 and 2,500 red knots along the coasts of Texas and Louisiana, respectively, between January and June over the period from1980 to 1996, but these figures could include spring migrants. Morrison *et al*. (2006, p. 76) estimated only about 300 red knots winter along the Texas coast, based on surveys in January 2003 (Niles *et al.* 2008, p. 19). Higher counts of roughly 700 to 2,500 knots have been made on Padre Island, Texas, during October, which could include wintering birds (Newstead *et al.* 2013, p. 54; Niles *et al*. 2009, p. 1). There are no current estimates for the size of the Northwest Gulf of Mexico wintering group as a whole (Mexico to Louisiana). The best available current estimates for portions of this wintering region are about 2,000 in Texas (Niles 2012a), or about 3,000 in Texas and Louisiana, with about half in each State and movement between them (C. Hunter pers. comm. September 20, 2012).

Assessing the number of red knots within the action area during winter and migration periods is difficult as there is human disturbance throughout the year and the number of birds utilizing the area varies daily, monthly, seasonally, and from year to year. The number of red knots that winter in Texas and on Galveston Island is unknown. Ebird observations for the red knot document a range from one individual up to 19 individuals in one location. (Ebird 2018).

The entire 15-mile area proposed for beach nourishment is considered suitable habitat for wintering red knots.

Red Knot Critical Habitat
No critical habitat is designated for the red knot

Factors Affecting Species Environment within the Action Area

Galveston Island is a barrier island located along the upper Texas coast in the Gulf of Mexico. Barrier islands are traditionally dynamic systems, with wind, waves, storms, tidal and longshore currents moving sand along the beach (Britton and Morton 1989). A wide range of past, present and ongoing beach disturbance activities occur within the proposed action area. As storms and hurricanes have eroded Galveston beaches, nourishment activities have attempted to widen them. Nourishment activities can change the sediment color and composition, and may alter coastal processes. Beach nourishment occurred in the action area, albeit on a smaller scale, in 2003 under a previous Corps permit. Beach scraping and raking has increased in frequency in recent years; beach cleaning can artificially steepen beaches, and change sediment distribution patterns. Artificial dune systems are often constructed and maintained to protect beachfront structures. Excessive recreational use of beaches and flats may make these habitats unsuitable to the species that use these areas.

Residential development and recreational activities such as walking, jogging, walking unleashed pets, and operating vehicles on the beach increases the potential for wintering piping plovers to be impacted by loss of habitat, or could cause interference in roosting, resting and foraging activities. These types of activities could also disrupt sea turtle nesting habitat and activities.

Summary
Nesting Kemp's Ridley sea turtles, wintering piping plovers and red knots are known to occur in the action area. Galveston Island has been experiencing increased erosion in recent years, which was exacerbated by the recent hurricanes. Disturbances such as beach nourishment and beach raking are relatively common in the action area.

EFFECTS OF THE ACTION

Under section 7(a) (2) "effects of the action" refers to the direct and indirect effects of an action on a species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action. The effects of the proposed action are added to the environmental baseline to determine the future baseline that serves as the basis for the determination in this biological opinion. The impacts discussed below are the Service's evaluation of the direct and indirect effects of the proposed action. Indirect effects are those caused by the proposed action that occur later in time, but are still reasonably certain to occur (50 CFR 402.02). The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.

Kemp's Ridley

Beneficial Effects
Beach nourishment on approximately 15 miles of beach could provide additional nesting habitat for Kemp's Ridley sea turtles, particularly in light of the severe erosion that occurred in the action area as a result of Hurricane Ike in 2008 and Hurricane Harvey in 2017. In addition, the project would provide an opportunity to educate the public on the importance of beach habitats for nesting sea turtles.

Direct Effects
Schroeder (1994) found that even under the best of conditions, experienced sea turtle nest surveyors can misidentify about seven percent of nesting attempts as false crawls, in which a female turtle comes ashore to nest but returns to the water without digging a nest or laying eggs. Weather, tides, and off-road recreational vehicle tracks can obscure sea turtle tracks, especially after night nesting and before morning surveys. Turtle patrollers and/or monitors locate nests primarily by searching for the tracks left in the sand and locating females during their nesting activity. However, nesting turtles do not always leave visible tracks on the beach, particularly in areas with very hard packed sand, very soft and blowing sand, and thick seaweed. The passage of heavy equipment or construction vehicles could remove sea turtle tracks, making it difficult for the monitor to find a nest for investigation and protection. Therefore, even when turtle monitors are employed, sea turtles, hatchlings or eggs could be harmed by construction activities.

Burial of Sea Turtles, Eggs, or Hatchlings
Deposition of sand for beach nourishment on approximately 15 miles of beach could harm adult female sea turtles that attempt to nest in the action area during nourishment activities, but remain undetected by sea turtle monitors and/or construction crews. Likewise, undetected nests could be buried by sand resulting in crushing of eggs or hindering hatchlings from climbing out of the nest and reaching the ocean. Burying nests and the associated reduced hatching and emergence success are known impacts to sea turtle reproduction (Crain et al. 1995).

Collisions with Heavy Equipment and Vehicles
Operation of heavy equipment on the beach can crush nesting turtles, stranded turtles, hatchlings, and eggs (Mann 1977; NMFS and Service 1991a, 1991b, 1992, 1993; Ernest et al. 1998). Sea turtles on the beach at some stage of nesting may be difficult to see, and may be hit by vehicles or heavy equipment. Hatchlings may emerge at night or early in the morning from in-situ nests missed by sea turtle monitors. Because of their extremely small size, live hatchlings on the beach during the day are vulnerable to being run over.

Compaction of Undetected Nests
Mann (1977) reported that driving directly above incubating egg clutches can cause sand compaction, which may decrease nest success and directly kill pre-emergent hatchlings and eggs potentially by physical crushing or collapse of the nest chamber. Vehicles can also compact the sand, making it more difficult or impossible for nesting turtles to excavate a nest cavity. This can lead to increased false crawls and nests with shallow egg chambers (Fletemeyer 1996).

Compaction could also make it more difficult for hatchlings to emerge from an undetected nest.

Many factors, including speed, weight, and size of the vehicle, the timing of the event with respect to the incubation period, the depth of the eggs/hatchlings (below grade) at the time of impact, and the physical characteristics of the nest itself, will influence whether or not, and the extent to which, mortality or injury occurs. Further, there is no established relationship between the cumulative number of times a particular nests has been run over and the extent and duration of the mortality or injury event. Also confounding this analysis are other factors that may affect the viability of any particular sea turtle nest. For example, tidal inundation, storm events, predation, and accretion/erosion of sand could negatively influence a sea turtle nest deposited in areas where beach driving also occurs (NMFS and Service 1991a; 1991b; 1992; 1993).

Entrapment of Hatchlings in Vehicle Tire Ruts and Berms
It is reported that vehicular ruts and berms create obstacles for hatchlings moving from the nest to the ocean. Upon encountering a vehicle rut, hatchlings may be disoriented along the vehicle track rather than crossing over it to reach the water. Hatchlings become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon. Hatchlings detoured along vehicle ruts are at greater risk to vehicles, predators, fatigue and desiccation. If trapped for a period of time, this could cause them to weaken, become inverted, or succumb due to predation, disorientation, crushing, or dehydration (Hosier et al.1981; Fletemeyer 1996; Ernest et al. 1998). The depth and slope of the ruts influence the amount of impact, with deeper and more steeply sloped ruts causing a greater impact. Hosier et al. (1981) found that 3.9 to 5.9 inch (10 to 15 centimeter) deep tracks may serve as a significant impediment to loggerhead hatchlings. Berms may also create a barrier for adult nesting turtles causing and adverse effect by making them come ashore to nest and then abandon the nesting attempt or choose a less than suitable nesting area.

Vibration and Noise Impacts on Adults and/or Eggs
Vibrations and noise caused by heavy equipment, construction vehicles or temporary pipelines on the beach could frighten nesting turtles, harassing them, and possibly leading to a false crawl (NMFS and Service 1991a, 1991b, 1992; Ernest et al. 1998). Vibrations could also harm incubating eggs, but these effects are difficult to assess due to a lack of scientific data.

Lighting
Work lights can disorient loggerhead sea turtles that nest at night, possibly leading to an increase in false crawls. Lights can also disorient Kemp's ridley and loggerhead hatchlings from undiscovered nests; they could crawl in the wrong direction rather than enter the sea. This can make hatchlings more vulnerable to crushing, predation, and dehydration (NMFS and Service 1991a, 1991b; Fletemeyer 1996). Adult Kemp's ridley sea turtles are primarily daytime nesters, thus artificial work lights used at night should not affect them.

Pipeline
Even though the proposed pipelines are temporary, pipelines can cause nesting habitat to become inaccessible due to the pipeline acting as a barrier. Egg mortality can be increased where sea turtles are forced to nest in less suitable habitat due to the presence of barriers (Witherington et al. 2003). Both adults and hatchlings can be trapped behind the pipeline preventing them from reaching the ocean

Indirect Effects
Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur.

Change in Beach Sediment Composition
Sediments surrounding the egg chamber largely influence the incubation environment of the clutch. Temperature, moisture content, and gas exchange, all extremely important factors in the development of sea turtle embryos, are influenced by sediment characteristics (Ackerman et al. 1985). Thus, hatching success, emerging success, sex ratios, and hatchling fitness (size and vitality) may be different in compact sediments than in more loosely configured sediments of comparable grain size. Minute changes in the composition of beach sediment may affect sea turtle nesting frequency and success. Over time, these types of changes could result in the nourished beach becoming less suitable for use by nesting sea turtles and/or negatively impact the eggs and hatchlings.

Increased Beach Use and Residential Development
Beach nourishment in the action area would result in a wider beach profile, which would almost certainly encourage public use. This would increase the number of beach visitors to the area, increase recreational use in the action area (increasing vehicles, pedestrians, pets, and predators), and possibly expand beach grooming practices into additional areas. Beach maintenance activities such as raking and blading can modify sea turtle habitat by compacting the sand, and creating ruts, berms and escarpments.

Piping Plover and Red Knot

Piping plovers and red knots exhibit similar foraging and roosting behaviors and utilize similar coastal habitats. The factors affecting these species within the action are similar for both species; therefore, the following sections discuss the mutual effects of the action to both species.

Beneficial Effects
The project would provide an opportunity to educate the public on the importance of beach habitats for wintering piping plovers and red knots, primarily through the development and implementation of a public outreach program by the Galveston Park Board.

Direct Effects
Harm and Harassment from Construction Activities
Heavy equipment, construction vehicles, construction personnel, and temporary pipelines placed and operated on the beach could pose a hazard to roosting piping plovers and red knots, especially during cold temperatures or at night. The deposition of sand on approximately 15 miles of beach, the installation/removal of the temporary pipeline, and the construction of the DMPA at Apffel Park would temporarily affect the suitability of this area for wintering piping plovers and red knots. Benthic invertebrate and crustacean communities that these birds forage on would be temporarily disrupted, and the noise, human activity, and lighting associated with nourishment activities would result in harassment of the plovers and red knots.

Indirect Effects

Increased Public Use

Beach nourishment in the action area would result in a wider beach profile, which would almost certainly encourage public use. This would increase the number of beach visitors to the area, increase recreational use in the action area (increasing vehicles, pedestrians, pets, and predators), and possibly expand beach grooming practices into additional areas. Beach maintenance activities such as raking and blading can modify wintering piping plover and red knot habitat by removing debris, affecting prey species, and providing additional vehicle access points to the beach.

Summary

The proposed action has the potential to adversely affect the Kemp's ridley, migrating and wintering piping plover and their critical habitat, and migrating and wintering red knots within the action area. The construction activities may lead to temporarily diminished quantity and quality of sea turtle nesting habitat, feeding and roosting habitats for piping plovers and red knots within the action area. However, the proposed project could benefit Kemp's ridley sea turtles by providing additional nesting habitat, and could benefit sea turtles, wintering piping plovers and red knots through public education and outreach. However, direct effects may occur from burial of sea turtles, eggs, or hatchlings; collisions with heavy equipment or vehicles; compaction of undetected nests; vibration and noise impacts on adults and/or eggs; entrapment of hatchlings in vehicle tire ruts and berms; and lighting. Indirect effects to Kemp's ridley may occur from changes in beach sediment composition, and increased public use. Direct effects to piping plovers and red knots may occur in the form of harassment due to construction activities, and indirect effects could result from increased public use.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

Beach nourishment in the action area would result in a wider beach profile, which would almost certainly make development or re-development in nearby upland areas more desirable. Additional development or other activities occurring within the action area may occur with or without Federal authorization. Continued development may further increase public users to the area (increasing vehicles, pedestrians, pets, and predators) which will have associated effects to listed species within the action area. Increased lighting from development may affect sea turtle nesting habitat on the beachfront; increased predators associated with people may affect wintering piping plovers.

We reasonably expect future state, local, or private entities to nourish segments of the beach that narrow or become degraded in the future. However, because beach nourishment activities require permitting by the U.S. Army Corps of Engineers, these actions are likely to require Section 7 consultation between the Corps and the Service and do not fall under the definition of future state, tribal, local, or private actions.

CONCLUSION

After reviewing the current status of the Kemp's ridley sea turtle, the piping plover and the red knot; the environmental baseline for the action area; the effects of the issuance of Department of Army permit SWG-2007-01025; and the cumulative effects; it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Kemp's ridley sea turtle, the piping plover and the red knot.

Kemp's Ridley Sea Turtle

The Service finds that the proposed action is not likely to jeopardize the Kemp's ridley sea turtle for the following reasons:

1. Although the number of Kemp's ridley nests in Texas has steadily increased in recent years, the majority of Kemp's ridley sea turtles continue to nest on beaches in the Mexican states of Tamaulipas and Vera Cruz. The number of Kemp's ridley nests found in Texas (12 on the upper Texas coast in 2017 and 15 in 2018), is significantly lower than the number of nests in Mexico (approximately 24,000 in 2017).

2. The conservation measures proposed by the Corps and the Galveston Park Board will reduce the likelihood that nesting Kemp's ridleys, their eggs or hatchlings are harmed during beach nourishment activities.

Piping Plover and Red Knot

The Service finds that the proposed action is not likely to jeopardize the wintering piping plover and Red Knot for the following reasons:

1. Beach nourishment activities would result in temporary harassment of piping plovers and red knots in and adjacent to the action area. Feeding opportunities would be temporarily disrupted due to benthic invertebrate and crustacean community loss. Invertebrate populations may take up to one year to fully recover. However, the proposed action would not permanently alter the suitability of these areas for the species.

2. The conservation measures proposed by the Corps and the Galveston Park Board will reduce the likelihood that wintering piping plovers are harmed during beach nourishment.

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the Galveston Park Board, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the Galveston Park Board to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps and the Galveston Park Board must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Kemp's Ridley Sea Turtle

Based on the information within our files and within the BA (including the conservation measures proposed by project proponents), the Service anticipates that 2 adult Kemp's ridley sea turtle and eggs or hatchlings from 4 sea turtle nests will be taken directly as a result of this action. Specifically, incidental take resulting from this project is expected to be in the form of harm and/or harassment from:

1. Disruption of breeding activities from noise, vibrations, heavy machinery and human presence on the beach.

2. Entrapment of adults and hatchlings in trenches and vehicle ruts and trenches.

3. Crushing, collision, and burial of sea turtles and/or nests and compaction of sand over nest with heavy equipment.

The Service anticipates that the incidental take of sea turtle hatchlings and/or eggs from these effects will be difficult to detect for the following reason(s):

1. Turtle nests are difficult to find. Natural factors, such as rainfall, wind, and tides and human-caused factors, such as pedestrian traffic, may obscure crawls, resulting in nests being destroyed because they were missed during monitoring surveys.

2. The total number of hatchlings and eggs per undiscovered nest is unknown.

3. The reduction in percent hatching and emerging success per nest over an undisturbed nest site is unknown.

4. An unknown number of females may avoid the project beaches and be forced to nest in less optimal areas.

Piping Plover and Red Knot

The Service anticipates harassment, in the form of noise and human disturbance, of 25 piping plovers and 19 red knots due to beach nourishment and construction activities action over the 5-year term of the permit. Effects on these species are expected to be temporary and non-lethal. Incidental take associated with this project is expected to be in the form of harm and/or harassment from:

1. Disruption of feeding and sheltering behaviors resulting from noise, vibrations, heavy machinery and human presence on the beach.

2. Reduction in feeding and sheltering opportunities or capabilities due to the loss and/or degradation of foraging and roosting habitat.

3. Temporary or permanent reduction in survivability of wintering piping plovers and red knots resulting from the lost and/or degradation of foraging and roosting habitat.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service has determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting and hatchling Kemp's ridley sea turtles, non-breeding piping plovers and red knots in the proposed Galveston Park Board beach nourishment project within the action area:

1) Implement all conservation measures in the BO, permit application and/or project plans.
2) Ensure that all parties involved in the project (i.e., contractors, work crews, monitors, etc.) fully understand the endangered species protection measures detailed in the incidental take statement

3) Prevent and/or reduce escarpment formations.
4) Indiscriminately leave wrack/sargassum in place for roosting and/or foraging piping plovers and red knots if possible.
5) Establish and implement a protocol to notify the Texas Coastal Ecological Service Field Office [TXCESFO (Houston office)] immediately of direct take of sea turtles, hatchlings, sea turtle eggs, or nests.
6) Notify TXCESFO in 2 weeks prior to the initiation and upon completion of work activities.
7) Submit an annual report describing beach nourishment locations, activity type, and "look this up on current report sheet".

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and the Galveston Park Board shall comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting or monitoring requirements. These terms and conditions are non-discretionary.

Sea Turtles and Piping Plovers and Red Knots

1) As detailed in the project description the Corps and Galveston Park Board will implement measures to avoid and minimize impacts to sea turtles, piping plovers and red knots. Conservation measures will be implemented and made part of the Corps permit.

2) Galveston Park Board in coordination with the Corps shall insure that contractors, work crews, and the sea turtle, piping plover and red knot monitors shall be properly trained to identify sea turtles, piping plovers and red knots prior to the commencement of work each time work is to be conducted.

3) Notify TXCESFO in writing two weeks prior to initiation of construction activities and within two weeks following the completion of project construction. Upon completion of the project, a report describing any deviations from the description of the proposed action (see description of proposed action section above), conservation measures implemented during project activities, the success of such measures, any incidents that may have occurred, and any recommendations on improvements to those measures shall be submitted to TXCESFO. Reports should be sent to U.S. Fish and Wildlife Service, ATTN: Field Supervisor, 17629 El Camino Real Suite 211, Houston, Texas 77058.

4) In the event that activities result in the direct take (killing, harming, or maiming) of a sea turtle, hatchlings, or eggs, the person(s) responsible for monitoring sea turtles shall notify TXCESFO (281/286-8282, 281/212-1512) and Dr. Donna

Shaver (National Park Service/PAIS), and the Texas Sea Turtle Stranding Coordinator (361/949-8173, ext. 226). The Corps and other project proponents will develop a standard methodology for notifying the aforementioned contacts. The handling of dead or stranded sea turtles found during the monitoring program will be established by the Sea Turtle Coordinator and the Service.

5) Provide updated summary table to the TXCESFO by December 31st of each year. The summary table should include, location of activities, conservation measures implemented, success of such measures, species take, incidences, and any recommendations on improvements to those measures (example attached).

These reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

For the benefit of nesting sea turtles and wintering piping plovers, the Service recommends the following:

1. Work with the Service to design and fund a research program to determine the long-term effects of beach nourishment activities on sea turtle nesting success and/or wintering piping plover critical habitat components. This includes annual beach (sand survey) monitoring, and 1-year post-nourishment threatened and endangered species monitoring to provide data that indicates the completed project is species impact neutral.

2. Work with the Service to develop a plan to monitor and survey benthic organism recovery associated with beach nourishment activities along Galveston Island.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in your request for issuance of SWG-2007-01025 As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded;

(2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates the Corps' efforts to identify and minimize effects to listed species from this project. For further information, please contact staff biologist Moni Belton at 281/212-1512. Please refer to the consultation number Consultation No. 02ETTX00-2018-F-2491 in future correspondence concerning this project.

Sincerely,

Chuck Ardizzone
Field Supervisor

cc: Steve Walls, Corps of Engineers, Galveston District
cc: Rhonda Gregg-Hirsch, Atkins
cc: Reuben Trevino, Galveston Parks Board

LITERATURE CITED

Ackerman, R.A., R.C. Seagrave, R. Dmi'el, and A. Ar. 1985. Water and heat exchange between parchment-shelled reptile eggs and their surroundings. Copeia 1985:703-711.

Anderson, J.D. 2007. The formation and future of the upper Texas coast: a geologist answers questions about sand, storm, and living by the sea. Texas A&M University Press, College Station, TX.

Andres, B.A. 2009. Analysis of shorebird population trend datasets. Unpublished report by the U.S. Fish and Wildlife Service, Denver, CO.

Bart, J., and V. Johnston editors. 2012. Arctic shorebirds in North America: A decade of monitoring. University of California Press, Berkeley, CA.

Britton, J.C. and B. Morton. 1989. Shore Ecology of the Gulf of Mexico. University of Texas Press, Austin, Texas, U.S.A.

Burchfield, P., J. L. Pena, and B. Arroyo. 2002. Report on the Mexico/United States of America population restoration project for the Kemp's Ridley sea turtle (*Lepidochelys kempii*) on the coasts of Tamaulipas and Veracruz, Mexico.

Crain, D. A., A.B. Bolten, and K.A. Bjorndal. 1995. Effects of beach nourishment on sea turtles: review and research initiatives. Restoration Ecology 3(2):95-104.

Cohen, J.B., S.M. Karpanty, J.D. Fraser, B.D. Watts, and B.R. Truitt. 2009. Residence probability and population size of red knots during spring stopover in the mid-Atlantic region of the United States. Journal of Wildlife Management 73(6):939-945.

Cohen, J.B., S.M. Karpanty, J.D. Fraser, and B.R. Truitt. 2010. The effect of benthic prey abundance and size on red knot (*Calidris canutus*) distribution at an alternative migratory stopover site on the US Atlantic Coast. Journal of Ornithology 151:355-364.

Davis, T.H. 1983. 1, Loons to sandpipers. Pages 372-375 *In* J. Farrand, ed. The Audubon Society master guide to birding, Knopf, New York

Duerr, A.E., B.D. Watts, and F.M. Smith. 2011. Population dynamics of red knots stopping over in Virginia during spring migration. Center for Conservation Biology technical report series. College of William and Mary & Virginia Commonwealth University, CCBTR-11-04, Williamsburg, VA.

eBird.org. 2018. eBird: An online database of bird distribution and abundance (web application). Cornell Lab of Ornithology, Ithaca, New York. , available at http://www.ebird.org/.

Elliott-Smith, E., Haig, S.M., and Powers, B.M., 2009, Data from the 2006 International Piping Plover Census: U.S. Geological Survey Data Series 426.

Ernest, R.G., R.E. Martin, and K.A. Duhring. 1998. Beach Driving and Sea Turtles: What Kind of Risk? In: Proceedings of the Seventeenth Annual Symposium on Sea Turtle Biology and Conservation, March 4-8, 1997, Orlando, Florida, p. 50-53. S.P. Epperly and J. Braun (compilers). NOAA Tech. Memo. NMFS-SEFSC-415.

Fletemeyer, J.R. 1996. Guest editorial: The shot heard around the world—Volusia Sea Turtle Suit. Marine Sea Turtle Newsletter 72: 16-17.

Gaskil, Melissa. "The 40 Year Rescue." *Texas Shores*, Winer/Spring 2018-2019, pp. 14-17.

Gibeaut, J.C., W. A. White, and T.A. Tremblay. 2000. Coastal hazards atlas of Texas: a tool for hurricane preparedness and coastal management-volume 1, the Southeast coast: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the Texas Coastal Coordination Council, pursuant to National Oceanic and Atmospheric Administration Award No. NA77OZ0202. <http://www.beg.utexas.edu/ coastal/presentations_reports/hazardsatlas_v1_2000.pdf>

Haig, S.M. and L.W. Oring. 1985. The distribution and status of the piping plover throughout the annual cycle. Journal of Field Ornithology 56:334-345.

Haig, S.M., and J.H. Plissner 1993. Distribution and abundance of Piping Plovers: results and implications of the 1991 international census. Condor 95:145-156.

Haig, S.M., and E. Elliott-Smith. 2004. Piping Plover. In A. Poole (eds.), The Birds of North America Online. Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Piping_Plover/.

Haig, S.M., Ferland, C.L., Cuthbert, F.J., Dingledine, J., Goossen, J.P., Hecht, A., and McPhillips, N., 2005, A complete species census and evidence for regional declines in Piping Plovers. Journal of Wildlife Management 69: 160-173.

Harrington, B.A. 2001. Red knot (*Calidris canutus*). *In* A. Poole, and F. Gill, eds. The birds of North America, No. 563, The Birds of North America, Inc., Philadelphia, PA.

Harrington, B.A. 2008. Coastal inlets as strategic habitat for shorebirds in the southeastern United States. DOER technical notes collection. ERDC TN-DOERE25. U.S. Army Engineer Research and Development Center, Vicksburg, MS, available at http://el.erdc.usace.army.mil/elpubs/pdf/doere25.pdf.

Hosier, P.E., M. Kochhar, and V. Thayer. 1981. Off-road vehicle and pedestrian track effects on the sea-approach of hatchling loggerhead turtles. Environmental Conservation 8(2): 158-161.

Hughes, A.L., and E.A. Caine. 1994. The effect of beach features on hatchling loggerhead sea turtles. Page 237 in Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation, March 1B5, 1994, Hilton Head, South Carolina. National Oceanic and

Atmospheric Administration, Technical Memorandum NMFS-SEFSC-351.

Kalasz, K. 2008. Delaware shorebird conservation plan. Version 1.0. Delaware Natural Heritage and Endangered Species Program Division of Fish and Wildlife, Delaware Department of Natural Resources & Environmental Control, Smyrna, DE.

Mann, T.M. 1977. Impact of developed coastline on nesting and hatchling sea turtles in southeastern Florida. Unpublished M.S. Thesis. Florida Atlantic University, Boca Raton.

Melvin, SM. and J.P. Gibbs. 1994. Viability analysis for the Atlantic Coast population of piping plovers. Unpublished report to the U.S. Fish and Wildlife Service, Sudbury, Massachusetts.

Morrison, R.I.Guy, B.J. McCaffery, R.E. Gill, S.K. Skagen, S.L. Jones, W. Gary, C.L. Gratto-Trevor,and B.A. Andres. 2006. Population estimates of North American shorebirds. Wader Study Group Bulletin 111:67-85.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1977. Memorandum of Understanding Defining the Roles of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in Joint Administration of the Endangered Species Act of 1973 as to Marine Turtles.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991a. Recovery Plan for U.S. Population of Atlantic Green sea turtle (*Chelonia mydas*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991b. Recovery plan for U.S. population of loggerhead turtle (*Caretta caretta*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992. Recovery Plan for Leatherback Turtles (*Dermochelys coriacea*) in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1993. Recovery Plan for Hawksbill Turtles (*Eretmochelys imbricate*) in the U.S. Caribbean Sea, Atlantic Ocean, and Gulf of Mexico. National Marine Fisheries Service, St. Petersburg, Florida.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2007. Kemp's ridley sea turtle (*Lepidochelys kempii*) 5-year review: summary and evaluation. National Marine Fisheries Service Silver Spring, MD and U.S. Fish and Wildlife Service, Albuquerque, NM.

Newstead, D.J., L.J. Niles, R.R. Porter, A.D. Dey, and J. Burger. (2013). Geolocation reveals midcontinent migratory routes and Texas wintering areas of red knots (*Calidris canutus rufa*). Wader Study Group Bulletin.

Nicholls, J.L. and G.A. Baldassarre. 1990. Habitat associations of piping plovers wintering in the United States. Wilson Bulletin 102:581-590.

Niles, L. 2009. Red knots wintering on the Florida Gulf Coast 2005-2009. Unpublished final report (Report on Red Knot Surveys in Florida 2008-2009) Neotropical Migrant Bird Conservation Act. Project #3556, Agreement #NJ-N31.

Niles, L.J. 2012. Blog - a rube with a view: Unraveling the Texas knot, available at http://arubewithaview.com/2012/05/01/unraveling-the-texas-knot/.

PAIS 2018 https://www.nps.gov/pais/learn/nature/current-nesting-season.htm

Plissner J.H. and S.M. Haig. 2000a. Metapopulation models for piping plovers (*Charadrius melodus*). Biological Conservation 92:163-173.

Plissner, J.H., and Haig, S.M., 2000b, Status of a broadly-distributed endangered species: Results and implications of the Second International Piping Plover Census: Canadian Journal of Zoology, v. 78.

Schroeder, B.A. 1994. Florida index nesting beach surveys: Are we on the right track? Pages 132-133 in Bjorndal, K.A., A.B. Bolten, D.A. Johnson, and P.J. Eliazar (compilers). Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351. Press, Washington, D.C.

Shaver, D.J. 1997. Kemp's ridley turtles from an international project return to Texas to nest. In: Proceedings of the Sixteenth Annual Gulf of Mexico Information Transfer Meeting, December 10-12, 1996, New Orleans, Louisiana, p. 38-40. University of New Orleans, Office of Conference Services (compiler). U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region MMS 97-0038.

Shaver, D.J. 1998. Kemp's ridley sea turtle nesting on the Texas coast, 1979-1996. In: Proceedings of the Seventeenth Annual Symposium on Sea Turtle Biology and Conservation, March 4-8, 1997, Orlando, Florida, p. 91-94. S.P. Epperly and J. Braun (compilers). NOAA Tech. Memo. NMFS-SEFSC-415.

Shaver, D.J. 1999a. Kemp's ridley sea turtle project at Padre Island National Seashore, Texas. In: Proceedings of the Seventeenth Annual Gulf of Mexico Information Transfer Meeting, December 16-18, 1997, New Orleans, Louisiana, p. 342-347. M. McKay and J. Nides (editors). U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, MMS 99-042.

Shaver, D.J. 1999b. Padre Island National Seashore Kemp's ridley sea turtle project and sea turtle strandings 1998 report. U.S. Department of the Interior, U.S. Geological Survey.

Shaver, D.J., and C.W. Caillouet, Jr. 1998. More Kemp's ridley turtles return to south Texas to nest. Marine Turtle Newsletter 82:1-5

Shaver, D.J. 2011. Texas coast *Kemp's ridley* nesting data. Unpublished data.

Texas Administrative Code. 2019. http://txrules.elaws.us/rule/title31_chapter15_sec.15.4

Texas Transportation Code. https://texas.public.law/statutes/tex._transp._code_section_545.352

U.S. Army Corps of Engineers. 2018. Biological Assessment of Potential Impacts to Threatened and Endangered Species, Beach Nourishment Project: 10th to 103rd Street, Galveston County, Texas

U.S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants: Determination of endangered and threatened status for the piping plover: Final rule. Federal Register 50(238):50726-50734.

U.S. Fish and Wildlife Service. 1988. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. Twin Cities, MN.

U.S. Fish and Wildlife Service. 1996. Piping plover (Charadrius melodus), Atlantic Coast population, revised recovery plan. Hadley, Massachusetts.

U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Ft. Snelling, Minnesota.

U.S. Fish and Wildlife Service (Service). 2014. Final rule for the threatened status for the Rufa Red Knot (*Calidris canutus rufa*). Federal Register 79:73706-73748.

U.S. Fish and Wildlife Service. 2015. Volume II: Draft Revised Recovery Plan for the Wintering Range of the Northern Great Plains Piping Plover and Comprehensive Conservation Strategy for the Piping Plover in its Coastal Migration and Wintering Range in the Continental United States.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) Second Revision. National Marine Fisheries Service, St. Petersburg, Florida.

Vale, K. 2016. Investigation of Factors Influencing Piping Plover Distribution Along the Upper Texas Coast. Thesis - Master of Science, University of Houston-Clear Lake. Thesis Chair: George Guillen.

Witherington, B.; Hirama, S., and Mosier, A., 2003. Responses of Sea Turtles to Barriers on Their Nesting Beach. Unpublished final project report to the U.S. Fish and Wildlife Service.

Zonick, C. and M. Ryan. 1996. The ecology and conservation of piping plovers (*Charadrius melodus*) wintering along the Texas Gulf Coast. Department of Fisheries and Wildlife, University of Missouri, Columbia, Missouri 65211. 1995 Annual Report.

WILDLIFE MONITORING CHECKLIST

Project Name: ____________________

Objective: Report sightings of protected species- piping plover, red knot, and various species of sea turtles (dead or alive), hatchlings, tracks, eggs or nests. In addition to reporting any birds observed injured or nesting.

DO NOT DISTURB OR TOUCH A SEA TURTLE, PIPING PLOVER OR RED KNOT.

Date:_ Start Time:____am/pm Finish Time:__am/pm

Weather: ☐ Sunny ☐ Fair ☐ Partly Cloudy ☐ Cloudy ☐ Windy ☐ Calm ☐ Rain

Reach of Beach Monitored:___

Observations:

- ☐ Piping Plover; ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- ☐ Red Knot; ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- ☐ Injured Birds (any species) ☐ Not Present in area ☐ Foraging ☐ Roosting (resting)
- ☐ Nesting Birds (any species) ☐ Nest location identified and reported

- **To report injured Piping Plover, Red Knot and/or any species of injured or nesting bird, Call U.S. Fish and Wildlife Service (281) 212-1512** if on upper Texas coast and **361-994-9005** if on lower Texas coast.

☐ Sea Turtle; Species common name(s):____________________

☐ Leaving Water ☐ Entering Water ☐ Laying Eggs ☐ Dead on Beach

☐ Metal Flipper Tag Identification:____________(Letters and/or Numbers);

- Take Photographs, **Call 1-866-TURTLE5 (1-866-887-8535)** for Instructions,
- Await Arrival of Officials.

☐ Living Tissue Tag (White Mark on one Scute of Shell); Take Photographs,

- Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions, Await Arrival of Officials.

☐ If Laying Eggs; Turtle is Facing ☐ North ☐ South ☐ East ☐ West,

- Mark Nest(do not penetrate sand), Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions,
- Take Photographs, Time/clock Laying Event, Await Arrival of Officials.

☐ Hatchlings; Take Photographs, Call **1-866-TURTLE5 (1-866-887-8535)** for instructions

- Await Arrival of Officials, Guard Against Predators.

☐ Tracks; Measure Width:____________, Take Photographs,

- Call **1-866-TURTLE5 (1-866-887-8535)** for Instructions, Await Arrival of Officials.

☐ Eggs/Nest; Mark Nest(do not penetrate sand), **Call 1-866-TURTLE5 (1-866-887-8535)** for Instructions,

- Take Photographs, Await Arrival of Officials.

☐ Stranded Marine Mammals if observed call Texas Marine Mammal Stranding Network at

- **1-800-9MAMMAL (1-800-962-6625)** for instructions.

☐ No Sightings; None of the Above.

Additional Comments:
____

Special Note: All sea turtles, piping plovers and red knots are protected by law as threatened or endangered species. No one, unless permitted, can remove sea turtle eggs, handle turtles, or disturb any of these species. Otherwise, one may be liable to fines up to $20,000 and criminal sentencing.

*Monitor Name:*____________________ *Telephone:*____________________
Please Print Clearly (Area Code) and Phone Number

Example: Annual Summary Table

Galveston Park Board of Trustees
U.S. Army Corps of Engineers
Beach Nourishment / Dune Restoration
Permit Summary Table 2014 – 2019 Authorization Period

U.S. Army Corps of Engineers Permit Number:	SWG-2007-01025
U.S. Army Corps of Engineers Authorization Date:	May 6, 2014
U.S. Army Corps of Engineers Permitted Authorization Term:	Five (5) Years
U.S. Army Corps of Engineers Permitted Activities Date Range:	May 6, 2014 to December 31, 2019
U.S. Army Corps of Engineers Authorized Permit Area:	Galveston Island, Texas from the western terminus of the Galveston seawall to the eastern boundary of Galveston Island State Park

Annual Report of Activities USACE Permit #SWG-2007-01025

Year	Species Trainer / Subject	Date	Location- Lat / Lon- Volume	Project Sponsor(s)	Dates of Construction	Construction Activities	Conservation Measures Implemented	Success	Species Take	Incidents (Construction / Project Related)	Improvements
							Yes or No	Yes or No	Number		
2014 05/06 to 12/31/2014			Dellanera Park / Seascape / End of Seawall Total Project ~113,000 yd³	Galveston Park Board, FEMA, City of Galveston, City of Galveston IDC, Texas General Land Office	Begin at Upland Sand Source 11/28/2014 Begin beach work 12/01/2014	Beach Nourishment, dune restoration, vegetation planting, dune walkover	Yes USACE authorized Special Conditions were followed	Yes	0	Debris found in material	Park Board staff monitor beach area, implement daily patrols and removal of foreign material.
2015 01/01 to 12/31/2015			(Continuation) Dellanera Park / Seascape / End of Seawall- Total Project ~113,000 yd³	Galveston Park Board, FEMA, City of Galveston, City of Galveston IDC, Texas General Land Office	(Continued) 01/01/2015 to 03/15/2015	Beach Nourishment, dune restoration, Vegetation planting, dune walkover	Yes USACE authorized Special Conditions were followed	Yes	0	Injured Gannett washed ashore- not project related	Bird transported for medical assistance. Park Board staff monitoring beach post construction for debris, continued daily patrols
2016 01/01 to 12/31/2016	Dr Metz Seaturtles / birds	March 31, 2016	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2017 01/01 to 12/31/2017			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2018 01/01 to 12/31/2018			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2019 01/01 to 12/31/2019			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

previous Discussions of PA 42: RE Division commented by electronic mails, dated 27 February 2017 and 01 March 2017, stating that the removal of material from DMPA 42 would require real estate authorization prior to use of the site. Permits may be issued subject to RE clearance with the following statement:

This permit does not authorize any injury or interference with any Federal property; nor does it grant property rights, access privileges, or rights-of-way entrance authorizations to any property including those owned by State or Federal agencies. There are Federal properties (owned or controlled by Corps of Engineers) identified within the project area. All appropriate accesses, authorization, rights-of-way on the Corps Federal project area must be procured from the Corps Real Estate Division prior to impacting any of these Federally-owned/operated lands. This Permit authorization is limited to those impacts exactly as depicted. If property access and/or use is denied and/or requires modification to the project as permitted, this authorization becomes null and void and would require a new authorization to adequately address these new impacts. Please visit the USACE Galveston District's website for the most current information regarding the District's outgrant policy at: http://www.swg.usace.army.mil/BusinessWithUs/RealEstateDivision/Outgrants.aspx.

The applicant responded on 02 March 2017, stating that they have determined that material from DMPA 42 would not be suitable for the Rollover Pass closure project; and they do not intend to use DMPA 42 as a borrow source. Therefore, no real estate authorization is required.

Application received for modification to permit: Add borrow source within 25-acre tract which would involve re-initiation of Section 7 of the ESA.

Meeting with Seth Jones (GIWW PM) OD-N and Frank Garcia (OD-N) and conference with CEPRA PM and POC for GLO and Agent, Taylor Engineering, Ms. Janet Botello, and myself. Discussed use of PA 42 as a cost-effective source of material. Seth also suggested that the GLO piggyback on the GIWW dredging if the window would work. He stated it would be sometime in November this year. The dredge pipe could pump directly into the area. I suggested they could stock pile it on the beach as that is where it already designated if not ready. Limitation with the infrastructure and coffer dams in place and then immediately filling the area.

No response from the GLO was received regarding the additional information letter dated 22 May 2019. Application was withdrawn on 26 June 2019.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 12, 2019

Mr. Steve Walls
Galveston District CESWG-PE-RE
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: USACE Permit Application No. SWG-2007-01025

Dear Mr. Walls:

This letter is in response to the Statement of Findings (SOF) dated July 31, 2019, for the Joint Public Notice dated March 29, 2018, on the Park Board of Trustees for the City of Galveston proposed beach nourishment activities along approximately 81,454 linear feet of beachfront on Galveston Island. The project was initially authorized by the United States Army Corps of Engineers on November 20, 2009 and the Park Board requests to expand opportunities to utilize beneficial use beach quality sand from federal projects along the Houston-Galveston Navigation Channel (HGNC) as they become available. The project is located along beachfront on Galveston Island, Galveston County, Texas.

The Texas Commission on Environmental Quality (TCEQ) has reviewed the public notice and related application information along with the SOF. On behalf of the Executive Director and based on our evaluation of the information contained in these documents, the TCEQ certifies that there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards. General information regarding this water quality certification, including standard provisions of the certification, is included as an attachment to this letter.

The TCEQ has reviewed this proposed action for consistency with the Texas Coastal Management Program (CMP) goals and policies in accordance with the CMP regulations (Title 31, Texas Administrative Code (TAC), Section (§)505.30) and has determined that the action is consistent with the applicable CMP goals and policies.

This certification was reviewed for consistency with the CMP's development in critical areas policy (31 TAC §501.23) and dredging and dredged material disposal and placement policy (31 TAC §501.25). This certification complies with the CMP goals (31 TAC §501.12(1, 2, 3, 5)) applicable to these policies.

No review of property rights, location of property lines, nor the distinction between public and private ownership has been made, and this certification may not be used in any way with regard to questions of ownership.

If you require additional information or further assistance, please contact Mr. Jeff Paull, Water Quality Assessment Section, Water Quality Division (MC-150), at (512) 239-1649 or by email at jeff.paull@*tceq.texas.gov.*

Sincerely,

David W. Galindo, Director
Water Quality Division
Texas Commission on Environmental Quality

DWG/JP/fc

Attachment

ccs: Ms. Kelly de Schaun, Park Board of Trustees-City of Galveston, 601 Tremont-2nd Floor, Galveston, Texas 77550
Ms. Rhonda Gregg Hirsch, Atkins, 17220 Katy Freeway, Suite 200, Houston, Texas 77094

WORK DESCRIPTION: As described in the public notice dated March 29, 2018, and the July 31, 2019, Environmental Assessment and Statement of Findings.

SPECIAL CONDITIONS: None

GENERAL: This certification, issued pursuant to the requirements of Title 30, Texas Administrative Code, Chapter 279, is restricted to the work described in the July 31, 2019, Environmental Assessment and Statement of Findings and shall be concurrent with the Corps of Engineers (COE) permit. This certification may be extended to any minor revision of the COE permit when such change(s) would not result in an impact on water quality. The Texas Commission on Environmental Quality (TCEQ) reserves the right to require full joint public notice on a request for minor revision. If this application is a modification of an original permit or any modification thereof for which a special condition was cited by the Commission or a predecessor agency, such conditions shall remain valid. The applicant is hereby placed on notice that any activity conducted pursuant to the COE permit which results in a violation of the state's surface water quality standards may result in an enforcement proceeding being initiated by the TCEQ or a successor agency.

STANDARD PROVISIONS: These following provisions attach to any permit issued by the COE and shall be followed by the permittee or any employee, agent, contractor, or subcontractor of the permittee during any phase of work authorized by a COE permit.

1. The water quality of wetlands shall be maintained in accordance with all applicable provisions of the Texas Surface Water Quality Standards including the General, Narrative, and Numerical Criteria.

2. The applicant shall not engage in any activity which will cause surface waters to be toxic to man, aquatic life, or terrestrial life.

3. Permittee shall employ measures to control spills of fuels, lubricants, or any other materials to prevent them from entering a watercourse. All spills shall be promptly reported to the TCEQ by calling the State of Texas Environmental Hotline at 1-800-832-8224.

4. Sanitary wastes shall be retained for disposal in some legal manner. Marinas and similar operations which harbor boats equipped with marine sanitation devices shall provide state/federal permitted treatment facilities or pump out facilities for ultimate transfer to a permitted treatment facility. Additionally, marinas shall display signs in appropriate locations advising boat owners that the discharge of sewage from a marine sanitation device to waters in the state is a violation of state and federal law.

5. Materials resulting from the destruction of existing structures shall be removed from the water or areas adjacent to the water and disposed of in some legal manner.

6. A discharge shall not cause substantial and persistent changes from ambient conditions of turbidity or color. The use of silt screens or other appropriate methods is encouraged to confine suspended particulates.

7. The placement of any material in a watercourse or wetlands shall be avoided and placed there only with the approval of the Corps when no other reasonable alternative is available. If work within a wetland is unavoidable, gouging or rutting of the substrate is prohibited. Heavy equipment shall be placed on mats to protect the substrate from gouging and rutting if necessary.

8. Dredged Material Placement: Dredged sediments shall be placed in such a manner as to prevent any sediment runoff onto any adjacent property not owned by the applicant. Liquid runoff from the disposal area shall be retained on-site or shall be filtered and returned to the watercourse from which the dredged materials were removed. Except for material placement authorized by this permit, sediments from the project shall be placed in such a manner as to prevent any sediment runoff into waters in the state, including wetlands.

9. If contaminated spoil that was not anticipated or provided for in the permit application is encountered during dredging, dredging operations shall be immediately terminated and the TCEQ shall be contacted by calling the State of Texas Environmental Hotline at 1-800-832-8224. Dredging activities shall not be resumed until authorized by the Commission.

10. Contaminated water, soil, or any other material shall not be allowed to enter a watercourse. Noncontaminated storm water from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.

11. Storm water runoff from construction activities that result in a disturbance of one or more acres, or are a part of a common plan of development that will result in the disturbance of one or more acres, must be controlled and authorized under Texas Pollutant Discharge Elimination System (TPDES) general permit TXR150000. A copy of the general permit, application (notice of intent), and additional information is available at:
http://www.tceq.texas.gov/permitting/stormwater/wq_construction.html or by contacting the TCEQ Storm Water & Pretreatment Team at (512) 239-4671.

12. Upon completion of earthwork operations, all temporary fills shall be removed from the watercourse/wetland, and areas disturbed during construction shall be seeded, riprapped, or given some other type of protection to minimize subsequent soil erosion. Any fill material shall be clean and of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters.

13. Disturbance to vegetation will be limited to only what is absolutely necessary. After construction, all disturbed areas will be revegetated to approximate the pre-disturbance native plant assemblage.

14. Where the control of weeds, insects, and other undesirable species is deemed necessary by the permittee, control methods which are nontoxic to aquatic life or human health shall be employed when the activity is located in or in close proximity to water, including wetlands.

15. Concentrations of taste and odor producing substances shall not interfere with the production of potable water by reasonable water treatment methods, impart unpalatable flavor to food fish including shellfish, result in offensive odors arising from the water, or otherwise interfere with reasonable use of the water in the state.

16. Surface water shall be essentially free of floating debris and suspended solids that are conducive to producing adverse responses in aquatic organisms, putrescible sludge deposits, or sediment layers which adversely affect benthic biota or any lawful uses.

17. Surface waters shall be essentially free of settleable solids conducive to changes in flow characteristics of stream channels or the untimely filling of reservoirs, lakes, and bays.

18. The work of the applicant shall be conducted such that surface waters are maintained in an aesthetically attractive condition and foaming or frothing of a persistent nature is avoided. Surface waters shall be maintained so that oil, grease, or related residue will not produce a visible film of oil or globules of grease on the surface or coat the banks or bottoms of the watercourse.

19. This certification shall not be deemed as fulfilling the applicant's/permittee's responsibility to obtain additional authorization/approval from other local, state, or federal regulatory agencies having special/specific authority to preserve and/or protect resources within the area where the work will occur.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
PHONE: 281/286-8282
FAX: 281/488-5882

In Reply Refer To:
2022-0070276

August 30, 2022

Ms. Raven Blakeway
Environmental Branch
Regional Planning and Environmental Center
Galveston District, U.S. Army Corps of Engineers
Post Office Box 1229
Galveston Texas 77553-1229

Dear Ms. Blakeway:

Thank you for the opportunity to comment on the Draft Environmental Assessment (DEA) for the proposed beneficial use of dredge material associated from the maintenance of the Federal Navigation Project (FNP), the Galveston Harbor and Channel. Please reference 2022-0070276 when responding to these comments. The U.S. Army Corps of Engineers (Corps) Galveston District (CESWG) in partnership with the Park Board of Trustees of the City of Galveston, Texas, proposes to utilize as part of the Tentatively Selected Plan (TSP), beneficial use of dredged material generated during operations and maintenance (O&M) dredging of the FNP for beach nourishment on Galveston Island. Specifically, the Corps proposes the placement of approximately 530,000 cubic yards (CY) of beach sand along a 1.7 mile long by 300-foot-wide section of Galveston Island beach from Sunbather Lane west. This study was authorized by Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326), as amended. Section 204 provides the authority to plan, design, and build projects in connection with dredging of authorized Federal navigation projects.

The United States Fish and Wildlife Service (Service) provides the following comments to assist the Corps in developing environmentally acceptable project alternatives and features for this study. These comments and recommendations do not constitute the final report of the Secretary of Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). These comments are made in accordance with revised Department of the Interior Manual (503 DM 1), dated August 3, 1973, the Fish and Wildlife Coordination Act ((16 U.S.C. 661-667(e)), the Endangered Species Act (Act) of 1973 (16 U.S.C. 1531 et seq.), Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668 et seq.), the

Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 et seq.), and the National Environmental Policy Act (42 U.S.C. 4321-4347).

Study Area
The Galveston Island study area is on the Gulf of Mexico seaward of Texas Highway 3005 from the western end of the 10-mile-long Galveston Seawall extending for six miles to 13 Mile Road (Figure 1). Galveston Island is a barrier island between the Gulf of Mexico to the east and the Texas mainland on West Bay 51 miles southeast of Houston.

Project Description
The study scope is for a one-time sand placement based on the sand quantity from the required operations and maintenance dredging of the Galveston Harbor and Channel. The length of beach to be nourished is dependent on the quantity of dredged sand available. Sand placement is to temporarily ameliorate the coastal erosion damages for a segment of the island's developed area adjacent to the public beaches. A summary of the alternatives considered for the tentatively selected plan (TSP) is as follows:

No action Alternative. Dredged material is deposited in open water. Beach Erosion and damage to homes and infrastructures is unabated. The No action Alternative does not prevent or delay coastal erosion damages and/or risks to life and property at Galveston Island.

<u>Alternatives 2 & 3</u>**.** Alternatives 2 & 3 are differentiated only by their respective location, which amounts to a 3,000-foot shift (along the shore) of the construction template. These two alternatives were developed following the consideration of the beach erosion between 8 Mile and 13 Mile Roads. Based on the existing beach profile and estimated available beach quality sand, it was determined that 1.7 miles of beach could be nourished. Dredged material would be brought to the west end of Galveston Beach by Hopper dredge and deposited via pipeline on the beach for placement.

<u>Alternatives 4 & 5:</u> These alternatives considered a seawall extension along segments of Galveston beach. A seawall provides robust defense against storm surge, but is not an alternative to beach nourishment, i.e. – erosion will continue seaward of the wall. Seawall extension alternatives were not considered feasible for the purposes of this study due to economic, environmental, and engineering concerns.

<u>Alternative 6.</u> This alternative considered delaying erosion by way of westward littoral drift of sand placed seaward of the seawall's west end with a short placement duration to avoid/reduce dredging delays in the Galveston Harbor and Channel. This alternative was screened out as analysis indicated that it would not adequately delay erosion.

Plan Formulation
The Corps used the following decision criteria to identify the TSP: Costs, Benefits, Objectives, Constraints, Completeness, Effectiveness, Efficiency, Acceptability, and Environmental Impacts.

Tentatively Selected Plan
The DEA indicated that both Alternatives 2 and 3 met the criteria of economic justification, environmental factors, completeness, and effectiveness to be constructed under the authority of Section 204. As Alternative 2 had the greatest excess benefits over cost as well as providing direct erosion protection to the most vulnerable development within the study area, including Highway 3005, an essential evacuation route; it was the most effective and acceptable plan. Alternative 2 was selected as the Tentatively Selected Plan.

General Comments
The Corps references, throughout the DEA, an existing Biological Opinion (BO) that was issued to the non-federal sponsor by the Service, through Consultation No. 02ETTX00-2018-F-2491, to permit the Corps to perform beach nourishment on Galveston Island, in Galveston County, Texas under permit SWG-2007-01025. After reviewing the original BO and the study parameters described in the DEA, the Service recommends that the Corps initiate Section 7 Consultation specific to their proposed beach nourishment project. The Service's review indicates that the BO references was issued to the Park Board of Trustees of the City of Galveston (Park Board) and not the Corps. Unless the Corps is acting on behalf of the Park Board as its contractor for this project, the Corps will need to evaluate the effects of their project on federally listed species and initiate any necessary consultation procedures pursuant to Section 7 of the Act.

Migratory Bird Treaty Act and Other Trust Resources
In accordance with the Migratory Bird Treaty Act of 1918 (as amended) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the study area includes habitats which are utilized by migratory shore birds. Sand placement along the beach and other activities associated with the proposed beach nourishment can destroy active nests and kill resident birds. Disturbance from project activities can also adversely affect breeding birds' use of nesting sites and result in nest abandonment. Accordingly, the Service recommends that the Corps implement the conservation measures listed in the DEA and actions for migratory birds as suggested in the Service document, "Nationwide Conservation Measures" (USFWS,2017*)*.

Final Recommendations
The Service recommends that the following planning objectives be implemented to guide future project planning efforts:

1. Include all current listed threatened and endangered species in your DEA analysis.
2. Reduce impacts to local wildlife by minimizing the acreage of those habitats adjacent to or directly impacted by project construction. Where unavoidable disturbances associated with project features is required, those activities should be conducted during the fall and winter to minimize affects to nesting migratory birds.
3. Avoid affects to threatened and endangered species, at risk species, and species of concern.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of project alternatives on Federal trust resources during the subsequent phases of this feasibility study. Should you have any questions regarding our comments, please contact David Hoth, Assistant Field Supervisor at 281-212-1504 or David_Hoth@fws.gov.

Sincerely,

Charles Ardizzone
Field Supervisor

Literature Cited

[USFWS] U.S. Fish and Wildlife Service. 2017. https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

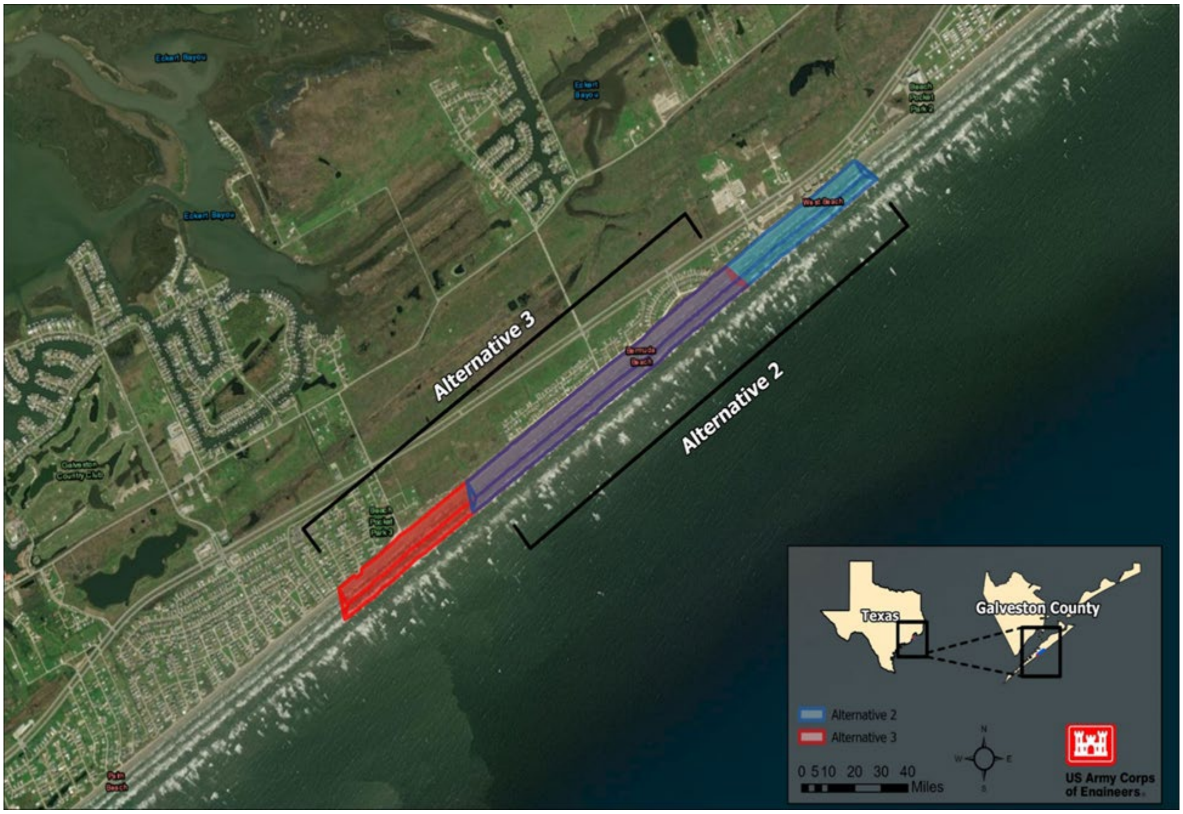


Figure 1. Study Area

Appendix C-4 Clean Water Act Compliance

Clean Water Act Compliance

for

Galveston Island Coastal Erosion CAP 204 Project
Galveston, Texas

Water Quality Certification Response

Water Quality Certification Request

Section 404(b)(1) Guidelines

TCEQ Tier II Analysis

Pre-Filing Record

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 2, 2022

Dr. Raven Blakeway,
Environmental Branch, Regional Planning and Environmental Center
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Galveston Island Coastal Erosion EA

Dear Dr. Blakeway:

This letter is in response to the 401 Certification Request dated July 21, 2022 and the Joint Public Notice dated July 15, 2022 for the U.S. Army Corps of Engineers Galveston District (USACE) and the City of Galveston's Draft Detailed Project Report and Environmental Assessment (DDPR-EA) for the Galveston Island Coastal Erosion project. The project is located at Bermuda Beach on Galveston Island, Galveston County, Texas.

The Texas Commission on Environmental Quality (TCEQ) has reviewed the DDPR-EA, 401 Certification Request, Joint Public Notice, and associated information. Based on our evaluation of the information contained in these documents, the TCEQ certifies that there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards and will comply with water quality requirements.

The proposed action involves beneficially using dredged material to nourish approximately 8,976 linear feet (1.75 miles) of beachfront on Galveston Island at Bermuda Beach.

The USACE is requesting a waiver from the TCEQ standard threshold of dredged material effluent (i.e., <300 milligrams per liter total suspended solids (TDS)) in areas where nourishment activities occur. Water in and around the surf zone (project area) regularly exceeds the TSS threshold under natural conditions. The material dredged and placed within the project area will consist of beach-quality sand, free of contaminants.

The TCEQ Tier II 401 Questionnaire and Alternatives Analysis Checklist provided by the applicant states that the long-term benefits of restoring coastal habitats and enhancing coastal erosion protection outweigh any temporary effects by improving habitat quality and functionality for the project area. Therefore, there is no mitigation proposed and best management practices (BMPs) will be followed to minimize adverse impacts.

The TCEQ has reviewed this proposed action for consistency with the Texas Coastal Management Program (CMP) goals and policies in accordance with the CMP regulations (Title 31, Texas Administrative Code (TAC), Section (§)505.30) and has determined that the action is consistent with the applicable CMP goals and policies.

This certification was reviewed for consistency with the CMP's development in critical areas policy (31 TAC §501.23) and dredging and dredged material disposal and placement policy (31 TAC §501.25). This certification complies with the CMP goals (31 TAC §501.12(1, 2, 3, 5)) applicable to these policies.

No review of property rights, location of property lines, nor the distinction between public and private ownership has been made, and this certification may not be used in any way with regard to questions of ownership.

If you require additional information or further assistance, please contact Ms. Jenna R. Lueg of the Water Quality Division MC-150, P.O. Box 13087, Austin, Texas 78711-3087. Ms. Lueg may also be contacted by e-mail at *jenna.lueg@tceq.texas.gov*, or by telephone at (512) 239-4590.

Sincerely,

Gregg Easley

Section Manager
Water Quality Division
Texas Commission on Environmental Quality

RS/JRL

Cc: Dr. Raven Blakeway, U.S. Army Corps of Engineers via email at Raven.Blakeway@usace.army.mil

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

July 21, 2022

Ms. Jenna Lueg
Texas Commission on Environmental Quality
Water Quality Assessment Section, MC 150
P.O. Box 13087
Austin, Texas 78711-3087

Dear Ms. Lueg,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the City of Galveston, is conducting the Galveston Island Coastal Erosion, Galveston, TX continuing authorities study as authorized by Section 204 of the Water Resources Development Act of 2016. The study purpose is to determine interest in beneficially using dredged material for coastal storm risk management on Galveston Island beaches to benefit coastal communities and public infrastructure.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) has been prepared to present the findings and recommendations and disclose the potential impacts to the human and natural environment if the Tentatively Selected Plan (TSP) is implemented. The TSP, Alternative 2, involves placing dredged material along 1.7 miles at Bermuda Beach seaward of the line of vegetation. Material would by hydraulically dredged and pumped to the beach through a series of submerged or floating pipelines, then shaped into the template beach profile using heavy equipment (e.g., bulldozers).

The USACE requests a water quality certification (WQC) for the TSP. Impacts to surface waters are addressed in the enclosed Section 404(b)(1) analysis and the TCEQ Tier II Certification Questionnaire and Alternative Analysis Checklist and in the DDPR-EA which can be viewed on the Galveston website at:

https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/

Pursuant to the recent changes to the WQC process, a pre-filing meeting request was accepted by your office on December 14, 2021 (Enclosure). Additionally, a Joint Public Notice is being published on July 15, 2022, and will begin a 30-day public review period. Upon completion of the comment period, any comments received will be forwarded to your office.

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center at 409-766-3837or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffrey F. Pinsky

Jeffery F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (3)

EVALUATION OF SECTION 404(b)(1) GUIDELINES
(SHORT FORM)

Galveston Coastal Erosion, Galveston, TX

GUIDELINE COMPLIANCE:

1. Review of Compliance (230.10(a)-(d))		
A review of the proposed project indicates that:	Yes	No*
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, and 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	

Reference: various sections of Chapter 4 of the Draft Detailed Project Report and Integrated Environmental Assessment (DDPR-EA) and Appendix C.

2. Technical Evaluation Factors (Subparts C-F)	Not Applicable	Not Significant	Significant*
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)		X	
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	
6) Alteration of salinity gradients		X	
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)		X	
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)		X	
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)		X	
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		

* Where a 'Significant' category is checked, add an explanation below.

List Appropriate References: Chapter 4 of the DDPR-EA.

During dredging and construction activities, localized effects on water quality are expected, e.g., increased turbidity and total suspended sediments, organic enrichment, reduced dissolved oxygen, elevated carbon dioxide levels, water temperature changes, and decreased light penetration. During dredging and construction, localized water quality perturbations can adversely affect biota, particularly primary producers, suspension/filter feeders, and visual feeders. Any such direct adverse effects on water quality and indirect negative impacts on biota would be temporary and localized. Following dredging and construction activities, water quality in the localized impact area would return to pre-construction conditions.

Dredging and placement of dredged material would smother and terminate immobile benthic organisms and cause mobile benthos to abandon the borrow and beneficial use areas. Functional recovery of benthic fauna is expected to occur within 1-3 years[1] at the borrow and beneficial use sites.

Aquatic organisms thrive in foreshore and nearshore zones of the beach, where sediments are frequently inundated by water, providing a critical nursery and feeding habitat for many fish species. Daily flooding by saltwater and moderate- to high- energy waves prohibit plant growth aside from inconspicuous algae in these zones. Backshore areas, those at or just above the high tide zone, are exposed to harsh conditions including fluctuations in temperature and salinity, that preclude habitation by few animals and no plants. The wrack zone, the transition between dry beach and surf zone, provides a reservoir of water and food for cryptic nocturnal feeders or species that feed during high tide (e.g., crabs, spiders, beetles), and is characterized by an abundance of arthropods and worms. The wrack zone is a prime foraging habitat for shorebirds. The beneficial use of dredged material for beach nourishment would increase suitable habitat for aquatic organisms in these zones and improve shorebirds' foraging habitat, resulting in no net loss. The material would be consolidated to 1.75 miles of beachfront on

[1] De La Cruz, S.E.W., Woo, I., Hall, L., Flanagan, A., Mittelstaedt, H. 2020. Impacts of periodic dredging on macroinvertebrate prey availability for benthic foraging fishes in central San Francisco Bay, California: U.S. Geological Survey Open-File Report 2020-1086. https://doi.org/10.3133/ofr20201086

Galveston Island following dredging. Temporary sand training dikes would be used to contain slurry discharge parallel to the shore. Bulldozers would shape dredged material once on the beach along the proposed work area. Upon construction completion, the work area would be restored to pre-construction contours, thereby developing foreshore, nearshore, and wrack zones that would enable aquatic organisms and shorebird access. Beach nourishing is expected to have a higher ecological value than open water because of its benefits to terrestrial and aquatic organisms.

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	X
5) Spill records for petroleum products or designated (Section 311 of Clean Water Act) hazardous substances	X
6) Other public records of the significant introduction of contaminants from industries, municipalities, or other sources	X
7) Known existence of substantial material deposits of substances that could be released in harmful quantities to the aquatic environment by man induced discharge activities	X

3. Evaluation of Dredged or Fill Material (Subpart G) (continued)	**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	

Sediment dredged from the Galveston Harbor and Channel (GHC) would be beneficially used to complete beach nourishment. Sediment placed on the beach would be configured with beach-quality sand, consistent in grain size, color, and composition as the existing beach sediment. Historical beneficial use beach nourishment projects, using material from GHC, demonstrated sand compatibility. Material from GHC has been evaluated using bioassay and bioaccumulation procedures. The chemical and grain size analyses, solid phase bioassays, and bioaccumulation assessments indicated that the GHC material was clean and did not require treatment.

Sediment samples from the Texas Coastal Sediment Geodatabase (TxSed), compiled by the Texas General Land Office (GLO), were analyzed to review spatial variation, and estimate the median grain size (D_{50}) of native sediment. The calculated D_{50} (18 beach and 22 nearshore samples) was 0.156 mm and 0.094 mm for beach and nearshore samples, respectively. The shape of the existing cross-shore (depth of closure) profiles in the proposed project area indicate a theoretical D_{50} range of 0.07-0.1 mm. Theoretical D_{50} ranges are consistent with calculated D_{50}, suggesting the dredged material is sufficient for beach nourishment based on the beach equilibrium profile theory or the balance between erosion and accretion. Calculated

D_{50} is influenced by sampling location, which can often be biased towards larger grain sizes (e.g., coarse sand). Natural coastal processes distribute/sort sediment along a cross-shore profile, driven by the fall velocity (i.e., transport of suspended sediments) of sediment particles, predominantly controlled by respective grain size. These coastal processes lead to consistently poorly graded sediment. The coarsest sand is concentrated along the surf/swash zone, and finer particles are distributed seaward by waves/current or landward to dunes via aeolian processes[2]. Sediment samples for grain size analyses are often collected in the surf/swash zone, thus biased towards larger/coarser sand.

In 2017, the U.S. Army Corps of Engineers completed a contaminant assessment report for Galveston and Houston Ship channels in compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). Elutriate exceeded the EPA acute Water Quality Criterion (Criterion Maximum Concentration [CMC]) for ammonia during the assessment. While the exceedance would not provoke a water quality violation, the dilution required to meet the CMC was 1.44. The suspended particulate phase concentration fell below 1% within 150 minutes (2.5 hours) after discharge using a dilution curve, affording sufficient time to meet the ammonia CMC within the 4-hour requirement by RIA. Based on these results, the limiting permissible concentration for liquid and suspended particulate phases is completed, indicating no toxicity to sensitive marine water-column organisms is expected during placement. Further, no special handling or management is required during discharge.

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 the placement site	X
2) Current velocity, direction, and variability at the 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)	

4. Placement Site Delineation (230.11(f)) (continued)	**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	

5. Actions to Minimize Adverse Effects (Subpart H)	**Yes**	**No**
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	

[2] Benedet, L., Finkl, C.W., Campbell, T., Klein, A. 2004. Predicting the effect of beach nourishment and cross-shore sediment variation on beach morphodynamic assessment. *Coastal Engineering*, 8-9:51, p. 839-861. https://doi.org/10.1016/j.coastaleng.2004.07.012

List actions taken:

1) Would utilize the best available practical techniques and BMPs during dredging and construction activities to avoid and minimize potential temporary and long-term adverse impacts. Such as maintaining a work area that remains aesthetically attractive and free of floating or piled debris and trash, storing fuels and other hazardous materials in locations that would not introduce to surface waters if spilled, and using silt curtains when appropriate to minimize the movement of sediments, etc.

2) The movement of heavy equipment and support vehicles would utilize the placement of pipeline corridors to the greatest extent possible. Staging areas, access corridors, and general ground disturbance not related to restoration would use the smallest footprint possible to maintain a safe work environment.

3) Only clean fill material (dredged material or stone) free of contaminants would be placed in the restoration area. Placed dredged material will be of such composition that will not adversely affect the receiving waters; biological, chemical, or physical properties.

6. Factual Determination (230.11)	**Yes**	**No***
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: **Raven Blakeway** Position: **Biologist,** Regional Planning and Environmental Center

8. Findings (Select One)	**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: N/A	
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	

__________________ Date	Jeffrey F. Pinsky Jeffrey F. Pinsky Chief, Environmental Branch Regional Planning and Environmental Center

NOTES:

* A negative, significant, or unknown response indicates that the permit application may not comply 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.

Use care in assessing pertinent portions of the technical information of items 2a-e before completing the final review of compliance.

A 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.

SUPPORTING DOCUMENTATION

Project Description

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Galveston Island Park Board of Trustees of the City of Galveston, is examining the potential of beneficially using sand material generated during routine maintenance dredging operations of the Galveston Harbor and Channel (GHC) to nourish beach on the west end of Galveston Island. Galveston Island is a placement site candidate for beach nourishment under the Corps of Engineers' beneficial use of dredge material program (§204). This Federally authorized project would not induce additional dredging beyond the Federal Standard.

The project is located on Galveston Island, a barrier island between the Gulf of Mexico and the Texas mainland, 51 miles southeast of Houston, Texas. The proposed project is located in Galveston Island's center, parallel to FM 3005, extending from 8 Mile Road southwest to 13 Mile Road (Figure 1). Two alternatives are proposed for nourishment at the study location, in which placement would occur seaward of the vegetation line. Alternative 2 extends southwest from south of Sunbather Lane to 11 Mile Road, while Alternative 3 extends southwest from Hershey Beach to Fidler Crab Lane (Figure 1).

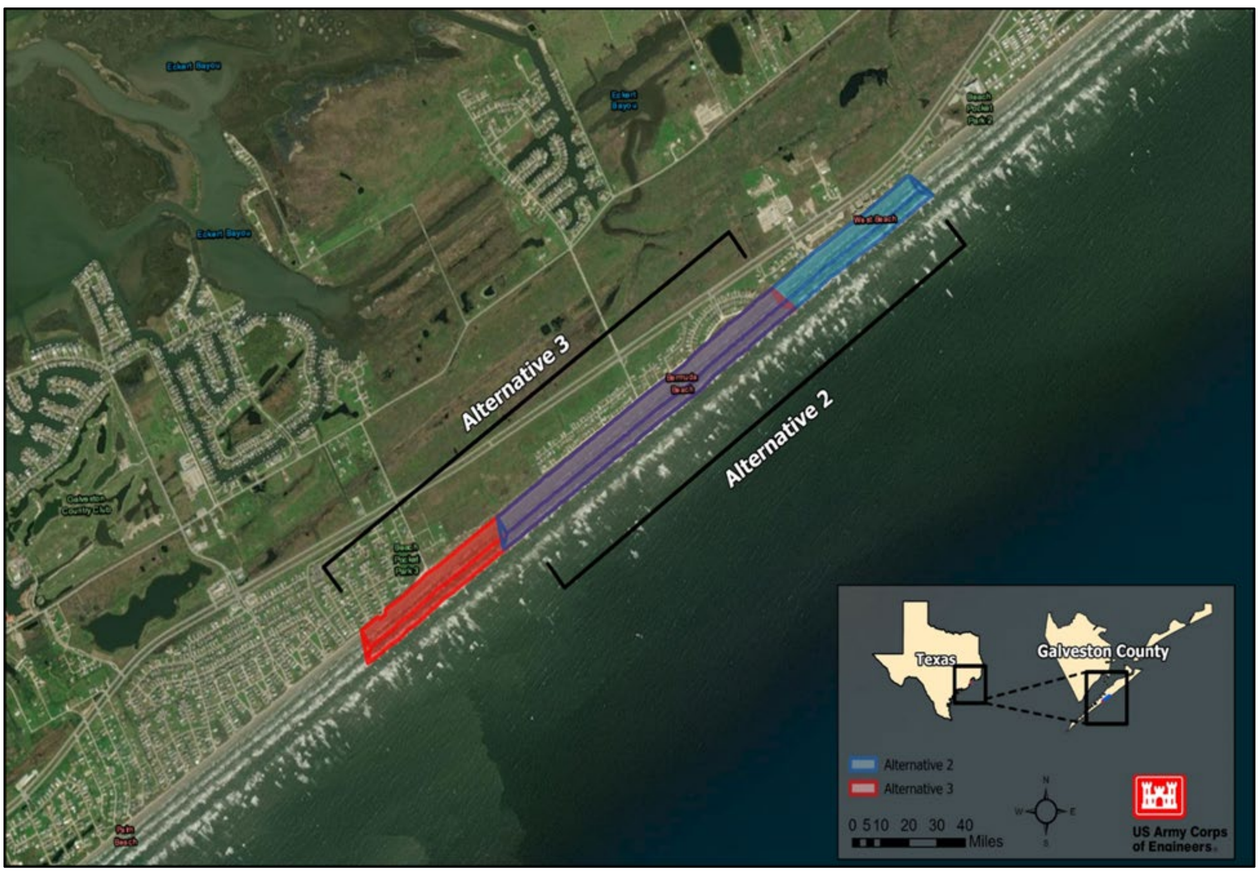


Figure 1 Study Location with proposed project alternatives in blue (Alternative 2) and red (Alternative 3). The overlap between alternatives is shown in purple.

Alternative 2 was chosen as the Tentatively Selected Plan (TSP). Dredge material is brought to the west end of Galveston Beach by hopper dredge and pumped by a pipeline for beach placement (Figure 2). Alternative 2 involves beneficially using dredged material to nourish approximately 1.7 miles of beachfront on Galveston Island at Bermuda Beach seaward of the vegetation line beginning south of Sunbather Lane and stretching southwest, terminating before 11 Mile Road. Approximately 530,000 cubic yards of beach quality sand would be deposited and leveled on the beach.

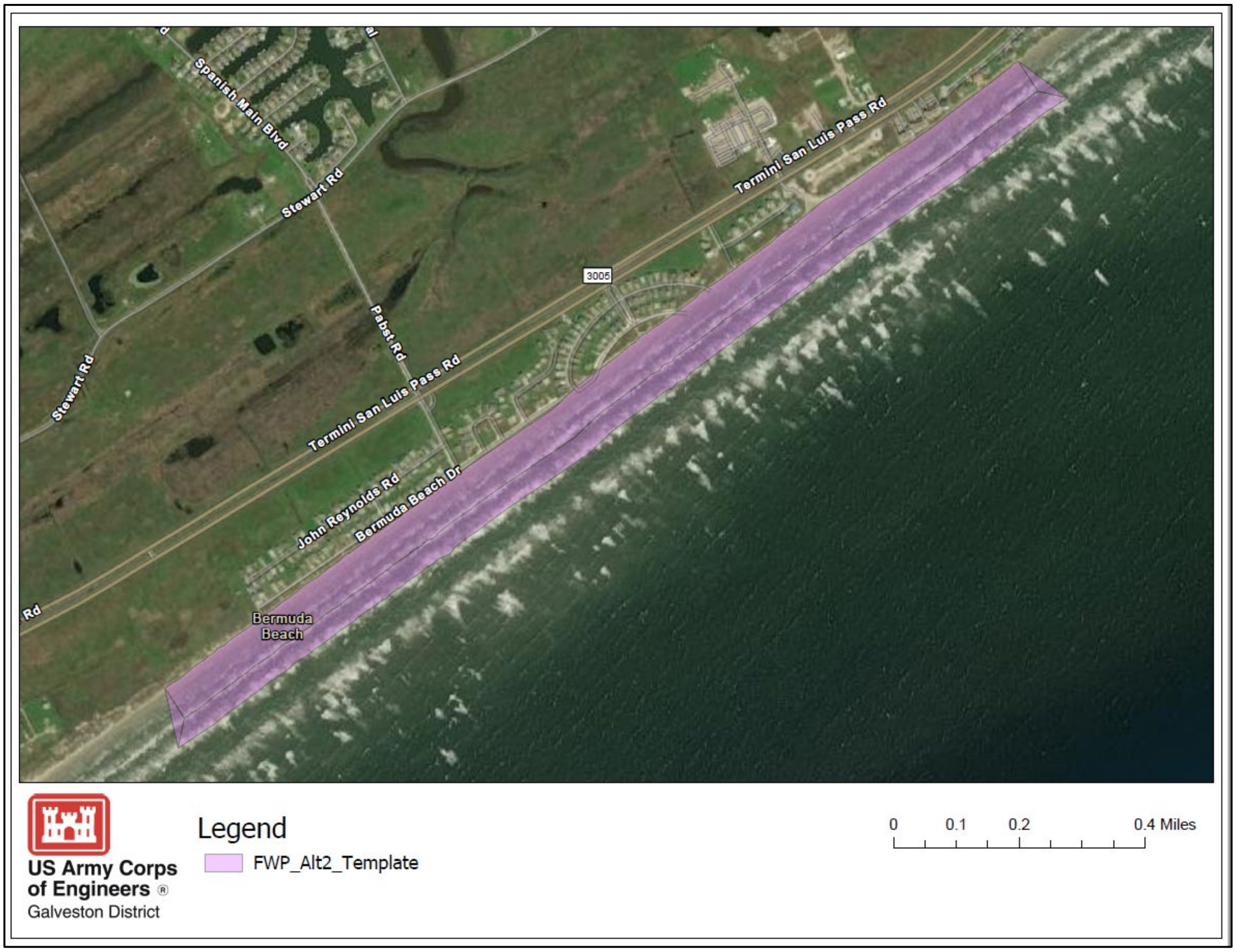


Figure 2 Project area for Alternative 2

Nourishment would be accomplished by hydraulically dredging material from GHC with a hopper dredge, pipelining the material to the beach, and using heavy equipment (e.g., bulldozers, loaders) to shape the fill on the beach into the design template (Figure 3). Any slurry discharge from the pipeline would be contained parallel to the shore using temporary sand training dikes. The dimensions of the nourished sections would include a 300-foot added berm width at +4.0 feet NAVD88 to minimize scarping, followed by a 180-foot seaward 1:20 slope to tie into the existing profile (Figure 3). Nourishment activities would be divided into multiple confined cells along the proposed area, in which shaping of the dredged material will be restricted to a single cell until completion. After construction is complete, project sites would be restored to pre-construction slope/contours.

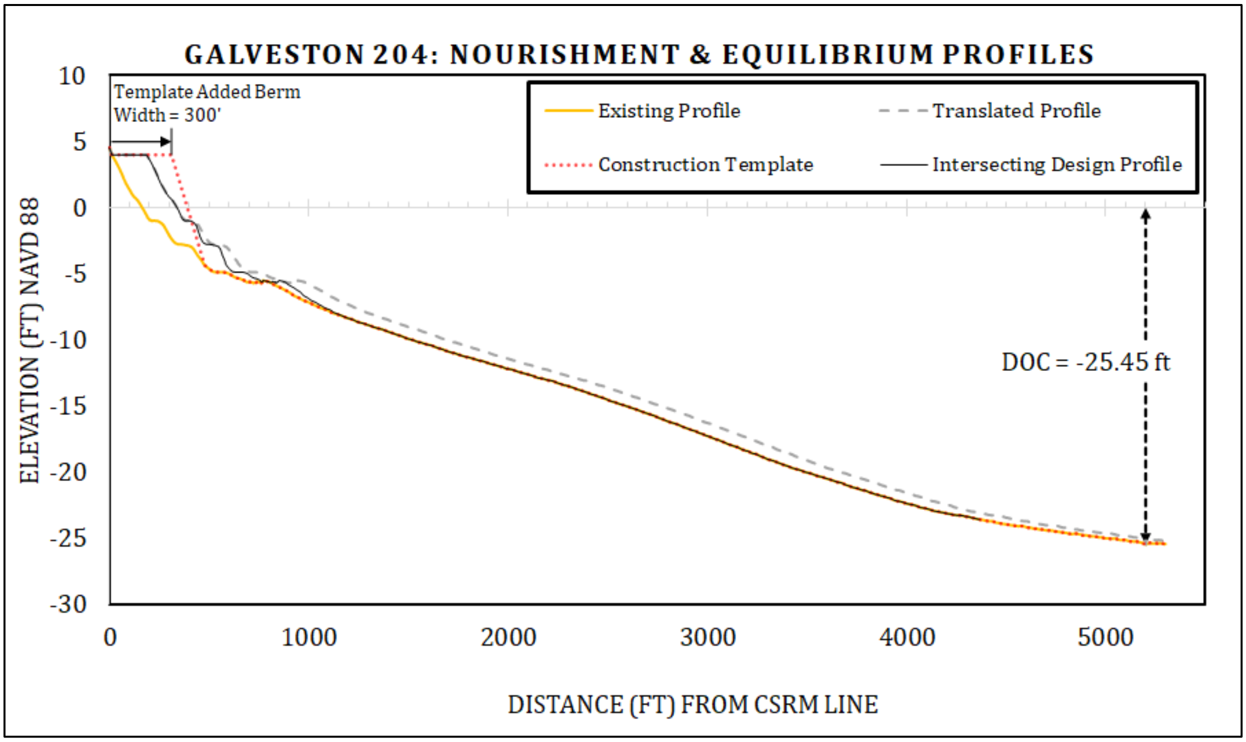


Figure 3 Profiles of the existing beach and design template for nourishment based on beach equilibrium concepts as the distance from Coastal Storm Risk Management Line (CSRM)

The TSP integrates watershed purposes of recreation, erosion protection, and critical habitat provision for migratory birds, foraging seabirds, and nesting sea turtles. It was determined to be feasible, environmentally acceptable, and economically justified based on currently available data and information developed during plan formulation, and significant institutional knowledge of beach nourishment activities. There is minimal uncertainty given available data and institutional knowledge form a construction perspective. However, uncertainties exist on site-specific, design-level details (e.g., exact sediment quantities, the extent of erosion control needs, construction staging locations, pipeline pathways, and duration of construction), which would be addressed during the pre-engineering and design phase. Additional plan details are provided in the DDPR-EA and the Engineering Appendix of the DDPR-EA (Appendix A).

Beach Placement

Material placement on the beach would involve pumping sediment directly onto the site by a dredge with pump-off capabilities. A pipeline would be routed from the dredge anchor point (i.e., pump-out location) in offshore waters (approximately 30-foot water depth) to the beach nourishment location. The pipe would be mobilized in segments of varying length (mean 40 feet) and diameter (mean 24-30 inches). Pipeline configuration would be proposed by the contractor based on performance and site conditions, then approved by USACE prior to implementation. The in-water configuration could entail a submerged pipeline, anchored by the density of the material or secured by physical means, or a floating pipeline on the surface. Pipeline configuration on the beach would be placed seaward of the vegetation line and foredune with discharges directed into the placement area. The pipe would be periodically added and removed as sections are completed. Mobilizing the pipeline requires heavy equipment and vessels to transport and connect pipe segments from the dredge anchor point to the nourishment location.

The pipeline's construction disturbance area varies depending on pipe size (diameter and length). When identifying the pipeline route, USACE would consider site content and environmental features to minimize the environmental impact of construction activities. Once heavy equipment is on the beach and the pipeline is configured, operations are generally confined to the vicinity of the mean high-water line, away from dune vegetation. However, heavy equipment is temporarily operated throughout the width of the beach during active nourish placement to manage the outflow of sediment and construct target elevations for the appropriate beach profile.

Typically, the beach nourishing process involves bulldozers and occasionally backhoes to distribute sand from the outflow of the pipeline. The dredged material exits the pipe as a sand slurry, which is defused as it is released from the terminal pipe to reduce the flow velocity onto the beach. Dikes are constructed on one or two sides of the affluent area to extend the settlement of suspended solids to reduce nearshore turbidity. As sand releases from suspension, bulldozers and backhoes distribute it evenly to prevent future ponding and erosion, ensure proper coverage of cell units, and conform to the engineered beach template.

The construction zone, consisting of the active nourishment area and heavy equipment, is encompassed by a 500-1,000-foot fenced buffer. Stakes mark the cell unit, and elevation requirements are reviewed before sand placement. As target elevations are achieved in a cell unit, construction mobilizes to the next station. Sand would not be placed in multiple cell units concurrently. Once a nourishment area is completed (generally 500-1,000-foot acceptance sections), stakes are removed from the beach and the area is restored to pre-construction conditions.

Throughout the pumping process, the contractor would be required to inspect the pipeline route to verify the pipe's integrity and fix any leaks/disruptions. During construction operations, vehicles (e.g., pickup trucks, all-terrain vehicles) and heavy equipment (e.g., bulldozers, backhoes) may traverse the beach; however, construction activities are prohibited within existing dune vegetation or other environmentally sensitive locations identified prior to construction.

Sediment

Sediment placed on the beach would be configured with beach quality sand, consistent in grain size, color, and composition as the existing beach sediment and absent of hazardous contaminants. Historical beneficial use beach nourishment projects, using material from GHC, demonstrated sand compatibility concerning grain size and organic content. Material from GHC has been evaluated using bioassay and bioaccumulation procedures. The chemical and grain size analyses, solid phase bioassays, and bioaccumulation assessments indicated that GHC material was clean and did not require treatment.

Timing

The proposed action would be authorized for a single placement. GHC maintenance dredging occurs every two years or every odd fiscal year; thus, this project's earliest available dredge cycle would appear in the fiscal year 2023. Hopper dredging and beach nourishment would be targeted to occur between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters. However, the project timeline is constrained by dredge vessel availability which could result in construction activities occurring outside the target window. Placement operations are anticipated to occur 18-24 hours per day. Project construction duration cannot increase beyond the estimated length of time it would take to bring material at a rate of 0.063 days per 10,000 cubic yards or equivalent, including dredging, transport, and discharge.

Description of the Discharge Site(s)

Approximately 1.7 miles of beachfront on Galveston Island at Bermuda Beach, beginning just south of Sunbather Lane and stretching southwest, stopping just short of 11 Mile Road would be nourished with dredged material seaward of the vegetation line. Approximately 530,000 cubic yards of beach quality sand would be obtained from the GHC, an authorized Federal project, during routine maintenance dredging operations and deposited on the beach.

The project area is exposed to oceanographic processes including tides, currents, and wave action as described in the DIFR-EA. The daily mean tidal range along the project area is 0.8 feet, with more considerable variations dependent on the wind that can depress (up to 4 feet) or raise (spring tides) surface water elevations. Currents are affected by many different physical forces and characteristics. In Galveston, currents change seasonally, in which currents move southwest (i.e., the same direction as net longshore current) in non-summer months and shift to the opposite direction in summer months[3]. The predominant wave direction is from the southeast, though the direction and magnitude can shift seasonally.

The project area can occasionally be used by various marine and terrestrial fauna for resting, nesting, and foraging; however, abundance and diversity are low given the exposure to physical processes. A complete description of species commonly found in the project area can be found in the DDPR-EA.

[3] Johnson, D.R. 2008. Ocean Surface Current Climatology in the Northern Gulf of Mexico. *Gulf Coast Research Laboratory*. Ocean Springs, MS.

Texas Commission on Environmental Quality
Tier II Analysis

Galveston Coastal Erosion, Galveston, TX

401 CERTIFICATION QUESTIONNAIRE

The following questions are included on the Texas Commission on Environmental Quality (TCEQ), Tier II 401 Certification Questionnaire. The responses provided seek to show implementing the Tentatively Selected Plan (TSP) for the Galveston Coastal Erosion, Galveston, TX section 204 continuing authorities program study will avoid adverse impacts during construction and upon completion of the project.

I. Water quality impacts

A. *Describe BMPs to control short-term and long-term* ***turbidity and suspended solids*** *in the waters being dredged and/or filled. Describe the type of sediment (sand, clay, etc.) that will be dredged or used for fill. Note: the return water from the upland placement of hydraulically dredged material will be required to meet the permit limit of 300 mg/L total suspended solids.*

Water in and around the surf zone (project area) regularly exceeds the Total Suspended Solids (TSS) threshold under natural conditions. USACE is requesting a waiver from the TCEQ standard threshold of dredged effluent to (i.e., <300 milligrams per liter) in areas where nourishment activities occur. The material dredged and placed within the project area consists of beach-quality sand, free of contaminants.

B. *Describe measures that will be used to* ***stabilize disturbed soil areas****, i.e., dredge material mounds, recently constructed levees or berms, and construction sites, during and after construction. Special construction techniques intended to minimize soil or sediment disruption should also be described.*

A dewatering structure consisting of sand sourced from a specific beach cell will be constructed, creating an impoundment between the dry beach and the dewatering structure to facilitate dewatering. Once dewatered, the beach quality sand will be distributed evenly to prevent future ponding and erosion, ensure proper coverage of cell units, and conform to the engineered beach template. Once construction has completed, the dewatering structure will be removed or distributed throughout the placement area.

C. *Describe any methods used to* ***test the sediments for contamination****, especially when dredging will occur in areas with a potential to be contaminated i.e., downstream of wastewater outfalls, waterbodies listed for contaminated sediments in the CWA 3030(d) list, or within an Area of Concern of a Superfund site.*

USACE has a significant repository of water and sediment chemistry data and elutriates data that elucidate water-soluble constituents released during dredging and placement. Based on available data, there is no indication of current water or elutriate contaminant problems known from the dredged site, Galveston Harbor and Channel (GHC). Geotechnical investigations were performed on sand collected from GHC to ensure color, grain size, and composition were compatible with the placement site and met the USACE criteria for beach quality sand.
In 2017, USACE completed a contaminant assessment report for the Galveston Ship Channel in compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). The limited permissible concentration for liquid and suspended particulate phases was determined, indicating no toxicity or contamination to sensitive marine water column organisms.

II. Disposal of waste materials

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

Not Applicable. Implementation of the action would not involve removing or destroying existing structures.

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

Not applicable. No sewage would be generated during construction, and the proposed project does not involve constructing a business or subdivision.

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

Not Applicable. Implementation of the action would not involve constructing or using a marina(s).

ALTERNATIVES ANALYSIS CHECKLIST

I. Alternatives

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

The action aims to nourish beaches along Galveston Island through the beneficial use of dredge material to naturally protect adjacent coastal properties from storm surges and coastal erosion. This intent can only be achieved by conducting work within surface waters in the State, specifically along the beaches and in the nearshore environment.

B. *How could the project layout onsite be designed to avoid and minimize impacts to surface water in the State?*

The chosen alternative does not avoid impacts to surface water in the State. This alternative was selected because it met the purpose and need for the action (i.e., beneficial use of dredged material). Although there are temporary adverse impacts to surface waters, the long-term benefits of restoring coastal habitats and enhancing coastal erosion protection outweigh any temporary impacts by increasing the habitat quality and functionality of the project area. The adverse effects anticipated from this action are minimal and brief.

C. *How could the project footprint be reduced to avoid and minimize impacts to surface water in the State?*

Reducing the project footprint would result in less dredged material being beneficially used for nourishment purposes. This would result in sediment being removed from the sediment budget of the west beach on Galveston Island, as it would instead be disposed of in an offshore disposal site. Reducing the project footprint would effectively eliminate the beneficial use of dredged material and the purpose of this action.

D. *What offsite locations were considered as an alternative for the project site?*

Not Applicable. No offsite locations were considered for this project as this does not provide beneficial use of dredged material.

E. *What are the consequences of not building the project (no-build alternative)?*

Without action, marine influences and other natural and human factors, such as subsidence, sea level change, navigation channels, oil and gas development, industry growth, and population increases would result in continued coastal habitat loss in the study area. Beach erosion and damage to homes and infrastructures would be unabated. This alternative does not prevent coastal erosion damages and risks to life and property at Galveston Island.

II. Comparison of Alternatives

A. *How do the costs compare for each alternative?*

Alternatives went through a cost-benefit and risk analysis. Two were considered cost-effective and the best-buy plan, i.e., there were no other plans that provided the same level of benefit for a lower cost. The alternatives (Alternatives 2 and 3) are differentiated by respective location; however, Alternative 2 has the most significant excess benefits over cost and is the most efficient, acceptable plan.

B. *What are the logistical (location, access, transportation, etc.) limitations for each alternative?*

Additional alternatives beyond the initial array were not logistically feasible due to economic, environmental, and engineering concerns with the placement of dredged material or because it did not meet the project's scope of beneficial use.

C. *What are the technological limitations for each alternative?*

Not applicable. There are no technological limitations for the alternatives considered.

D. *Are there other reasons why an alternative was not considered feasible?*

Tthere are no other reasons why other alternatives were not considered feasible.

E. *Please provide a comparison of each alternative considered using each of the criteria above.*

No alternatives beyond the initial array were considered in plan formulation involving non-surface water locations. The cost-benefit analysis for the alternatives were given full consideration (Table 1). Plans are considered cost-effective if the benefits outweigh the costs. The most beneficial strategy is that which provides the greatest benefits at the lowest costs. Of the six plans (including the no action alternative) evaluated, two plans, were identified as cost effective.

Table 1 Preliminary results of cost-benefit analysis. Both plans are considered cost effective. The asterisk (*) highlights the most beneficial strategy.

Plan	Annual Cost ($1000)	Annual Benefit ($1,000)	Benefit-Cost Ratio
Alternative 2	$10,752	$2,704	5.6*
Alternative 3	$10,932	$2,516	5.2

F. *Please explain how the preferred alternative is the least damaging practicable alternative.*

Temporary adverse impacts are expected with this alternative; however, the long-term benefits of restoring coastal habitats and enhancing coastal erosion protection outweigh any temporary effects by improving habitat quality and functionality for the project area. Best management practices (BMPs) will be followed to minimize adverse impacts and reduce damages (see the response to G below). Alternative 2 will have identical negative impacts as the No Action

Alternative due to dredging activities that would already occur. However, the No Action Alternative would not use dredged material for beach nourishment, instead be deposited offshore. Because the purpose is to use dredged material for beneficial use, Alternative 2 was identified as the least damaging alternative for this action.

G. *If all impacts to jurisdictional surface water in the State cannot be avoided, please explain how the remaining impacts will be minimized?*

Impacts to State surface waters will be minimized using best management practices (BMPs) during dredging and construction activities. These BMPs will include, but are not limited to:

- Use of silt fencing to limit soil migration and water quality degradation.
- Refueling and maintaining vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils.
- Limiting the idling of vehicles and equipment to reduce emissions.
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc., to the smallest size required to safely operate during construction and restoring staging areas 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 the 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.

[Non-DoD Source] RE: Galveston Coastal Erosion, Galveston, TX -- Pre-filing Notification

401CERTS <401CERTS@tceq.texas.gov>

Tue 12/14/2021 8:09 PM

To: Fisher, Melinda CIV USARMY CESWF (USA) <Melinda.Fisher@usace.army.mil>

Thanks Melinda. Prefiling meeting request received. I'll be assigning this to staff soon and will let you know who it gets assigned to.

Thanks,

Peter Schaefer

Peter Schaefer, Team Leader
Standards Implementation Team (MC 150)
Water Quality Assessment Section
Water Quality Division, TCEQ
email: *peter.schaefer@tceq.texas.gov*
phone: 512-239-4372
fax: 512-239-4420

From: Fisher, Melinda CIV USARMY CESWF (USA) <Melinda.Fisher@usace.army.mil>
Sent: Monday, December 13, 2021 2:20 PM
To: 401CERTS <401CERTS@tceq.texas.gov>
Subject: Galveston Coastal Erosion, Galveston, TX -- Pre-filing Notification

To Whom It May Concern,

Please accept this notification of our intent to file for a Water Quality Certification next month. The 401 State Certification Pre-Filing Meeting Request Form is attached. If you need anything else or would like to schedule a meeting, please let me know.

Note: This is a Civil Works Continuing Authorities Program Study, therefore there will not be a USACE regulatory permit number assigned.

Thanks!
Melinda

~~~~~~
Melinda Fisher
Wildlife Biologist
Regional Planning & Environmental Center (RPEC)
Environmental Branch
Compliance Section
Office: 918-669-7423
Cell: 918-953-9534
~~~~~~

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Why is this Pre-Filing Meeting Request Required? The U.S. Environmental Protection Agency published its Clean Water Act Section 401 Certification Rule in the Federal Register on July 13, 2020. It took effect on September 11, 2020. The federal rule requires all project applicants to submit a Pre-filing Meeting Request to the state certifying authority, the Texas Commission on Environmental Quality (TCEQ), at least 30 days prior to submitting a Section 401 Water Quality Certification Request (Certification Request). The TCEQ has prepared this Pre-filing Meeting Request form to help project applicants comply with the new 401 Certification Rule requirements.

Next Steps: The TCEQ will review your request for a Pre-filing Meeting to determine whether it is necessary or appropriate for your specific project, though actually conducting a Pre-filing Meeting is optional. Completing this form will help with the TCEQ's determination. Thank you for using this form.

1. Please submit this request form and a project location map to 401Certs@tceq.texas.gov.

2. If a Pre-filing Meeting is determined to be necessary by either the applicant or the TCEQ, the meeting will be scheduled to discuss the project.

3. If you do not receive a response to your request for a pre-filing meeting, after at least 30 days, you may submit the certification request to the TCEQ if a Section 401 certification is required for your project. Projects that require state certification are 1) all individual permit U.S. Army Corps of Engineer 404 permit applications and, 2) individual conditional certifications for the return water of Nationwide Permit 16.

For more information: EPA's 401 rule: https://www.epa.gov/cwa-401/final-rule-clean-water-act-section-401-certification-rule

Project Information

Project Name: **Galveston Coastal Erosion, Galveston, TX**
Project Applicant
Name: Melinda Fisher
Organization: US Army Corps of Engineers, Galveston District
Phone no.: 918-953-9534
Email: melinda.fisher@usace.army.mil
Consultant
Name: --
Organization: --
Phone no.: --
Email: --
Project Location *(Note: Please attach a project location map when submitting this form)*
Address: (nearest) 4120 Hershey Beach Dr (start) / 4226 Ghost Crab Ln (end)
City: Galveston, TX 77554
County: Galveston

Texas Commission on Environmental Quality
401 State Certification Pre-filing Meeting Request Form

Latitude/Longitude of project location: 29° 12'41.21" N 94° 55'08.49" W

Brief Project Description

The proposed action involves beneficially using dredged material to nourish approximately 8,976 linear feet (1.75 miles) of beachfront on Galveston Island at Bermuda Beach between Hershey Beach Drive and Ghost Crab Lane. Approximately 530,000 cubic yards of beach quality sand would be obtained from the Galveston Harbor and Channel (GHC), an authorized Federal project, during routine maintenance dredging operations and would not induce additional dredging beyond the Federal Standard.

Nourishment would be accomplished by hydraulic dredge, pipelines to the beach, and heavy equipment (bulldozers and loaders) shaping the fill on the beach. Temporary sand-training dikes would be used to contain the slurry discharge parallel to the shore. Once the sand is pumped onto the beach, bulldozers would shape the fill into the design template. The nourished sections would consist of a nearly horizontal 300-foot wide berm at +4.0 feet NAVD88 to minimize scarping, followed by a 180-foot seaward slope constructed at 1 on 20 to tie into the existing profile (Figure 5). Beach nourishment activities will be broken down and divided into multiple confined cells along the proposed work area. Work will begin in an individual cell and continue until that cell is completed. Beach quality sand will not be placed in multiple cells/areas at the same time. After construction is complete, all project sites would be restored to pre-construction slope or contours and all ruts leveled.

Please provide the type of federal permit for which the applicant is seeking state 401 certification. Please include a federal permit number if available.

No Federal Permit, this is a Civil Works Feasibility Study.

Jurisdictional Impacts

Fill/Excavate	Wetland (Cowardian Class), Seagrass, Oyster	Acres	Stream (linear feet)		
			intermittent	*perennial*	*tidal*
Example. Fill	Example. Palustrine Emergent Wetland (PEM)	Example. 3			
Example. Fill			Example. 300	Example. 100	
Fill	Marine Intertidal Unconsolidated Shore (M2USP/M2USN)	41.83			
Fill	Marine Subtidal Unconsolidated Bottom (M1UBL)	122.5			

Best Management Practices (BMPs) to be implemented:

1. Best available practical techniques and BMPs would be utilized during dredging and construction activities to avoid and minimize potential temporary and long-term adverse impacts, such as maintaining a work area that remains aesthetically attractive free of floating or piled debris and trash, storing fuels and other hazardous materials in locations which would not be introduced to surface waters if spilled, using silt curtains when appropriate to minimize movement of sediments, etc.
2. Movement of heavy equipment and support vehicles would utilize placement pipeline corridors to the greatest extent possible. Staging areas, access corridors, and general ground disturbance not related to restoration would utilize the smallest footprint possible to maintain a safe work environment.
3. Placed dredged material will be of beach quality sand consistent in grain size, color, and composition and free of contaminants, so that the composition will not adversely affect the biological, chemical or physical properties of the receiving waters.
4. Regular inspection of the pipeline route to check and fix pipe leaks.
5. No driving or construction activity is permitted within existing dune vegetation or other environmentally sensitive locations identified prior to construction.

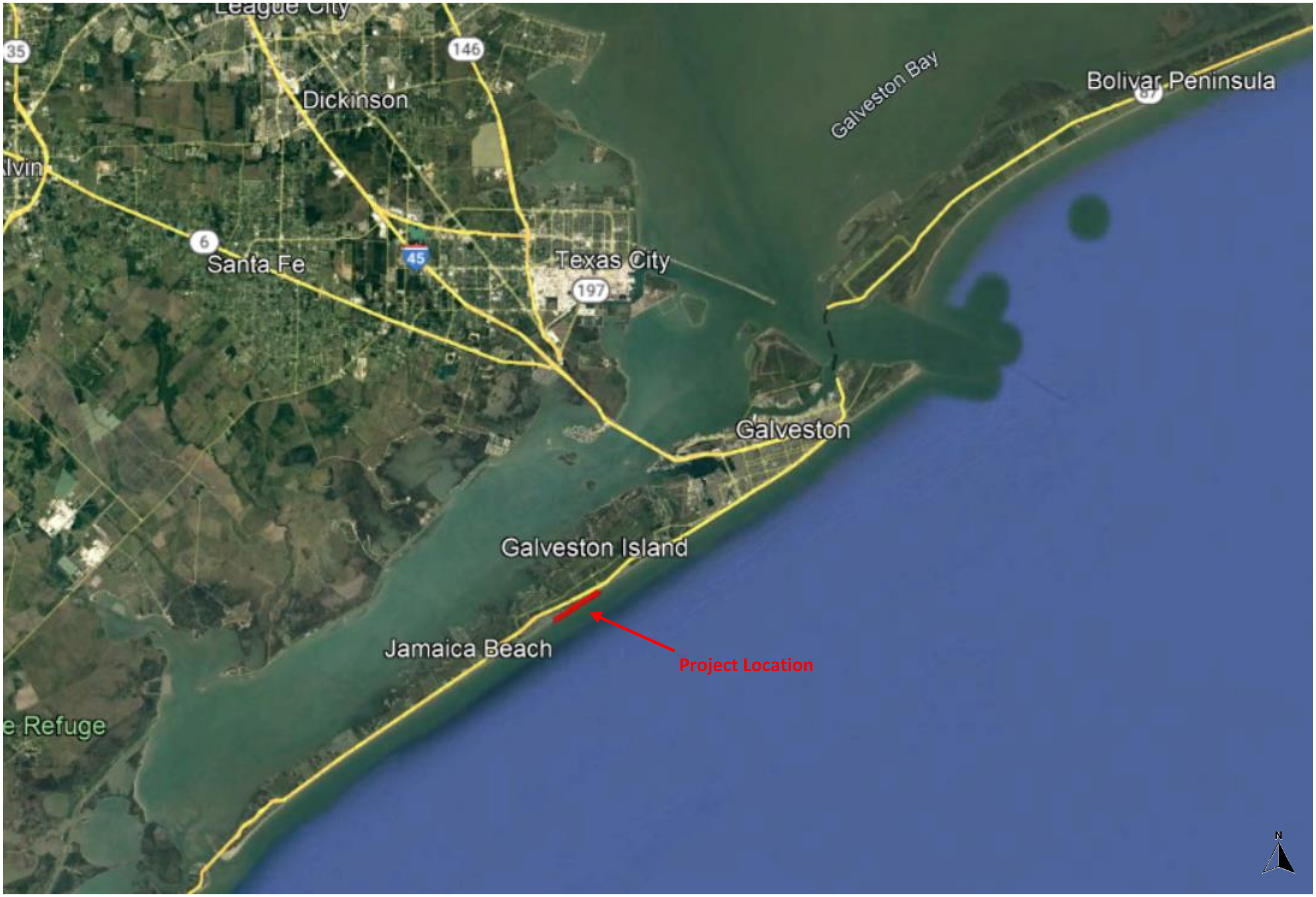


Figure 1. Overview of project location

Figure 2. Sheet 1 of Project Location

Figure 3. Sheet 2 of Project Location

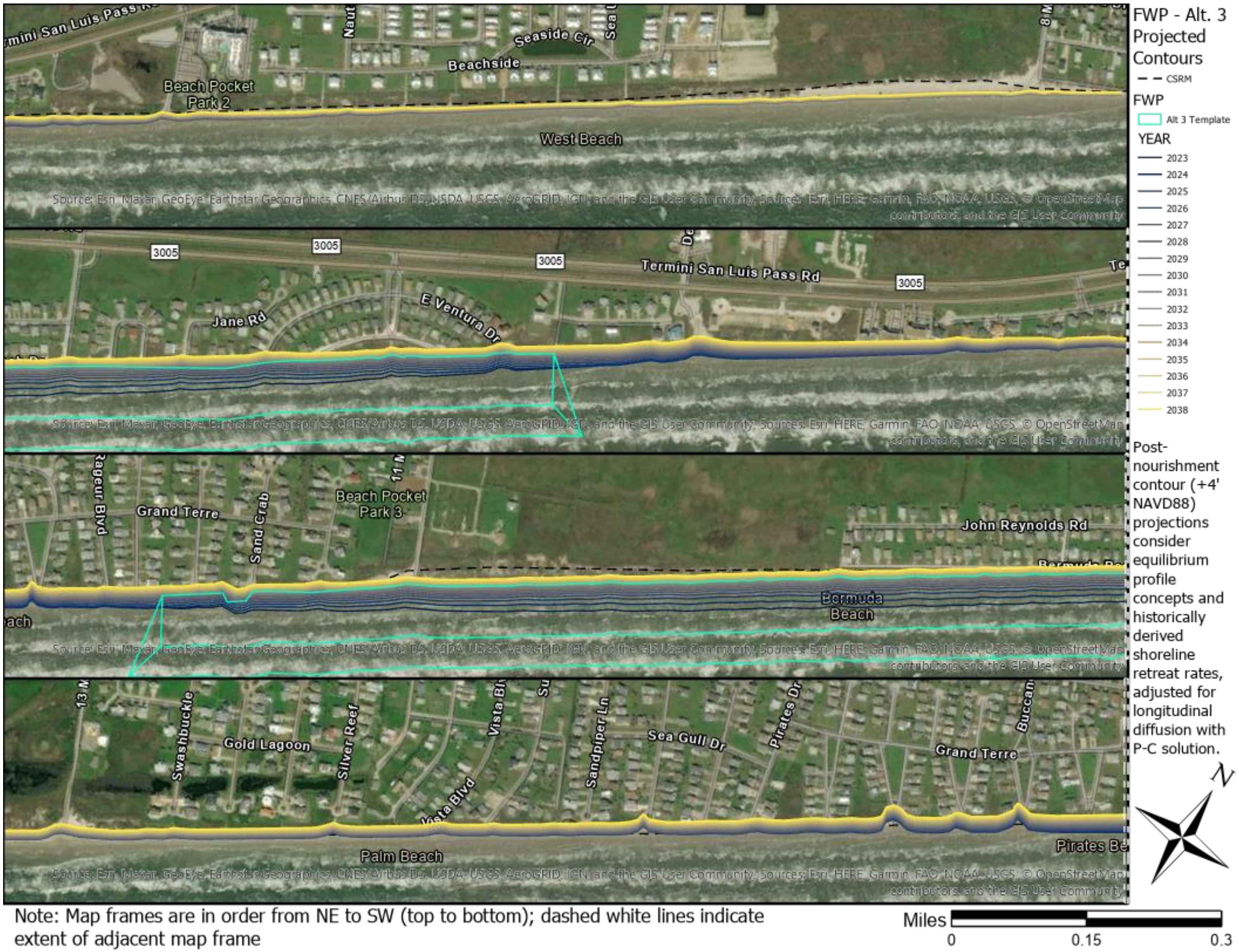


Figure 4. Post-nourishment contour (+4’ NAVD88) projections based on historic equilibrium profile concepts.

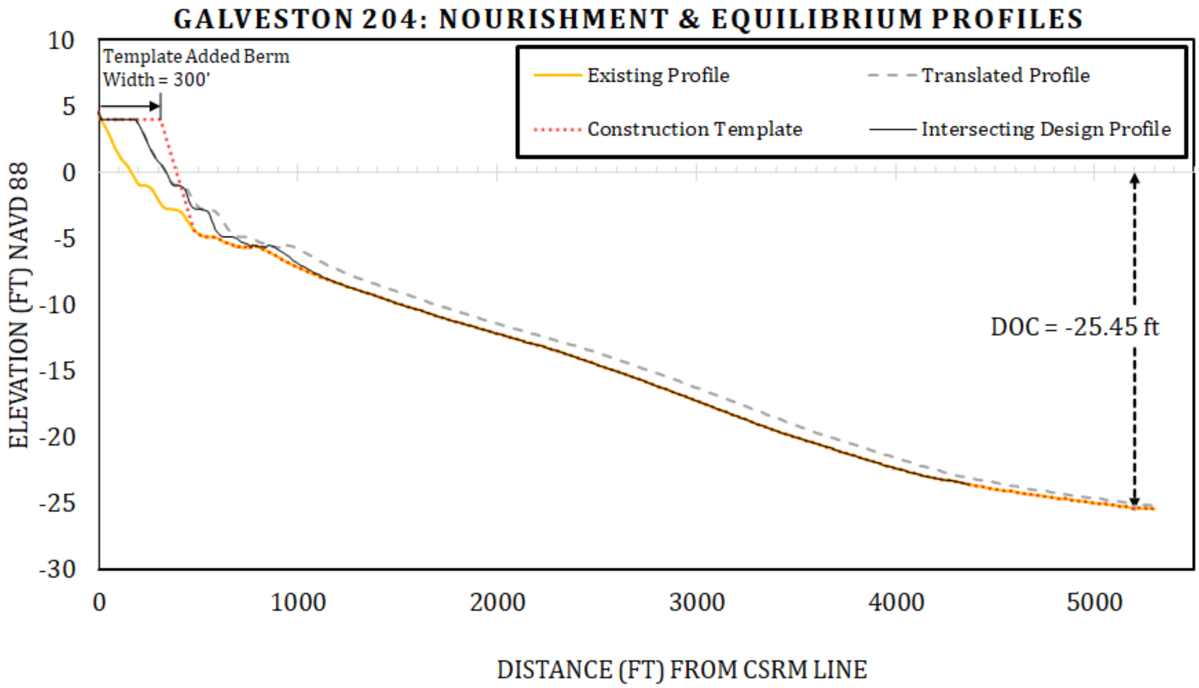


Figure 5. Existing and design profiles based on beach equilibrium concepts

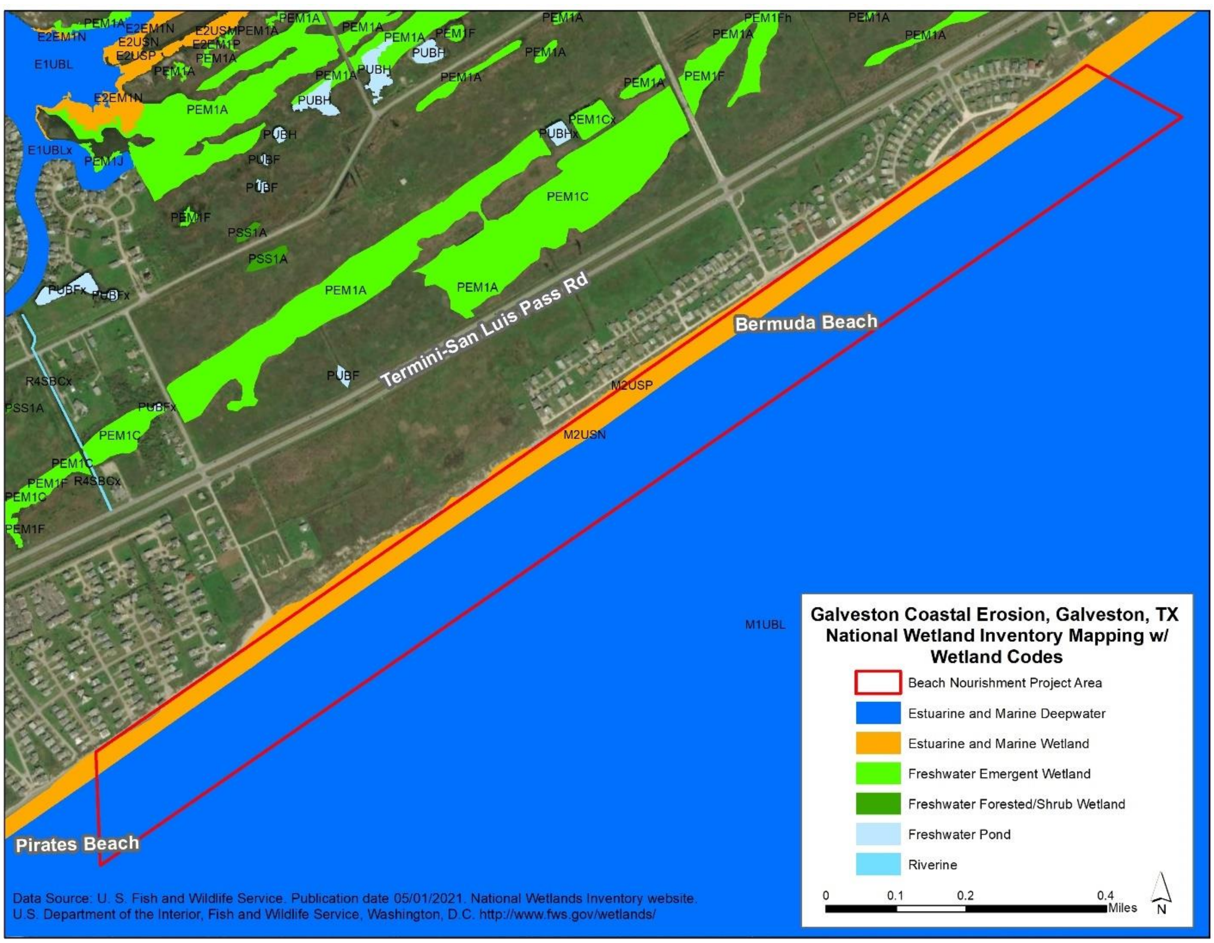


Figure 6. National Wetland Inventory Mapping of the Project Area

Appendix C-5 Coastal Zone Management Act Compliance

Coastal Zone Management Act Compliance

for

Galveston Island Coastal Erosion CAP 204 Project

Galveston, Texas

Consistency Review Response

Consistency Review Request

Consistency Determination

TEXAS GENERAL LAND OFFICE
GEORGE P. BUSH, COMMISSIONER

September 19, 2022

Raven Blakeway
U.S Army Corps of Engineers
Regional Planning and Environmental Center
2000 Fort Point Road
Galveston, TX 77550
Via e-mail: Raven.Blakeway@usace.army.mil

Re: Galveston Island Coastal Erosion CAP 204 Project
Draft Detailed Project Report and Environmental Assessment
Texas CMP#: 22-1361-F2

Dear Ms. Blakeway:

The Galveston Island Coastal Erosion project is a Civil Works study being undertaken by the U.S. Army Corps of Engineers in partnership with the Galveston Island Park Board of Trustees of the City of Galveston. This Draft Detailed Project Report and Environmental Assessment (DDPR-EA) examines the potential of beneficially using sand material generated during routine maintenance dredging operations of the Galveston Harbor and Channel (GHC) to nourish beach on the west end of Galveston Island.

This plan involves beneficially using dredged material to nourish approximately 1.7 miles of beachfront on Galveston Island at Bermuda Beach seaward of the vegetation line beginning south of Sunbather Lane and stretching southwest, terminating before 11 Mile Road. Approximately 530,000 cubic yards of beach quality sand would be deposited and leveled on the beach.

On July 14, 2022, the USACE published the DDPR-EA. On the July 21, 2022, the USACE submitted a consistency determination to the GLO, as required for proposed federal activities in the state's coastal zone. USACE's Consistency Determination asserted that the proposed activities were consistent with the goals and policies of the Texas Coastal Management Program (TCMP). Upon being deemed administratively complete the GLO posted the matter for public notice and comment in the Texas Register.

After coordination between USACE and GLO staff, GLO can confirm that at this feasibility phase, the proposed project is generally consistent with the TCMP. Because the project is at the Feasibility Study stage, detailed information about project design and construction (including, but not limited to, staging locations and pipeline pathways), and the potential effects on coastal resources, has not yet been generated. Therefore, TCMP's concurrence with your consistency determination has been evaluated appropriately under the provisions of NOAA's federal consistency regulations for phased consistencies per 15 CFR §930.36(d).

Consistency determinations, broadly, are prepared when sufficient information has been developed to reasonably determine the consistency of the activity with the State's approved coastal management plan.

The consistency determination must include a detailed description of the proposed activity and foreseeable coastal effects, and comprehensive data and information sufficient to support consistency determination. When this level of detail is not available, the phased consistency provides the State agreement that the federal activity is consistent at the early stage of planning, while anticipating that additional information and decisions will be developed in later phases, such as Preconstruction Engineering and Design, and will be subject to further consistency review. The phased consistency affords the USACE and the State of Texas the opportunity to work towards full consistency as project design proceeds.

Through continued close collaboration between USACE and GLO staff to ensure continued consistency with the TCMP, GLO anticipates concurring with the full consistency determination with each phase of the project. Proceeding by way of the phased consistency determination assures that both our agencies can be successful in meeting our missions.

I look forward to continuing a close collaboration between our organizations. If you have any questions please contact me at (512) 463-7497 or at Federal.Consistency@glo.texas.gov.

Sincerely,

Leslie Koza

Leslie Koza
Federal Consistency Coordinator
Texas General Land Office

Cc: Jeff Pinsky, USACE

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

July 21, 2022

Ms. Leslie Koza
Texas General Land Office
Federal Consistency Coordinator
PO Box 12873
Austin, Texas 78711-2873

Dear Ms. Koza,

The U.S. Army Corps of Engineers Galveston District (USACE), in partnership with the City of Galveston, is conducting the Galveston Island Coastal Erosion, Galveston, TX continuing authorities study as authorized by Section 204 of the Water Resources Development Act of 2016. The study purpose is to determine interest in beneficially using dredged material for coastal storm risk management on Galveston Island beaches to benefit coastal communities and public infrastructure.

A Draft Detailed Project Report and Environmental Assessment (DDPR-EA) was prepared to present the findings and recommendations and disclose the potential impacts to the human and natural environment if the Tentatively Selected Plan (TSP) is implemented. The TSP, Alternative 2, involves placing dredged material along 1.7 miles at Bermuda Beach seaward of the line of vegetation. Material would be hydraulically dredged and pumped to the beach through a series of submerged or floating pipelines, then shaped into the template beach profile using heavy equipment (e.g., bulldozers). The DDPR-EA can be viewed on the Galveston District website at:

https://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/

Pursuant to the Coastal Zone Management Act of 1972 (Public Law 92-583, 15 CFR §930.34(a)), the USACE has prepared a consistency determination report for the TSP (Enclosure). The report documents no adverse impacts to the 16 Coastal Natural Resource Areas, of which ten occur in the project area. Additionally, consistency with the four enforceable policies that apply to this project has been demonstrated.

The USACE has concluded that the project complies with the Texas Coastal Management Program and will be conducted in a manner consistent with all rules and regulations of the program. Please accept this letter and enclosed report as a formal request to initiate the consistency review process.

If you have any questions or need additional information to conduct your review, please contact Dr. Raven Blakeway, Biologist, Environmental Branch, Regional Planning and Environmental Center at 409-790-9058 or Raven.Blakeway@usace.army.mil.

Sincerely,

Jeffrey F. Pinsky

Jeffrey F. Pinsky
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosure (1)

Enclosure

Galveston Island Coastal Erosion, Galveston, Texas

Texas Coastal Management Plan Consistency Determination

July 2022

US Army Corps of Engineers
Galveston District

Prepared by:
United States Army Corps of Engineers Regional Planning and Environmental Center

(*This page left intentionally blank*.)

TABLE OF CONTENTS

INTRODUCTION

The U.S. Army Corps of Engineers, Galveston District (USACE), in partnership with the Galveston Island Park Board of Trustees of the City of Galveston, is examining the potential of beneficially using sand material generated during routine maintenance dredging operations of the Galveston Harbor and Channel (GHC) to nourish beach on the west end of Galveston Island. Galveston Island is a placement site candidate for beach nourishment under the Corps of Engineers' beneficial use of dredge material program (§204). This Federally authorized project would not induce additional dredging beyond the Federal Standard.

The project is located on Galveston Island, a barrier island between the Gulf of Mexico and the Texas mainland, 51 miles southeast of Houston, Texas. The proposed project is located in Galveston Island's center, parallel to FM 3005, extending from 8 Mile Road southwest to 13 Mile Road (Figure 1). Two alternatives are proposed for nourishment at the study location, in which placement would occur seaward of the vegetation line. Alternative 2 extends southwest from south of Sunbather Lane to 11 Mile Road, while Alternative 3 extends southwest from Hershey Beach to Fidler Crab Lane (Figure 1).

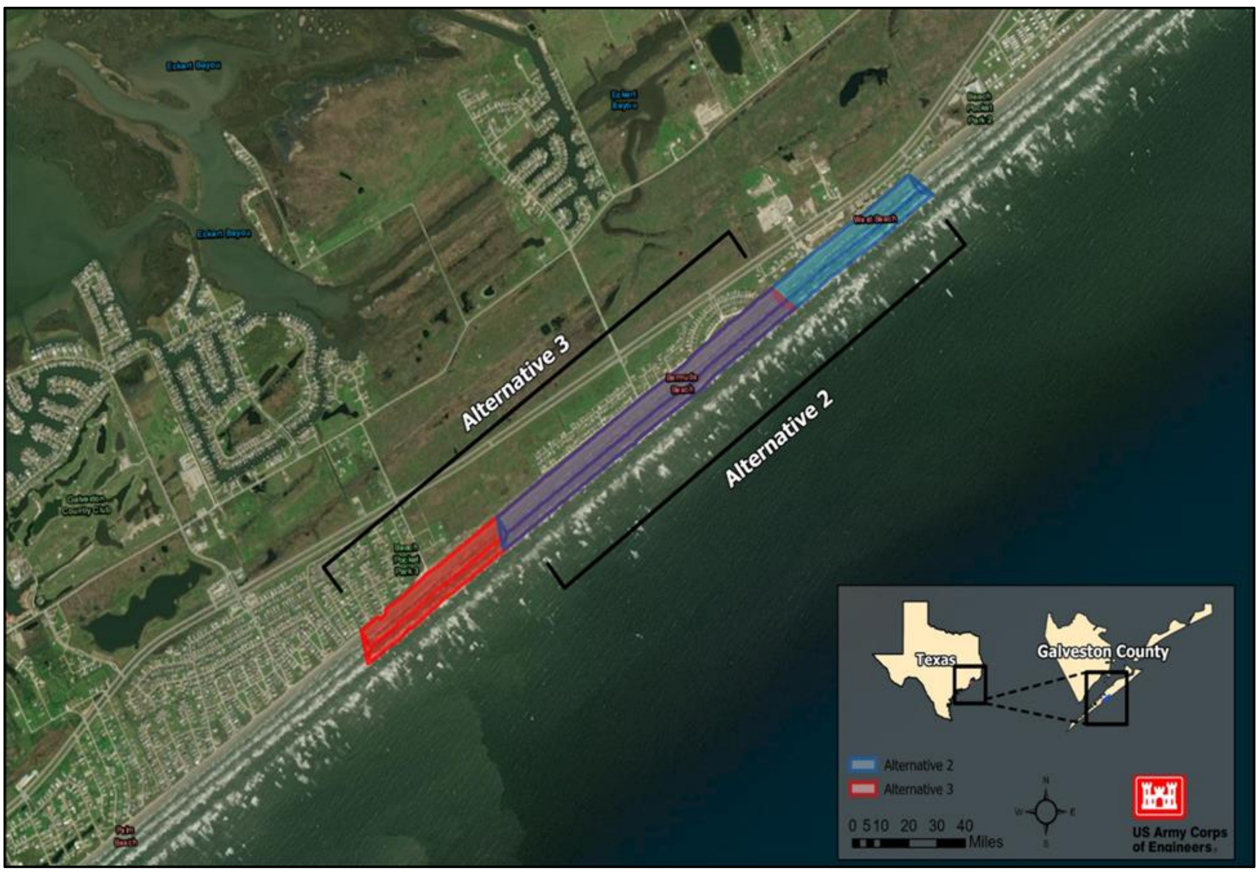


Figure 1 Study Location with proposed project alternatives in blue (Alternative 2) and red (Alternative 3). The overlap between alternatives is shown in purple.

Alternative 2 was chosen as the Tentatively Selected Plan (TSP). Dredge material is brought to the west end of Galveston Beach by hopper dredge and pumped by a pipeline for beach placement (Figure 2). Alternative 2 involves beneficially using dredged material to nourish approximately 1.7 miles of beachfront on Galveston Island at Bermuda Beach seaward of the vegetation line beginning south of Sunbather Lane and stretching southwest, terminating before 11 Mile Road. Approximately 530,000 cubic yards of beach quality sand would be deposited and leveled on the beach.

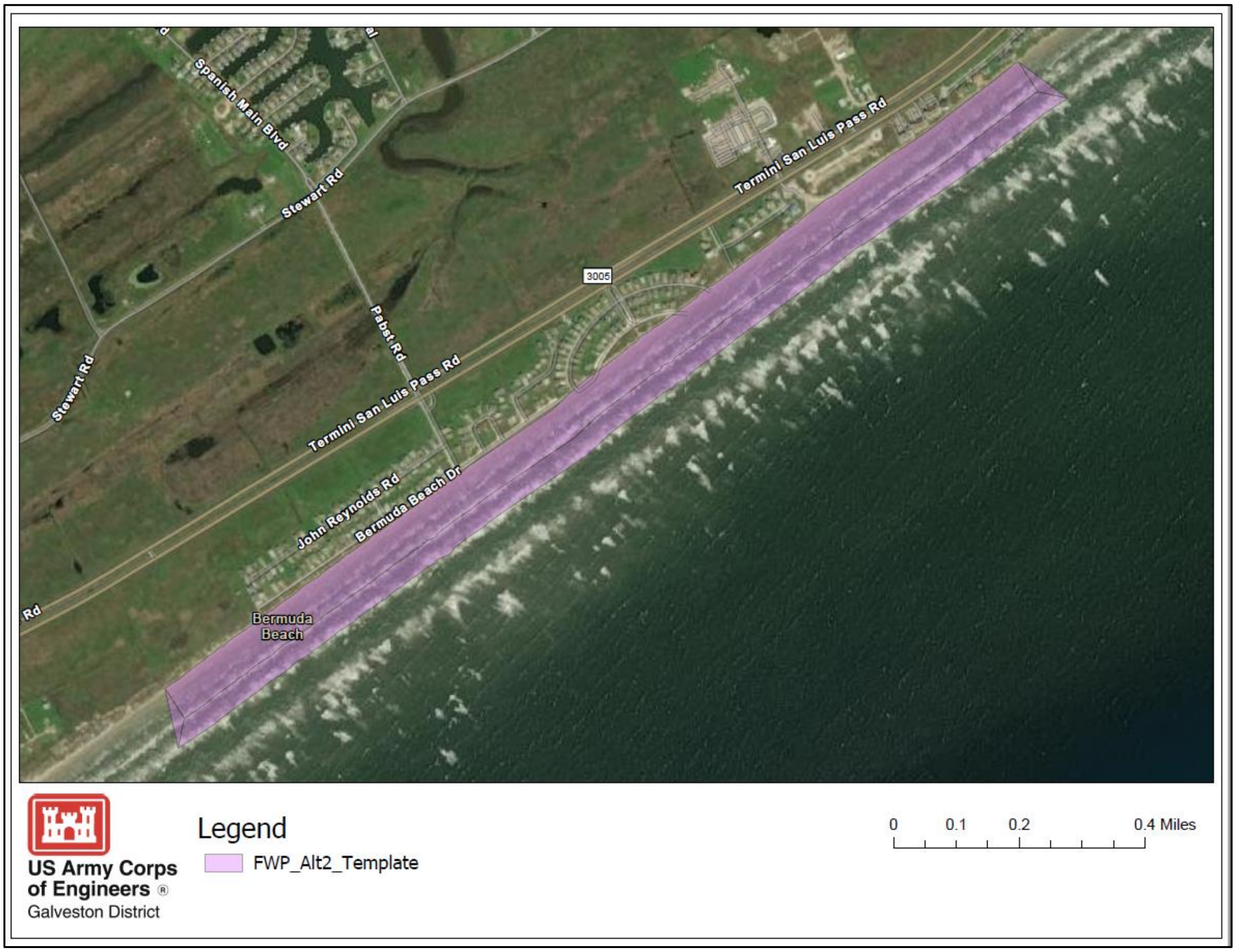


Figure 2 Project area for Alternative 2

Nourishment would be accomplished by hydraulically dredging material from GHC with a hopper dredge, pipelining the material to the beach, and using heavy equipment (e.g., bulldozers, loaders) to shape the fill on the beach into the design template (Figure 3). Any slurry discharge from the pipeline would be contained parallel to the shore using temporary sand training dikes. The dimensions of the nourished sections would include a 300-foot added berm width at +4.0 feet NAVD88 to minimize scarping, followed by a 180-foot seaward 1:20 slope to tie into the existing profile (Figure 3). Nourishment activities would be divided into multiple confined cells along the proposed area, in which shaping of the dredged material will be restricted to a single cell until completion. After construction is complete, project sites would be restored to pre-construction slope/contours.

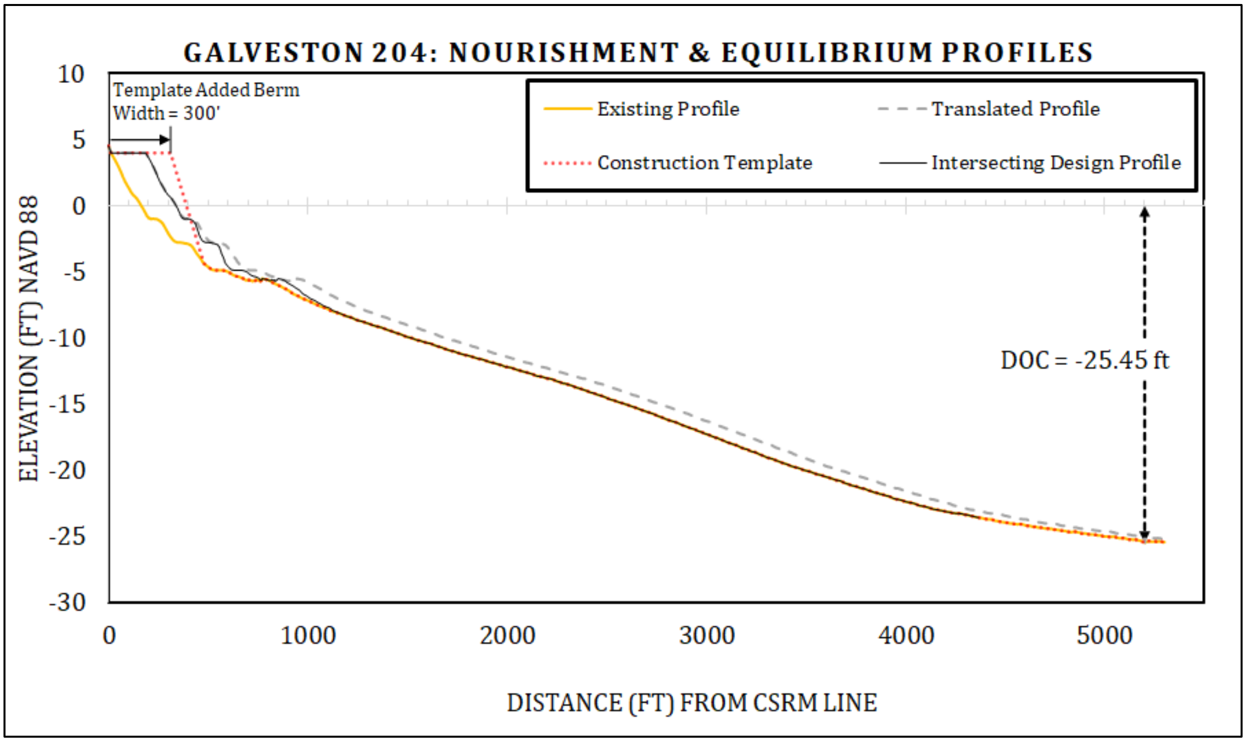


Figure 3 Profiles of the existing beach and design template for nourishment based on beach equilibrium concepts as the distance from Coastal Storm Risk Management Line (CSRM)

The TSP integrates watershed purposes of recreation, erosion protection, and critical habitat provision for migratory birds, foraging seabirds, and nesting sea turtles. It was determined to be feasible, environmentally acceptable, and economically justified based on currently available data and information developed during plan formulation, and significant institutional knowledge of beach nourishment activities. There is minimal uncertainty given available data and institutional knowledge form a construction perspective. However, uncertainties exist on site-specific, design-level details (e.g., exact sediment quantities, the extent of erosion control needs, construction staging locations, pipeline pathways, and duration of construction), which would be addressed during the pre-engineering and design phase. Additional plan details are provided in the DDPR-EA and the Engineering Appendix of the DDPR-EA (Appendix A).

Beach Placement

Material placement on the beach would involve pumping sediment directly onto the site by a dredge with pump-off capabilities. A pipeline would be routed from the dredge anchor point (i.e., pump-out location) in offshore waters (approximately 30-foot water depth) to the beach nourishment location. The pipe would be mobilized in segments of varying length (mean 40 feet) and diameter (mean 24-30 inches). Pipeline configuration would be proposed by the contractor based on performance and site conditions, then approved by USACE prior to implementation. The in-water configuration could entail a submerged pipeline, anchored by the density of the material or secured by physical means, or a floating pipeline on the surface. Pipeline configuration on the beach would be placed seaward of the vegetation line and foredune with discharges directed into the placement area. The pipe would be periodically added and removed as sections are completed. Mobilizing the pipeline requires heavy equipment and vessels to transport and connect pipe segments from the dredge anchor point to the nourishment location.

The pipeline's construction disturbance area varies depending on pipe size (diameter and length). When identifying the pipeline route, USACE would consider site content and environmental features to minimize the environmental impact of construction activities. Once heavy equipment is on the beach and the pipeline is configured, operations are generally confined to the vicinity of the mean high-water line, away from dune vegetation. However, heavy equipment is temporarily operated throughout the width of the beach during active nourish placement to manage the outflow of sediment and construct target elevations for the appropriate beach profile.

Typically, the beach nourishing process involves bulldozers and occasionally backhoes to distribute sand from the outflow of the pipeline. The dredged material exits the pipe as a sand slurry, which is defused as it is released from the terminal pipe to reduce the flow velocity onto the beach. Dikes are constructed on one or two sides of the affluent area to extend the settlement of suspended solids to reduce nearshore turbidity. As sand releases from suspension, bulldozers and backhoes distribute it evenly to prevent future ponding and erosion, ensure proper coverage of cell units, and conform to the engineered beach template.

The construction zone, consisting of the active nourishment area and heavy equipment, is encompassed by a 500-1,000-foot fenced buffer. Stakes mark the cell unit, and elevation requirements are reviewed before sand placement. As target elevations are achieved in a cell unit, construction mobilizes to the next station. Sand would not be placed in multiple cell units concurrently. Once a nourishment area is completed (generally 500-1,000-foot acceptance sections), stakes are removed from the beach and the area is restored to pre-construction conditions.

Throughout the pumping process, the contractor would be required to inspect the pipeline route to verify the pipe's integrity and fix any leaks/disruptions. During construction operations, vehicles (e.g., pickup trucks, all-terrain vehicles) and heavy equipment (e.g., bulldozers, backhoes) may traverse the beach; however, construction activities are prohibited within existing dune vegetation or other environmentally sensitive locations identified prior to construction.

Sediment

Sediment placed on the beach would be configured with beach quality sand, consistent in grain size, color, and composition as the existing beach sediment and absent of hazardous contaminants. Historical beneficial use beach nourishment projects, using material from GHC, demonstrated sand compatibility concerning grain size and organic content. Material from GHC has been evaluated using bioassay and bioaccumulation procedures. The chemical and grain size analyses, solid phase bioassays, and bioaccumulation assessments indicated that GHC material was clean and did not require treatment.

Timing

The proposed action would be authorized for a single placement. GHC maintenance dredging occurs every two years or every odd fiscal year; thus, this project's earliest available dredge cycle would appear in the fiscal year 2023. Hopper dredging and beach nourishment would be targeted to occur between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters. However, the project timeline is constrained by dredge vessel availability which could result in construction activities occurring outside the target window. Placement operations are anticipated to occur 18-24 hours per day. Project construction duration cannot increase beyond the estimated length of time it would take to bring material at a rate of 0.063 days per 10,000 cubic yards or equivalent, including dredging, transport, and discharge.

CONSISTENCY WITH THE TEXAS COASTAL MANAGEMENT PROGRAM

Transportation to and placement of the dredged material in the nourishment units will be analyzed in this document for consistency with the Texas Coastal Management Program (TCMP) policies. Dredging is not assessed in this document as it was evaluated in the Final Environmental Assessment of the Galveston Harbor Channel (GHC) Extension Feasibility Study (USACE 2016). GHC dredging and placement activities have been identified as consistent with the policies of the TCMP. The proposed actions would not exceed the dredging needs described in the GHC, or the Federal standard.

Impacts on Coastal Natural Resource Areas

Potential impacts and methods to minimize or avoid those impacts to Coastal Natural Resource Areas (CNRA's) listed in 31 Texas Administrative Code (TAC) §501.3 are addressed below. Implementation of this project would have beneficial and less than adverse impacts on ten of the 16 CRNAs. Negative impacts are expected to be localized and short-term, returning to baseline conditions after construction ceases, while beneficial impacts are localized and long-term.

Coastal Shore Areas

A coastal shore area is defined as all areas within 100 feet landward of the highwater mark on state submerged land. The Galveston Island beach selected for dredge placement is a coastal shore area. Project implementation is expected to have localized, beneficial impacts on the coastal area as nourishment would enhance the function of the coastal system by reducing erosive forces and stabilizing the shoreline to improve the protection of adjacent infrastructure.

Coastal Waters

Coastal waters are defined as water in the open Gulf of Mexico and/or under tidal influence. Temporary and localized negative impacts on coastal waters in and around the surf zone of the project area are anticipated to occur because of dredging and placement activities, including the release of suspended solids, increased turbidity, and movement of tidal sand. Impacts are expected to be less than adverse because they are localized and temporary, only lasting while active placement and sediment shaping are ongoing. Between pump-out cycles and after construction is complete, baseline conditions would return.

Critical Dune Area

A critical dune area is defined as a protected sand dune complex on the Gulf shoreline within 1,000 feet of mean high tide designated by the land commissioner under Section 63.121 of the Texas Natural Resources Code. Further, the City of Galveston established a Dune Conservation Area along the Galveston coastline, which is defined as areas along Galveston's Gulf Coast where beachfront dunes naturally occur, restored dunes may be located, and lands within 25 feet of the north toe of existing or restored dunes. Project implementation is expected to have temporary and less than adverse impacts to critical dune areas as all construction activities would occur seaward of dunes and the line of vegetation. Additionally, construction equipment would utilize existing roads and traffic corridors to transport heavy equipment to the project area. Following completion of placement activities, habitat would be restored to pre-existing conditions. This project is expected to have long-term, beneficial impacts on critical dune areas. The beach profile is being constructed to promote natural dune formation following criteria described in the City of Galveston's Erosion Response Plan (COG 2012).

Critical Erosion Area
A critical erosion area is defined as a coastal area that is experiencing historical erosion, according to the most recently published data of the Bureau of Economic Geology (BEG) of the University of Texas at Austin, that the commissioner finds to be a threat to public health, safety, and welfare; public beach use or access; general recreation; traffic safety; public property or infrastructure; private commercial or residential property; fish or wildlife habitat; or an area of regional or national importance. According to the City of Galveston's Erosion Response Plan, coastal erosion, storm events, and coastal construction projects have strongly influenced diminishing conditions along the Galveston coastline (COG 2012). Significant portions of the Galveston coastline, particularly beaches west of Stewart Road, experience an average erosion rate of >8 feet per year. According to data from the BEG, the proposed project area erodes four to six feet per year (COG 2012). This erosion rate, combined with other stressors such as storms and coastal development, impedes the ability of dune systems to protect the shoreline and landward infrastructure. This project would provide long-term, beneficial impacts to coastal erosion areas through beach nourishment activities that attempt to reduce coastal storm damage risks. Project implementation would reduce erosion rates in the project area by constructing a beach profile to promote natural dune formation following the criteria described in COG (2012).

Gulf Beach
A Gulf beach is defined as a beach bordering the Gulf of Mexico that is 1) located inland from the mean low tide line to the natural line of vegetation bordering the seaward shore of the Gulf of Mexico, or 2) part of a contiguous beach area to which the public has a right of use or easement. Long-term beneficial impacts are expected in the project area and beyond the boundaries of the project area. The introduction of sediments to create a more comprehensive beach profile would offer localized benefits by attenuating wave energies and reducing erosion into the dry beach and dune areas while protecting infrastructure behind dunes. Implementation would offer benefits beyond the project area as the additional sediments would contribute to sediment availability for longshore transport, allowing natural renourishment of other Gulf beach locations.

Special Hazard Areas
Special hazard areas are designated by the Administrator of the Federal Insurance Administration under the National Flood Insurance Act as having special flood, mudslide or mudflow, or flood-related erosion hazards and shown on a flood hazard boundary map or flood insurance rate map as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E. The project area is designated within the 1% annual chance coastal floodplain and has a VE designation on the Federal Emergency Management Agency Flood Maps for Galveston County, Texas. This project is expected to provide long-term, beneficial impacts through coastal storm damage risk reduction in the special hazard area proposed for nourishment activities. Project implementation would reduce flooding by creating a more comprehensive beach profile that allows for wave

attenuation further seaward of infrastructure. Placement activities would not change the base of floodplain elevation and thus would not cause property reclassification as a non-hazard zone. Additionally, the project is not expected to induce the development of special hazard areas or be a factor in determining building requirements in the future. This project would be one-time nourishment, only providing benefits for up to 16 years. Placement activities would not protect against higher storm surge events, as this is a one-time placement, and no permanent, hardened structures are being installed.

Submerged Land

Submerged land is defined as land located under waters under tidal influence or under waters of the open Gulf of Mexico, without regard to whether the land is owned by the state or a person other than the state. The Texas General Land Office Coastal Resources online mapping tool defines Galveston Island beaches as submerged lands. Project implementation is expected to have temporary, localized, and less than adverse impacts on submerged lands. A pipeline would be constructed to move dredged material from offshore locations to a placement site on the beach. Pipeline configuration could entail a submerged pipeline, anchored by the density of the material, or secured by physical means, that would temporarily impact submerged lands. Mobilizing the pipeline requires vessels to transport and connect pipe segments from the dredge anchor point to the nourishment location, which would also temporarily affect submerged lands. These impacts are expected to be temporary because pre-existing conditions of submerged lands would be restored upon project completion. The City of Galveston and the Texas General Land Office will enter into an agreement that will allow the General Land Office to provide USACE with an Authorization of Entry to access the beach and submerged lands.

Tidal Sand or Mud Flat

Tidal sand is defined as a silt, clay, or sand substrate, without regard to whether it is vegetated by algal mats, that occur in intertidal areas and that are regularly or intermittently exposed and flooded by tides, including tides induced by weather. The project would result in localized, temporary, and less than adverse impacts in a tidal sand area. Disturbance to tidal sands in the project area from pipeline construction, heavy equipment (to move sediment to shape the beach profile), sand training dikes (to reduce nearshore turbidity), and the sand deposit would temporarily impact tidal sands in the project area; however, these are expected to cease upon project completion. Upon completion of placement activities, tidal sands would be restored to pre-construction conditions. Project implementation would also result in long-term, localized, beneficial impacts on tidal sand because nourishment would enhance the form and function of the area by increasing sediment inputs into the system, creating critical habitat for terrestrial and marine fauna, attenuating wave energies, and reducing erosive forces thereby protecting infrastructure.

Water of the Open Gulf of Mexico

Water of the open Gulf of Mexico is defined as water in this state, as defined by Section 26.001(5), Water Code, that is part of the open water of the Gulf of Mexico and that is within the territorial limits of the state. Temporary, localized, and less than adverse impacts to water of the open Gulf of Mexico are expected in and around the surf zone of the project area from dredging and placement activities. Placement activities would release suspended solids into Gulf of

Mexico waters, increasing turbidity and decreasing water quality. Impacts on water quality are temporary as they would cease upon project completion. Effects on Gulf of Mexico waters are expected to be less than adverse during placement activities, given the high suspended solids concentration in the project area under normal conditions. Once dredging and placement activities are concluded, Gulf of Mexico waters will return to pre-existing conditions.

Water under Tidal Influence

Water under tidal influence is defined as water in this state, as defined by Section 26.001(5), Water Code, that is subject to tidal influence according to the Texas Natural Resource Conservation Commission's stream segment map, which includes coastal wetlands. Temporary, localized, less than adverse impacts are expected in and around the surf zone of the project area from dredging and placement activities. Placement activities would release suspended solids into waters under tidal influence, increasing turbidity and decreasing water quality. Impacts on water quality are temporary as they would cease upon project completion. Effects to tidally influenced waters are expected to be less than adverse during placement activities given the high suspended solids concentration in the project area under normal conditions. Once dredging and placement activities are concluded, waters under tidal influence would return to pre-existing conditions.

Other CNRA's that would not be temporarily or permanently affected by project implementation because of the lack of the resource in the proposed area, as defined by §501.3, include coastal barriers, coastal historic areas, coastal preserves, coastal wetlands, hard substrate reefs, oyster reefs, and submerged aquatic vegetation.

Enforceable Policies

Four of the 20 enforceable policies reviewed apply to this project (Table 1).

Table 1 Coastal Management Program Enforceable Policies. Bolded terms indicate enforceable policies applicable to this project and are further discussed below.

Policy	Applicability
§ 501.15 Policy for Major Actions	N/A
§ 501.16 Policies for Construction of Electric Generating and Transmission Facilities	N/A
§ 501.17 Policies for Construction, Operation, and Maintenance of Oil and Gas Exploration and Production Facilities	N/A
§ 501.18 Policies for discharges of Wastewater and Disposal of Waste from Oil and Gas Exploration and Production Activities	N/A
§ 501.19 Policies for Construction and Operation of Solid Waste Treatment, Storage, and Disposal Facilities	N/A
§ 501.20 Policies for Prevention, Response and Remediation of Oil Spills	N/A
§ 501.21 Policies for Discharge of Municipal and Industrial Wastewater to Coastal Waters	N/A
§ 501.22 Policies for Nonpoint Source (NPS) Water Pollution	N/A
§ 501.23 Policies for Development in Critical Areas	**Yes**
§ 501.24 Policies for Construction of Waterfront Facilities and Other Structures on Submerged Lands	N/A
§ 501.25 Policies for Dredging and Dredged Material Disposal and Placement	**Yes**

§ 501.26 Policies for Construction in the Beach/Dune System	**Yes**
§ 501.27 Policies for Development in Coastal Hazard Areas	Yes
§ 501.28 Policies for Development Within Coastal Barrier Resource System Units and Otherwise Protected Areas on Coastal Barriers	N/A
§ 501.29 Policies for Development in State Parks, Wildlife Management Areas or Preserves	N/A
§ 501.30 Policies for Alteration of Coastal Historic Areas	N/A
§ 501.31 Policies for Transportation Projects	N/A
§ 501.32 Policies for Emission of Air Pollutants	**Yes**
§ 501.33 Policies for Appropriations of Water	N/A
§ 501.34 Policies for Levee and Flood Control Projects	N/A

§ 501.23 Policies for Development in Critical Areas

a) Dredging and Construction of structures in, or the discharge of dredged or fill material into, critical areas shall comply with the policies in this section. In implementing this section, cumulative and secondary adverse effects of these activities will be considered.

(1) The policies in this section shall be applied in a manner consistent with the goal of achieving no net loss of critical area functions and values.

Compliance: There is no net loss of critical area functions and values. The plan aims to restore critical areas and minimize future loss and general area degradation from irreversible cultural modifications (e.g., altered hydrologic regimen) to the coastal system.

(2) Persons proposing development in critical areas shall demonstrate that no practicable alternative with fewer adverse effects is available.

Compliance: All measures with more significant impacts were screened from further inclusion in the alternatives during plan formulation. The TSP takes advantage of sediment from existing dredging cycles from the GHC, allowing the material to be beneficially used and to remain within the system, rather than permanent removal by placement in an upland or offshore disposal site. There is sufficient material, in quantity and quality, from maintenance dredging; thus, there is no demonstrated need to do an out-of-cycle dredging operation or borrow offshore source material. The TSP was based on the critical need for nourishment and coastal storm risk reduction along this beach segment. Given the project design, with the beneficial use of dredge material (BUDM) and selecting the most critical area for nourishment, there is no practicable alternative with fewer adverse effects that provide the same risk reduction benefits.

(3) In evaluating practicable alternatives, the following sequence shall be applied:

(A) Adverse effects on critical areas shall be avoided to the greatest extent practicable.
(B) Unavoidable adverse effects shall be minimized to the greatest extent practicable by limiting the degree or magnitude of the activity and its implementation.
(C) Appropriate and practicable compensatory mitigation shall be required to the greatest extent practicable for all adverse effects that cannot be avoided or minimized.

Compliance: There are no anticipated adverse effects to critical areas per §501.3. Implementing the TSP would result in long-term, beneficial impacts on critical areas, specifically critical dune, and erosion areas. The introduction of sediments would create a more comprehensive beach profile that offers localized benefits by attenuating wave energies and reducing erosion into critical dune areas. Nourishment would attempt to reduce coastal storm damage risks, by creating sacrificial erosion areas that protect the existing dunes and shoreline. This project would promote the natural development of critical areas by shaping placed sediment into a beach profile that stimulates natural dune formation. These beneficial impacts to critical areas are expected for at least 16 years. After this time, pre-existing conditions could revert, and shoreline loss would resume already affected areas.

(4) *Compensatory mitigation includes restoring adversely affected critical areas or replacing adversely affected critical areas by creating new critical areas. Compensatory mitigation should be undertaken, when practicable, in areas adjacent or contiguous to the affected critical areas (on-site)…*
(5) *Mitigation banking is acceptable compensatory mitigation if use of the mitigation bank has been approved by the agency authorizing the development and mitigation credits are available for withdrawal…*
(6) *In determining compensatory mitigation requirements, the impaired functions and values of the affected critical area shall be replaced on a one-to-one ratio…*

Compliance: There is no net loss of critical areas; therefore, no mitigation is needed. All negative impacts are temporarily occurring only during the construction periods. Long-term permanent effects are beneficial, resulting in a net increase in function and value of the critical areas.

(7) Development in critical areas shall not be authorized if significant degradation of critical areas will occur. Significant degradation occurs is:

(A) *The activity will jeopardize the continued existence of species listed as endangered or threatened, or will result in likelihood of the destruction or adverse modification of a habitat determined to be a critical habitat under the Endangered Species Act, 16 United States Code Annotated, §§1531-1544;*
(B) *the activity will cause or contribute, after consideration of dilution and dispersion, to violation of any applicable surface water quality standards established under §501.21 of this title;*
(C) *the activity violates any applicable toxic effluent standard or prohibition established under §501.21 of this title;*
(D) *the activity violates any requirement improved to protect a marine sanctuary designated under the Marine Protection, Research, and Sanctuaries Act of 1972, 33 United States Code Annotated, Chapter 27; or*
(E) *taking into account the nature and degree of all identifiable adverse effects, including their persistence, permanence, areal extent, and the degree to which these effects will have been mitigated pursuant to subsections (c) and (d) of this section, the activity will, individually or collectively, cause or contribute to significant adverse effects on:*

(i) human health and welfare, including effects on water supplies, plankton, benthos, fish, shellfish, wildlife, and consumption of fish and wildlife;
(ii) the life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, or spread of pollutants or their byproducts beyond the site, or their introduction into an ecosystem, through biological, physical, or chemical processes;
(iii) ecosystem diversity, productivity, and stability, including loss of fish and wildlife habitat or loss of the capacity of a coastal wetland to assimilate nutrients, purify water, or reduce wave energy; or
(iv) generally accepted recreational, aesthetic or economic values of the critical area which are of exceptional character and importance.

Compliance: The project would not cause adverse effects on human health and welfare or any of the natural resources or systems listed above. The project does not occur in a wetland system and thus would not reduce ecosystem diversity, productivity, or the capacity of to assimilate nutrients, purify water, or reduce wave energy. The project could improve ecosystem diversity and productivity, by increasing the capacity of the tidal flat to function.

b) The TCEQ and the RRC shall comply with the policies in this section when issuing certifications and adopting rules under Texas Water Code, Chapter 26, and the Texas Natural Resources Code, Chapter 91, governing certification of compliance with surface water quality standards for federal actions and permits authorizing development affecting critical areas; provided that activities exempted from the requirement for a permit for the discharge of dredge or fill material, described in Code of Federal Regulations, Title 33, §323.4 and/or Code of Federal Regulations, Title 40, §232.3, including…shall not be considered activities for which a certification in required. The GLO and the SLB shall comply with the policies in this section when approving oil, gas, or other mineral lease plans of operation or granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapters 32, 33, and 51-53, and Texas Water Code, Chapter 61, governing development affecting critical areas on state submerged lands and private submerged lands, and when issuing approval and adopting rules under Texas Natural Resources Code, Chapter 221, for mitigation banks operated by subdivisions of the state.

Compliance: A 404(b)(1) analysis has been prepared and will be submitted to TCEQ for approval.

c) Agencies required to comply with this section will coordinate with one another and with federal agencies when evaluating alternatives, determining appropriate and practicable mitigation, and accessing significant degradation. Those agencies' rules governing authorizations for development in critical areas shall require a demonstration that the requirements of subsection (a)(1)-(7) of this section have been satisfied.

Compliance: Coordination has been conducted with U.S. Fish and Wildlife Service, National Marine Fisheries Service, Texas Parks and Wildlife Department, Texas General Land Office, Texas Commission on Environmental Quality, and Texas Historical Commission. The Environmental Protection Agency has been notified of the project and provided opportunities to comment but has not been involved in project planning.

d) *For any dredging or construction of structures in, or discharge of dredge or fill material into, critical areas that is subject to the requirements of §501.15 of this title (relating to Policy for Major Actions), data and information on the cumulative and secondary adverse affects of the project need not be produced or evaluated to comply with this section if such data and information is produced and evaluated in compliance with §501.15(b)-(c) of this title.*

Compliance: The project complies with §501.15(b) – (c).

§501.25 Policies for Dredging and Dredged Material and Placement

a) *Dredging and the disposal and placement of dredge material shall avoid and otherwise minimize adverse effects to coastal waters, submerged land, critical areas, coastal shore areas, and Gulf beaches to the greatest extent practicable. The policies of this section are supplement to any further restrictions or requirements relating to the beach access and use rights of the public. In implementing this section, cumulative and secondary adverse effects of dredging and the disposal and the placement of dredge material and the unique characteristics of affected sites shall be considered.*

Compliance: Dredged material would be beneficially used to restore beach in an area that succumbs to high annual erosion rates, to reduce erosive forces, enhance natural dune formation, and offer protection to landward infrastructure. Placement in each restoration unit would have localized, temporary, and less than adverse effects on all natural resource areas listed in §50125 (a). Temporary impacts could include but are not limited to an increase in turbidity and suspended solids, burying/smothering of benthic organisms, movement of tidal sand, heavy equipment use, and restrictions to the use of specific areas. These are expected to be localized and restored to normal conditions once placement activities are completed.

(1) *Dredging and dredged material disposal and placement shall not cause or contribute, after consideration of dilution and dispersion, to violation of any applicable surface water quality standards established under §501.21 of this title.*

Compliance: Dredging activities would cause temporary, localized, and less than adverse impacts to surface water quality through increased turbidity and suspended solids, thereby degrading water quality. Water in and around the project area regularly exceeds the Total Suspended Solids (TSS) threshold, as defined by the Texas Commission for Environmental Quality (TCEQ; <300 milligrams per liter), under natural conditions. Additionally, based on available data, there is no indication of current water or elutriate contaminant problems known from the dredged site, Galveston Harbor and Channel (GHC). Previous analyses indicated no toxicity or contamination to sensitive marine water column organisms would occur due to this dredging activity.

(2) *Except as otherwise provided in paragraph (4) of this subsection, adverse effects on critical areas from dredging and dredged material disposal or placement shall be avoided and otherwise minimized, and appropriate and practicable compensatory mitigation shall be required, in accordance with §501.23 of this title.*

Compliance: Project implementation would not result in any long-term, permanent, or irreversible adverse effects on CNRAs and would realize a net increase in critical areas (e.g., tidal flats); therefore, no compensatory mitigation is needed. Placement of BUDM into critical areas would restore function to the affected CNRAs and improve the overall system.

(3) Except as provided in paragraph (4) of this subsection, dredging and the disposal and placement of dredged material shall not be authorized if:

(A) there is a practicable alternative that would have fewer adverse effects on coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches, so long as that alternative does not have other significant adverse effects;

(B) all appropriate and practicable steps have not been taken to minimize adverse effects on coastal waters submerged lands, critical areas, coastal shore areas, and Gulf beaches; or

(C) significant degradation of critical areas under §501.23(a)(7)(E) of this title would result.

Compliance: Critical and coastal shore areas would be temporarily affected by the project during construction, but not result in a long-term net loss of any of the resources that make up these areas. The project has net environmental benefits that would result from reintroducing sediments to the shoreline and widening the beach profile, which would restore the form and function of critical and coastal shore areas. Construction activities have been minimized to the greatest extent practicable, including reducing the overall construction footprint to only what is necessary and seasonal timing restrictions to avoid breeding/spawning and migrating fish and wildlife impacts to the greatest extent practicable.

(4) A dredging or dredged material disposal or placement project that would be prohibited solely by application of paragraph (3) of this subsection may be allowed if it is determined to be of overriding importance to the public and national interest in light of economic impacts on navigation and maintenance of commercially navigable waterways.

Compliance: Placement is not precluded by paragraph (3), as noted above.

b) Adverse effects from dredging and dredged material disposal and placement shall be minimized as required in subsection (a) of this section. Adverse effects can be minimized by employing the techniques in this subsection where appropriate and practicable.

(5) Adverse effects from dredging and dredge material disposal and placement can be minimized by controlling the location and dimensions of the activity. Some of the ways to accomplish this include:

Compliance: Placement of material onto the beach does not induce adverse effects. Temporary impacts associated with placement have been minimized to the greatest extent possible by employing Best Management Practices and minimization and conservation measures prescribed by TCEQ and U.S. Fish and Wildlife Services. See compliance discussions found in section (a) above.

(A) locating and confining discharges to minimize smothering of organisms;

(B) locating and designing projects to avoid adverse disruption of water inundation patterns, water circulation, erosion and accretion processes, and other hydrodynamic processes;

(C) using existing or natural channels and basins instead of dredging new channels or basins, and discharging materials in areas that have been previously disturbed or used for disposal or placement of dredged material;
(D) limiting the dimensions of channels, basins, and disposal and placement sites to the minimum reasonably required to serve the project purpose, including allowing for reasonable overdredging of channels and basins, and taking into account the need for capacity to accommodate future expansion without causing additional adverse effects;
(E) discharging materials at sites where the substrate is composed of material similar to that being discharged;
(F) locating and designing discharges to minimize the extent of any plume and otherwise dispersion of material; and
(G) avoiding the impoundment or drainage of critical areas.

Compliance: Open water impacts are minimized by placing dredge material on beaches. Can provide all dredged material requirements to implement the project through existing maintenance dredging cycles, so no modifications to the channel (e.g., widening or deepening, or more frequent dredging) are required to ensure enough sediment to implement. The project's nourishment features were designed to improve ecological functions of CNRAs, including proper drainage and suitable substrate material for species composition, and increase resiliency and sustainability to future conditions. Discharges would be confined with temporary sand training dikes to minimize release into adjacent areas. The sand training dikes would be breached after the sediments have settled and not result in any long-term impoundment or drainage changes to critical areas.

(6) Dredging and disposal and placement of material to be dredged shall comply with applicable standards for sediment toxicity. Adverse effects from constituents contained in materials discharged can be minimized by treatment of or limitations on the material itself. Some ways to accomplish this include;

(A) disposal or placement of dredged material in a manner that maintains physiochemical conditions at discharge sites and limits or reduces the potency and availability of pollutants;
(B) limiting the solid, liquid, and gaseous components of material discharged;
(C) adding treatment substances to the discharged material; and
(D) adding chemical flocculants to enhance the deposition of suspended particulates in confined disposal areas.

Compliance: Sediments dredged from the GHC have been tested for various chemical parameters of concern. Samples yielded no cause for concern, and sediments are safe for beneficial use. Additional details are provided in the DDPR-EA and Appendix C (CWA Appendix).

(7) Adverse effects from dredging and dredged material disposal or placement can be minimized through control of the materials discharged. Some ways of accomplishing this include:

(A) use of containment levees and sediment basins designed, constructed, and maintained to resists breaches, erosion, slumping, or leaching;

(B) use of lined containment areas to reduce leaching where leaching of chemical constituents from the material is expected to be a problem;
(C) capping in-place contaminated material or, selectively discharging the most contaminated material first and then capping it with the remaining material;
(D) properly containing discharged material and maintaining discharge sites to prevent point and nonpoint pollution; and
(E) timing the discharge to minimize adverse effects from unusually high water flows, wind, wave, and tidal actions.

Compliance: Small, temporary sand training dikes would be created during beach nourishment efforts to limit the movement of sediments outside the placement site. After all ground disturbing activities are complete and the site has sufficiently settled, the dike would be mechanically breached. Beach nourishment measures may have some temporary and local impacts by increasing turbidity; however, material generated from construction activities has been tested and found not to contain harmful concentrations of pollutants. Discharges would not occur during conditions involving high water flows, waves, or tidal actions.

(8) Adverse effects from dredging and dredged material disposal or placement can be minimized by controlling the manner in which material is dispersed. Some ways of accomplishing this include:

(A) where environmentally desirable, distributing the material in a thin layer;
(B) orienting material to minimize undesirable obstruction of the water current or circulation patterns;
(C) using silt screens or other appropriate methods to confine suspended particulates or turbidity to a small area where settling or removal can occur;
(D) using currents and circulation patterns to mix, disperse, dilute, or otherwise control the discharge;
(E) minimizing turbidity by using a diffuser system or releasing material near the bottom;
(F) selecting sites or managing discharges to confine and minimize the release of suspended particulates and turbidity and maintain light penetration for organisms; and
(G) setting limits on the amount of material to be discharged per unit of time or volume of receiving waters.

Compliance: All sites minimize or avoid adverse dispersal effects to the greatest extent practicable during construction. Material to be used for nourishment would be hydraulically discharged at specific discharge points. Would mechanically move the material with heavy equipment, reducing material dispersal into undesirable areas. Temporary sand training dikes would be constructed around nourishment units to limit the movement of sediments outside of the intended placement area. After all ground disturbing activities are complete and the site has sufficiently settled, the dike would be mechanically breached. There are no sediments of concern.

(9) Adverse effects from dredging and dredged material disposal or placement operations can be minimized by adapting technology to the needs of each site. Some ways of accomplishing this include:

(A) using appropriate equipment, machinery, and operating techniques for access to sites and transport of material, including those designed to reduce damage to critical areas;
(B) having personnel on site adequately trained in the avoidance and minimization techniques and requirements; and
(C) designing temporary and permanent access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement.

Compliance: Dredged material placement into the nourishment areas would minimize impacts to the greatest extent practicable including but not limited to siting pumps and pipes outside of environmentally sensitive and critical areas where possible; utilizing existing access roads to move material, equipment and personnel; and employing Best Management Practices (BMPs) to avoid adverse impacts. During Pre-construction Engineering and Design (PED), practices to further reduce environmental impacts on all areas and resources will be considered and employed to the greatest extent practicable.

(10) Adverse effects from dredging and dredged material disposal or placement operations can be minimized by adapting technology to the needs of each site. Some ways of accomplishing this include:

(A) avoiding changes in water current and circulation patterns that would interfere with the movement of animals;
(B) selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species that have a competitive edge ecologically over indigenous plants or animals;
(C) avoiding sites having unique habitat or other value, including habitat of endangered species;
(D) using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics;
(E) using techniques that have been demonstrated to be effective in the circumstances similar to those under consideration whenever possible and, when proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiating their use on a small scale to allow corrective action if unanticipated adverse effects occur;
(F) timing dredging and dredged material disposal or placement activities to avoid spawning or migration seasons and other biologically critical time periods; and
(G) avoiding the destruction of remnant natural sites within areas already affected by development.

Compliance: The project would be designed and implemented in such a way to avoid adverse impacts to plant and animal populations and their habitat to the greatest extent practicable, including but not limited to seasonal timing restrictions, using existing access roads, employing construction BMPs, siting pumps and pipes in areas that would have the slightest disturbance on the overall system, and utilizing the smallest construction footprint possible. The project is intended to enhance the natural form and function of the coastal system; therefore, all long-term impacts are expected to be beneficial by increasing suitable habitat, resiliency, and sustainability.

(11) Adverse effects on human use potential from dredging and dredged material disposal or placement can be minimized by:

(A) selecting sites and following procedures to prevent or minimize any potential damage to the aesthetically pleasing features of the site, particularly with respect to water quality;
(B) selecting sites which are not valuable as natural aquatic areas;
(C) timing dredging and dredged material disposal or placement activities to avoid the seasons or periods when human recreational activity associated with the site is most important; and
(D) selecting sites that will not increase incompatible human activity or require frequent dredge or fill maintenance activity in remote fish and wildlife areas.

Compliance: Placement of dredged material into nourishment sites may adversely impact the human environment in and around the placement sites by visually disturbing the scenic view with construction equipment and activity, increasing noise, and reducing the number of recreational opportunities. These impacts would be temporary, only lasting the time for the material to be appropriately placed and for the area to stabilize. Timing of construction is entirely dependent on dredging cycles; however, during PED, it would be advised to avoid the peak recreational seasons (spring/summer) if possible. After construction is complete, recreation and scenic value are expected to increase through increased recreational areas and opportunities (i.e., more beach=more beachgoers).

(12) Adverse effects from new channels and basins can be minimized by locating them at sites:

(A) that ensure adequate flushing and avoid stagnant pockets; or
(B) that will create the fewest practicable adverse effects on CNRAs from additional infrastructure such as roads, bridges, causeways, piers, docks, wharves, transmission line crossing, and ancillary channels reasonably likely to be constructed as a result of the project; or
(C) with the least practicable risk that increased vessel traffic could result in navigation hazards, spills or other forms of contamination which could adversely affect CNRAs;
(D) provided that, for any dredging of new channels or basins subject to the requirements of §501.15 of this title (relating to Policy for Major Actions), data and information on minimization of secondary adverse effects need not be produced or evaluated to comply with this paragraph if such data and information is produced and evaluated in compliance with §501.15(b)(1) of this title.

Compliance: The project does not include constructing new channels or basins; therefore, §501.25(8)(A-D) does not apply.

c) Disposal or placement of dredged material in existing contained dredge disposal sites identified and actively used as described in an environmental assessment or environmental impact statement issued prior to the effective date of this chapter shall be presumed to comply with the requirements of subsection (a) of this section unless modified in design, sign, use, or function.

d) Dredged material from dredging projects in commercially navigable waters is a potentially reusable resource and must be used beneficially in accordance with this policy.

(1) If the costs of beneficial use of dredged material area reasonably comparable to the costs of disposal in a non-beneficial manner, the material shall be used beneficially.

(2) If the costs of the beneficial use of dredged material are significantly greater than the costs of disposal in a non-beneficial manner, the material shall be used beneficially unless it is demonstrated that the costs of using the material beneficially are not reasonably proportionate to the costs of the project and benefits that will result. Factors that shall be considered in determining whether the costs of the beneficial use are not reasonably proportionate to the benefits include but are not limited to:

(A) environmental benefits, recreational benefits, floor or storm protection benefits, erosion prevention benefits, and economic development benefits;
(B) the proximity of the beneficial use site to the dredge site; and
(C) the quantity and quality of the dredged material and its suitability for beneficial use.

(3) Examples of the beneficial use of dredged material include, but are not limited to:

(A) projects designed to reduce or minimize erosion or provide shoreline protection;
(B) projects designed to create or enhance public beaches or recreational areas;
(C) projects designed to benefit the sediment budget or littoral system;
(D) projects designed to improve or maintain terrestrial or aquatic wildlife habitat;
(E) projects designed to create new terrestrial or aquatic wildlife habitat, including the construction of marshlands, coastal wetlands, or other critical areas;
(F) projects designed and demonstrated to benefit benthic communities or aquatic vegetation;
(G) projects designed to create wildlife management areas, parks, airports, or other public facilities;
(H) projects designed to cap landfills or other water disposal areas;
(I) projects designed to fill private property or upgrade agricultural land, if cost-effective public beneficial uses are not available; and
(J) projects designed to remediate past adverse impacts on the coastal zone.

e) If dredged material cannot be used beneficially as provided in subsection (d)(2) of this section, to avoid and otherwise minimize adverse effects as required in subsection (a) of this section, preference will be given to the greatest extent practicable to disposal in…

Compliance: Dredged material would be beneficially used to nourish the beach habitat throughout the project area; therefore, the project is consistent with §501.25(d)(1 –3). Policies §501.25(c) and §501.25(e)(1 –3) do not apply to this project.

f) *For new sites, dredged materials shall not be disposed of or placed directly on the boundaries of submerged lands or at such location so as to slump or migrate across the boundaries of submerged lands in the absence of an agreement between the affected public owner and the adjoining private owner or owners that defined the location of the boundary or boundaries affected by the deposition of the dredged material.*

Compliance: Dredged materials would not be placed directly on submerged lands. If, during PED, it is identified that placement would occur on submerged lands, appropriate real estate agreements would be drafted and in place before construction to ensure all landowners are appropriately notified and compensated for any loss or impacts.

g) *Emergency dredging shall be allowed without a prior consistency determination as required in the applicable consistency rule when…*

Compliance: An emergency does not exist with implementation of the project. Consistency of the project with program policy would be determined prior to project authorization.

h) *Mining of sand, shell, marl, gravel, and mudshell on submerged lands shall be prohibited unless there is an affirmative showing of no significant impact on erosion within the coastal zone and no significant adverse effect of coastal water quality or terrestrial and aquatic wildlife habitat within a CNRA.*

Compliance: Project activities do not involve mining for shell, marl, gravel, or mud shell; however, sand would be dredged from bay bottoms of the GHC for use in nourishment units. Dredging sand from this location has already been addressed in other documents.

i) *The GLO and the SLB shall comply with the policies in this section when approving oil, gas, and other mineral lease plans of operation and granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapter 32, 33, and 51 – 53, and Texas Water Code, Chapter 61, for dredging and dredge material disposal and placement TxDOT shall comply with the policies in this subchapter when adopting rules and taking actions as local sponsor of the Gulf Intracoastal Waterway under Texas Transportation Code, Chapter 51. The TCEQ and the RRC shall comply with the policies in this section when issuing certifications and adopting rules under Texas Water Code, Chapter 26, and the Texas Natural Resources Code, Chapter 91, governing certification of compliance with surface water quality standards for federal actions and permits authorizing dredging or the discharge or placement of dredged material. The TPWD shall comply with the policies in this section when adopting rules at Chapter 57 of this title (relating to Fisheries) governing dredging and dredged material disposal and placement. TPWD shall comply with the policies in subsection (h) of this section when adopting rules and issuing permits under Texas Parks and Wildlife Code, Chapter 86, governing the mining of sand, shell, marl, gravel, and mudshell.*

Compliance: This project does not involve oil, gas, and other mineral lease plans of operation or granting of surface leases, easements, or permits; therefore, §501.25(i) does not apply.

§501.26 Policies for Construction in the Beach/Dune System

a) *Construction in critical dune areas or areas adjacent to or on Gulf beaches shall comply with the following policies:*

(1) *Construction within a critical dune area that results in the material weakening of dunes and material damage to dune vegetation shall be prohibited.*

(2) *Construction within critical dune areas that does not materially weaken dunes or materially damage dune vegetation shall be sited, designed, constructed, maintained, and operated so that adverse "effects" (as defined in §15.2 of this title (relating to Coastal Area Planning) on the sediment budget and critical dune areas are avoided to the greatest extent practicable. For purposes of this section, practicability shall be determined by considering the effectiveness, scientific feasibility, and commercial availability of the technology or technique. Cost of the technology or technique shall also be considered. Adverse effects (as defined in Chapter 15 of this title (relating to Coastal Area Planning) that cannot be avoided shall be:*

(A) *minimized by limiting the degree or magnitude of the activity and its implementation;*
(B) *rectified by repairing, rehabilitating, or restoring the adversely affected dunes and dune vegetation; and*
(C) *compensated for on-site or off-site by replacing the resources lost or damaged seaward of the dune protection line.*

Compliance: Localized, temporary, and less than adverse impacts are expected with nourishment activities as all dredged material placement would occur seaward of dunes and the vegetation line. Heavy equipment and construction vehicles will use established corridors and roads to avoid traffic across dune systems. The addition of sand to the existing beach profile would benefit critical dune areas as it would be constructed with a beach profile designed to promote natural dune development.

(3) *Mitigation and compensation for adverse effects that cannot be avoided or minimized shall provide at least a one-to-one replacement of the dune volume and vegetative cover, and preference shall be given to stabilization of blowouts and breaches and on-site compensation.*

Compliance: The project would not involve any short- or long-term adverse impacts which would require mitigation.

(4) *The ability of the public, individually and collectively, to exercise its rights of use of and access to and from public beaches shall be preserved and enhanced.*

Compliance: The project would temporarily restrict public access to the beach in areas of construction activities; however, it will minimize this to the best extent possible (i.e., the size of restricted construction areas) and will restore regular public access to the beach after construction activities are completed.

(5) *Non-structural erosion response methods such as beach nourishment, sediment bypassing, nearshore sediment berms, and planting of vegetation shall be preferred instead of structural erosion response methods. Subdivisions shall not authorize the construction of a new erosion response structure within the beach/dune system, except as provided by subsection (b) of this section or a retaining wall located more than 200 feet landward of the line of vegetation. Subdivisions shall not authorize the enlargement, improvement, repair or maintenance of existing erosion response structures on the public beach. Subdivisions shall not authorize the repair or maintenance of existing erosion response structures within 200 feet landward of the*

line of vegetation except as provided in §15.6(d) of this title (relating to Concurrent Dune Protection and Beachfront Construction Standards).

Compliance: The project does not involve the construction of any hardened structures, rather relies on non-structural measures to achieve risk reduction goals.

b) Construction of structural shore protection projects, including geotextile shore protection projects, in critical dune areas or areas adjacent to or on Gulf Beaches shall comply with the following policies:

(1) The size and the length of a shore protection project shall be determined as part of a site-specific construction and maintenance plan, taking into account both technical requirements and policy issues as described under this subsection, and shall be limited to the minimum size necessary to fulfill the project's goals and purposes.

Compliance: The size of the beach being constructed was developed using several sources of information, including size of successful past nourishment activities, rate of shoreline retreat, and beach profile criteria that promote dune formation and reduce erosive forces for the area. This project is intended to be a one-time activity to offer risk reduction for 16 years, after which time, pre-existing conditions may occur.

(2) A shore protection project shall only be used to protect community developments, public infrastructure, and for other lawful public purposes and shall not be used solely to protect individual structures or properties. A community development may include a neighborhood or aggregation of residences or commercial structures.

Compliance: The project indirectly protects community developments and public infrastructure by widening the beach profile to support coastal storm risk reduction. The project offers enhanced protection against erosive forces that rapidly and naturally encroach on landward infrastructure in the area. However, this does not predicate the threat of storms and/or natural disasters.

(3) A shore protection project located parallel to the shore shall be located landward of the boundary of state-owned submerged land as determined by a coastal boundary survey conducted in accordance with Texas Natural Resources Code §33.136, and shall avoid and otherwise minimize adverse effects to dunes and dune vegetation.

Compliance: This project would not induce short- or long-term adverse impacts on submerged lands or dunes. It would limit the short-term effects of construction activities across submerged lands and restrict it to placement and movement of pipeline equipment. All nourishment activities would occur landward of the boundary of state-owned submerged lands. Short-term impacts would cease after construction is complete. Dune systems will be avoided during construction activities with this project; instead long-term, beneficial effects are expected for dunes by building a beach profile that meets the criteria to promote natural dune growth and enhancement.

(4) *To maximize the protection offered by a shore protection project, to enhance the survivability of the project, and to minimize adverse effects to natural resources, a shore protection project shall be located according to the following preferred order:*

(A) *In an area where a foredune ridge is present, where practicable, a shore protection project shall be located landward of the foredune ridge;*
(B) *Where there is no foredune ridge, a project shall be located landward of the line of vegetation, where practicable;*
(C) *Where it is not practicable to locate a shore protection project landward of the line of vegetation, a project shall be located at the line of vegetation; or*
(D) *Where there is no other practicable location, a shore protection project shall be located at the most landward point of the public beach provided that the project sponsor has provided financial assurance that the pre-project beach width will be maintained through beach nourishment.*

Compliance: This project would be located seaward of the line of vegetation and would follow the current alignment of the beach and dune systems. Beach nourishment would provide long-term, beneficial protection to the dune system.

(5) *A shore protection project shall not adversely affect sea turtle nesting areas or an endangered species.*

Compliance: A Biological Opinion (BO) was issued by the U.S. Fish and Wildlife Services (USFWS) to permit USACE to perform beach nourishment on Galveston Island, Galveston County, TX under permit SWG-2007-01025. This BO addressed the effects on endangered Kemp's ridley sea turtles, piping plovers, and threatened red knots in accordance with Section 7 of ESA that have the potential to occur in the project area. USACE determined the proposed project would not effect the threatened West Indian Manatee, endangered Attwater's greater prairie chicken, and endangered leatherback sea turtle; thus, no coordination or contact with USFWS was necessary. USFWS concurred with USACE in their BO, dated June 17, 2019, that associated onshore activities of the proposed project may affect, but are not likely to adversely affect the endangered green sea turtle, hawksbill sea turtle, or the threatened loggerhead sea turtle. For additional details about species-specific effects, refer to the BO in the DDPR-EA (Appendix C). No long-term or permanent adverse effects are anticipated, and any short-term effects would be temporary (limited to the construction period) and less than adverse. During constructions, BMPs and conservation measures would be employed to further reduce negative impacts. After construction, placement areas are expected to increase habitat value and beneficially impact fish and wildlife species by increasing suitable foraging, nesting, and migration habitat.

(6) *Shore protection projects shall not be constructed on stable or accreting beaches.*

Compliance: The project area has been experiencing significant shoreline erosion at 4 to 6 feet per year. No shoreline accretion has been recorded for the project area.

(7) A shore protection project shall be designed to avoid and otherwise minimize any adverse effects to adjacent beaches or properties at either end of a project.

Compliance: The project would not adversely affect to adjacent beaches or properties. Construction activities and less than adverse impacts from project implementation are restricted to the placement area.

(8) To the extent allowed by law, a dune protection permit is required to authorize the construction of a shore protection project in the beach/dune system.

Compliance: The City of Galveston is the non-federal sponsor for the project and has attended planning meetings/discussions for placement activities. No dune protection permit is required to authorize this project, as placement activities would occur seaward of the vegetation line and are not anticipated to adversely impact the dune system.

(9) A mitigation plan shall be submitted for any adverse effects to critical dune areas as a result of the construction and presence of a shore protection project.

Compliance: The project would not adversely effect critical dune areas; therefore, a mitigation plan is not necessary.

(10) Public input shall be incorporated into a local government's review and approval of a shore protection project. Methods to obtain public input include public meetings, notices by mail to affected property owners, publication of notices in local newspapers, the Texas Register, and web sites.

Compliance: The Draft Project Report and Environmental Assessment (DPR-EA) will be released for public review 60 days after the TSP milestone meeting. A news release notifying the public of the availability of the DPR-EA will be published in local papers. Additional public input conducted by the local government is not anticipated since the project does not require a Dune Protection Permit.

(11) The success criteria for a shore protection project shall be developed by a project sponsor with consideration for the health and maintenance of the beach/dune system.

(12) The sponsor of a shore protection project shall be responsible for the ongoing maintenance of the project and, if necessary, beach nourishment and/or removal of the project.

Compliance: This is a one-time nourishment project; thus, ongoing maintenance of the project, renourishment, or removal is not expected.

(13) Sand from the beach/dune system shall not be used to fill or cover a shore protection project. Where appropriate, a shore protection project shall remain covered with sand and dune vegetation with a preference for natural dune vegetation. The sand and vegetation used to cover a shore protection project shall conform to the standards for dune restoration projects as described in §15.4 (relating to Dune Protection Standards) and §15.7, (relating to Local Government Management of the Public Beach) of this title.

Compliance: No dune construction is proposed for this project. All beach nourishment will be constructed from dredged material obtained from the Galveston Harbor Channel. The new beach profile will be constructed following criteria that promotes natural dune formation.

(14) *Long-term monitoring of a shore protection project shall be required to determine the project's effect on the beach/dune system and the project's effectiveness. Prior to the construction of a shore protection project, a project sponsor shall collect scientifically valid baseline data for monitoring the line of vegetation, the extent of the dry beach, a beach profile, and any other characteristics necessary for evaluating the project's effectiveness.*

Compliance: This is a one-time nourishment activity that does not require long-term monitoring.

(15) *Existing public access in the area of a shore protection project shall be replicated if not enhanced. A local government shall not impair or close an existing public access point or close a public beach to pedestrian or vehicular traffic without prior approval of the GLO as required under the Open Beaches Act, Texas Natural Resource Code Annotated, Chapter 61, and the Beach/Dune rules, Chapter 15 of this title.*

Compliance: Public access would remain intact, and the current use of the beach could continue, except during construction, at which time the beach would be temporarily closed for public safety. After construction, the beach would be more comprehensive and could increase public use of the area.

c) *The GLO shall comply with the policies in this section when certifying local government dune protection and beach access plans and adopting rules under the Texas Natural Resources Code, Chapters 61 and 63. Local governments required by the Texas Natural Resources Code, Chapters 61 and 63, and Chapter 15 of this title (relating to Coastal Area Planning) to adopt dune protection and beach access plans shall comply with the applicable policies in this section when issuing beachfront construction certificates and dune protection permits.*

Compliance: The project does not involve adopting dune protection or beach access plans, nor does it require issuing a beachfront construction certificate or dune protection permit; therefore, §501.26 (c) does not apply. Beach access for construction activities will be granted to USACE through an acquisitions process between the General Land Office and the City of Galveston.

§501.32 Policies for Emission of Air Pollutants

TCEQ rules under Texas Health and Safety Code, Chapter 382, governing emissions of air pollutants, shall comply with regulations at Code of Federal Regulations, Title 40, adopted pursuant to the Clean Air Act, 42 United States Code Annotated, §§7401, et seq, to protect and enhance air quality in the coastal area so as to protect CNRAs and promote the public health, safety, and welfare.

Compliance: The project is fully compliant with the Clean Air Act as documented in the DDPR-EA.

CONCLUSION

This project complies with the Texas Coastal Management Program and will be conducted in a manner consistent with all rules and regulations of the program.

REFERENCES

City of Galveston (COG). 2012. Erosion Response Plan: Galveston Planning and Development Regulations. City of Galveston, Galveston, TX. 37 pp.

U.S. Army Corps of Engineers (USACE) Southwest Division. 2016. Final Environmental Assessment Galveston Harbor Channel Extension Feasibility Study Houston-Galveston Navigation Channels, Texas. U.S. Department of Defense, Department of the Army, USACE Galveston District, Galveston, TX. 185 pp.

FINDING OF NO SIGNIFICANT IMPACT

GALVESTON ISLAND COASTAL EROSION DRAFT DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT
GALVESTON, TEXAS

The U.S. Army Corps of Engineers, Galveston District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Detailed Project Report and Environmental Assessment (DPR/EA) dated February 2023, for the Galveston Island Coastal Erosion addresses beneficial use of dredged material for coastal storm risk management opportunities and feasibility in Galveston, Texas.

The Final DPR/EA, incorporated herein by reference, evaluated six alternatives that would slow/delay erosion of beachfront and offer storm risk reduction in the study area. The recommended plan is the Locally Preferred Plan (LPP) and includes:

- Galveston Harbor and Channel (GHC) has been maintained by the Corps for navigation purposes, carried out periodically with the dredged sand placed into an ocean disposal area or deposited landward by hopper dredge. Galveston Island has sustained coastal storm damages and experienced localized, acute, erosion rates along the beach averaging 2.7 to 5.75 feet per year landward. Dredging the GHC provides the opportunity for the beneficial use of dredged material to delay/protect Galveston Island beachfront from coastal erosion. The maintenance dredging planned entails removing approximately 530,000 cubic yards (CY) of beach sand from the GHC to be placed on Galveston Island from Sunbather Lane west 1.7 miles. Dredged material would be deposited onto the beach using a submerged or floating pipeline, then moved with heavy equipment to match the beach profile template.

In addition to a “no action” plan, 5 alternatives were evaluated. The alternatives included beach nourishment on the west end of Galveston Island, differentiated by their respective location (Alternatives 2 and 3), seawall extension (Alternatives 4 and 5), west seawall beach nourishment (Alternative 6). Two alternatives (Alternative 2 and 3) meet the objective of preventing or delaying coastal erosion damage. Detailed information about these two alternatives can be found in Chapter 4 of the DDPR/EA.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant 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 DPR/EA will be implemented, if appropriate, to minimize impacts.

Examples of BMPs include but are not limited to:

- Use of silt fencing to limit soil migration and water quality degradation;
- 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.

If, for some reason, the BMPs are not implemented, the impacts of any of the action alternatives would only minimally increase from those described in Chapter 4. The increase in impacts would not be substantial enough to cause an adverse insignificant impact to become significant.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft DPR/EA and FONSI was completed on 15 August 2022. All comments submitted during the public review period were responded to in the Final DPR/EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (FWS) issued a biological opinion (Consultation No: 02ETTX00-2018-F-2491) to the Galveston Parks Board (the Non-Federal Sponsor), dated 17 June 2019, that determined that the planned beach nourishment would not jeopardize the continued existence of the following federally listed species or adversely modify designated critical habitat: Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), and leatherback sea turtle (*Dermochelys coriacea*), the West Indian manatee (*Trichechus manatus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), red knot (*Calidris canutus rufa*), and piping plover (*Charadrius melodus*). In a letter of agreement dated October 11, 2022, the FWS accepted the USACE's request to operate under the current Galveston Parks Board biological opinion with the understanding that the USACE would abide by all terms and conditions, conservation measures, and reasonable and prudent alternatives and measures resulting from those consultations and that they shall be implemented in order to minimize take of endangered species and avoid jeopardizing the species.

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 has no effect on historic properties.

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). The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix C of the DPR/EA.

A water quality certification pursuant to section 401 of the Clean Water Act was obtained from the Texas Commission on Environmental Quality. All conditions of the water quality certification shall be implemented in order to minimize adverse impacts to water quality.

A determination of consistency with the Texas Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 will be obtained from the Texas General Land Office prior to construction. In a letter dated 19 September 2022, the Texas General Land Office stated that the recommended plan appears to be consistent with state Coastal Zone Management plans, pending confirmation based on information to be developed during the pre-construction engineering and design phase. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. The project area is located in Ecoregion 4 nearshore habitat and includes EFH designated by the Gulf of Mexico Fishery Management Council for several life stages of fish and crustaceans, including highly migratory species and commercially and recreationally important species. EFH in the project vicinity includes sand, shell, and water column. These species are ubiquitous along the Texas coast with seasonal differences in abundance. The National Marine Fisheries Service provided concurrence with the USACE's findings of "no significant adverse effect" determination. The common bottle nosed dolphin (*Tursiops truncatus*) is the most likely marine mammal occurring in the nearshore. Other species of dolphins and whales are primarily restricted to deeper offshore waters; therefore, it is unlikely that any of these species would occur in or near the project area.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date	Rhett A. Blackmon Colonel, Corps of Engineers District Commander

Appendix D – Real Estate Plan

Galveston Island Coastal Erosion, City of Galveston, Galveston County, Texas

Section 204

Final Integrated Detailed Project Report and Environmental Assessment

November 2022

US Army Corps of Engineers
Galveston District

(NOTE: This page intentionally left blank.)

This Real Estate Plan has been prepared in accordance with ER 405-1-12 dated 1 May 1998.

PREPARED BY: ____________________________________

Nichole L. Schlund
Realty Specialist
Galveston District
U.S. Army Corps of Engineers

RECOMMENDED BY: ____________________________________

Timothy J. Nelson
Chief, Real Estate Division
Galveston District
U.S. Army Corps of Engineers

Table of Contents

List of Figures

List of Tables

List of Exhibits

List of Acronyms

BCE	Baseline Cost Estimate
BU	Beneficial Use
CAP	Continuing Authorities Program
CBRA	Coastal Barrier Resource Act
CBRS	Coastal Barrier Resource System
CSRM	Coastal Storm Risk Management
GLO	Texas General Land Office
HQUSACE	U.S. Army Corps of Engineers Headquarters
HTRW	Hazardous, Toxic, and/or Radioactive Waste
LERRD	Lands, Easements, Rights-of-Way, Relocations, and Disposals
NFS	Non-Federal Sponsor
OBA	Open Beaches Act
OPA	Otherwise Protected Area
ODMDS	Ocean Dredged Material Disposal Site
O&M	Operations & Maintenance
PCA	Project Cooperation Agreement
PDT	Project Delivery Team
PGL	Policy Guidance Letter
PL	Public Law
PPA	Project Partnership Agreement
REP	Real Estate Plan
ROM	Rough Order of Magnitude
ROW	Right-of-way
TSP	Tentatively Selected Plan
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources Development Act

1 General Background

This Real Estate Plan (REP) is the real estate work product of the U.S. Army Corps of Engineers (USACE), Galveston District, Real Estate Division that supports the Detailed Project Report and Environmental Assessment for the Galveston Island Coastal Erosion Continuing Authorities Program (CAP) 204 Regional Sediment Management (Beneficial Use of Dredged Material) Study. It identifies and describes the lands, easements, rights-of-way, relocations, and disposals (LERRD) required for the construction, operation and maintenance of the proposed project, including those required for relocations (i.e., Public Law 91-646 relocations and utility/facility relocations), borrow material, and dredged or excavated material disposal. Furthermore, the REP describes the estimated LERRD value, together with the estimated administrative and incidental costs attributable to providing LERRD, and the acquisition process.

This report is prepared based on specific data from the USACE, Galveston District Project Delivery Team (PDT) for the Galveston Coastal Erosion CAP Study. However, this plan is tentative in nature and intended for planning purposes only. Modifications to the recommended plan could occur and change the determinations of real property lines, estimates of values, and rights required for the project, etc. as outlined in this plan, even after final report approval. The level of detail provided in this REP is understood to be equivalent to the other PDT disciplines.

2 Project Type and Purpose

The island of Galveston loses between eight to 12 feet of beach annually due to natural erosion. The erosion narrows the gap between the developed city of Galveston and the shoreline, reducing the protection from hurricanes and tropical storms that frequently impact the area. Three major hurricanes and five lesser storms have caused destruction to Galveston, each taking years to recover. The reduction in beach surface may potentially have negative impacts to the environment including sea turtles and other sea life due to reduced nesting areas.

The Galveston Coastal Erosion CAP 204 project seeks to beneficially use material dredged from the Galveston Entrance Channel to renourish approximately 1.75 miles of beach on Galveston to reduce the expected annual damages for public infrastructure in the study area through the period of analysis.

3 Study Scope

This feasibility study will focus on measures and alternatives, which simultaneously meet the criteria for inclusion within the CAP 204 study and address the problems, opportunities, and constraints set forth by the study authority. Specifically, this project's scope is to beneficially utilize the dredged material from the entrance channel of the Federal Navigation Project, Galveston Harbor and Channel to renourish 1.75 miles of beach on Galveston Island.

4 Authority

The authority for this project is Section 204 of the 1992 Water Resources Development Act (WRDA), as amended, administered under the U.S. Army Corps of Engineers Continuing Authorities Program (CAP).

5 Study Area and Project Location

Galveston, Texas is located on Galveston Island along the Gulf Coast in Galveston County, Texas, which is the southeast portion of the state near Houston, Texas (Figure 1 and Figure 2).

Figure 1: Study Area in Relation to the State of Texas

(The remainder of this page intentionally left blank.)

Figure 2: Study Area in Relation to Houston, TX

(The remainder of this page intentionally left blank.)

The project location is situated in the center of Galveston Island, running parallel to FM 3005 stretching from 8 Mile Road southwest to Thirteen Mile Road (Figure 3 and Figure 4).

Figure 3: Project Location on Galveston Island

(The remainder of this page intentionally left blank.)

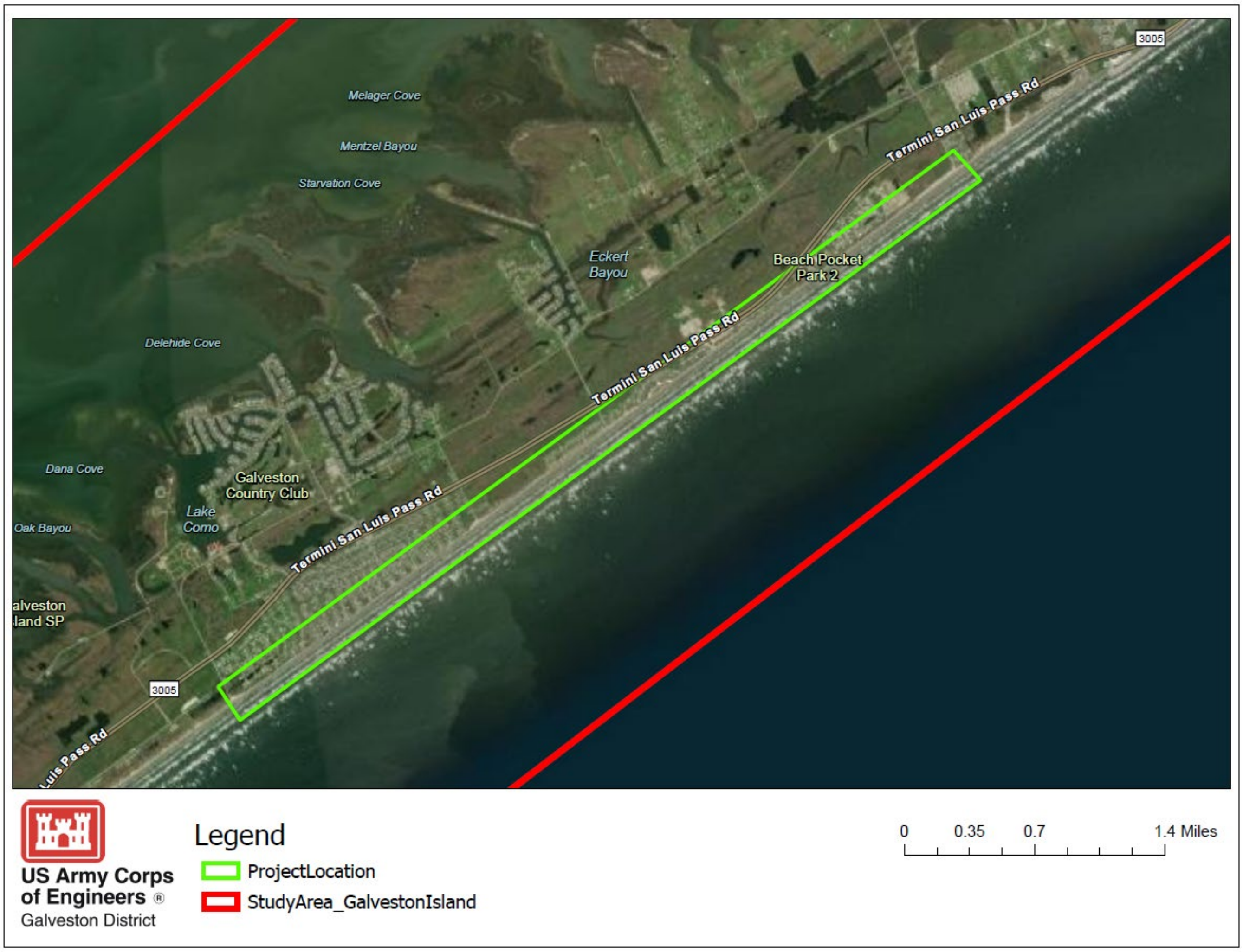


Figure 4: Project Location Zoomed In

6 Non-Federal Sponsors, Partners and Acquisition Responsibilities

6.1 Non-Federal Sponsor

The Park Board of Trustees of the City of Galveston (Park Board) served as the Non-Federal Sponsor (NFS) from the project's inception until May 2022. The Park Board is a governmental entity created by a special act of the Texas Legislature in 1962 for the purpose of directing all tourism efforts for Galveston. The Park Board actively participated in the feasibility portion of the project, attending site visits and PDT meetings. In May 2022, the City of Galveston took over as the Non-Federal Sponsor (NFS) for this project.

6.2 Other Study Participants

The Texas General Land Office (GLO) has also actively participated in the feasibility portion of the project by attending PDT meetings. The City of Galveston does not have the authority or capability to furnish LERRD for the project without the support of the GLO. The GLO, through the Texas Open Beaches Act, is the governing authority over the lands required for the project. GLO regularly partners with local governments that assist in the maintenance of public beaches by executing a Project Cooperation Agreement (PCA) with the local entity. It is the intention of the GLO and the City of

Galveston to enter into a PCA to facilitate the construction of this project. The City of Galveston will sign the PPA with USACE. Further details are available in Sections 6.3 and 9.5.

6.3 NFS Acquisition Responsibilities and Capabilities

The NFS is responsible for providing all LERRD required for the project. However, the City of Galveston does not have the authority and capability to furnish the private lands, easements, and rights-of-way for this project (Exhibit B). Instead, the LERRD will be provided by the GLO, in cooperation with the City of Galveston through a PCA signed between the GLO and the City of Galveston, as well as a supporting agreement with USACE. The PDT has determined this to be of minimal risk to the project and further details are outlined in Section 9.5.

7 NFS Notification of Risk

Even though the NFS does not have the authority or capability to directly furnish the LERRD for this project, Real Estate notified the NFS of the risks in acquiring land prior to the signing of the Project Partnership Agreement (PPA). A copy of the risk letter that was sent is shown in Exhibit A.

8 Alternative Formulation Process and Recommended Plan

The Galveston Coastal Erosion CAP 204 project seeks to beneficially use material dredged from the Galveston Entrance Channel to renourish approximately one mile of beach on Galveston to reduce the expected annual damages for public infrastructure in the study area through the period of analysis. The PDT evaluated three alternatives.

8.1 Alternatives Considered

The PDT considered the following alternatives:

- Alternative 1/No Action/FWOP – Traditional placement of dredge material into a placement area. In this case, the material would be placed in an offshore, Ocean Dredged Material Disposal Site (ODMDS).
- Alternative 2 – Placement on the beach, seaward of the vegetation line along a 1.75 mile stretch beginning just south of Sunbather Lane stretching southwest, stopping just short of 11 Mile Road (Figure 5).
- Alternative 3 – Alternative 3 partially overlaps Alternative 2 and involves placement on the beach, seaward of the vegetation line along a 1.75 mile stretch beginning at Hersey Beach Drive stretching southwest to Fidler Crab Lane (Figure 6 and Figure 7).

(The remainder of this page intentionally left blank.)

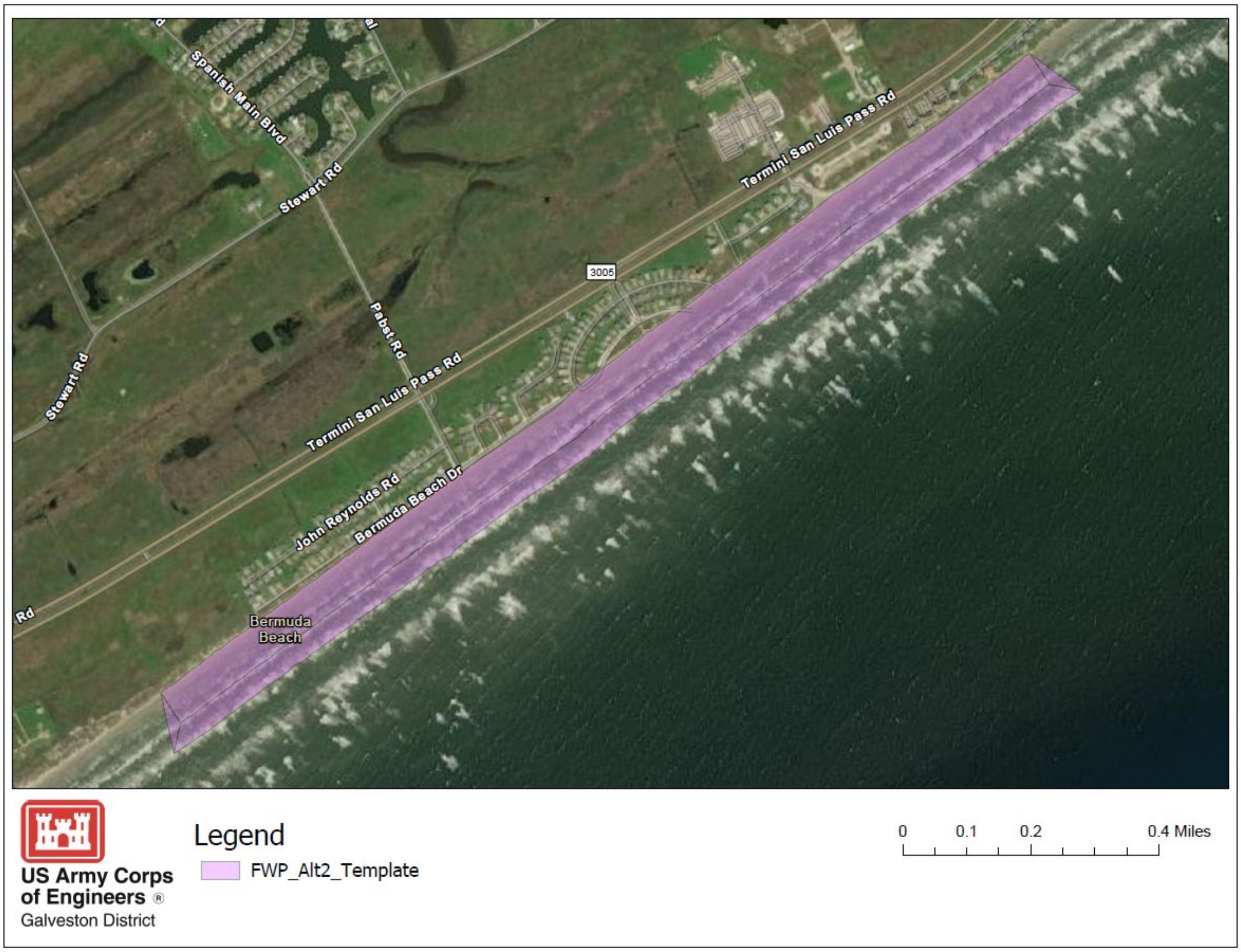


Figure 5: Alternative 2

(The remainder of this page intentionally left blank.)

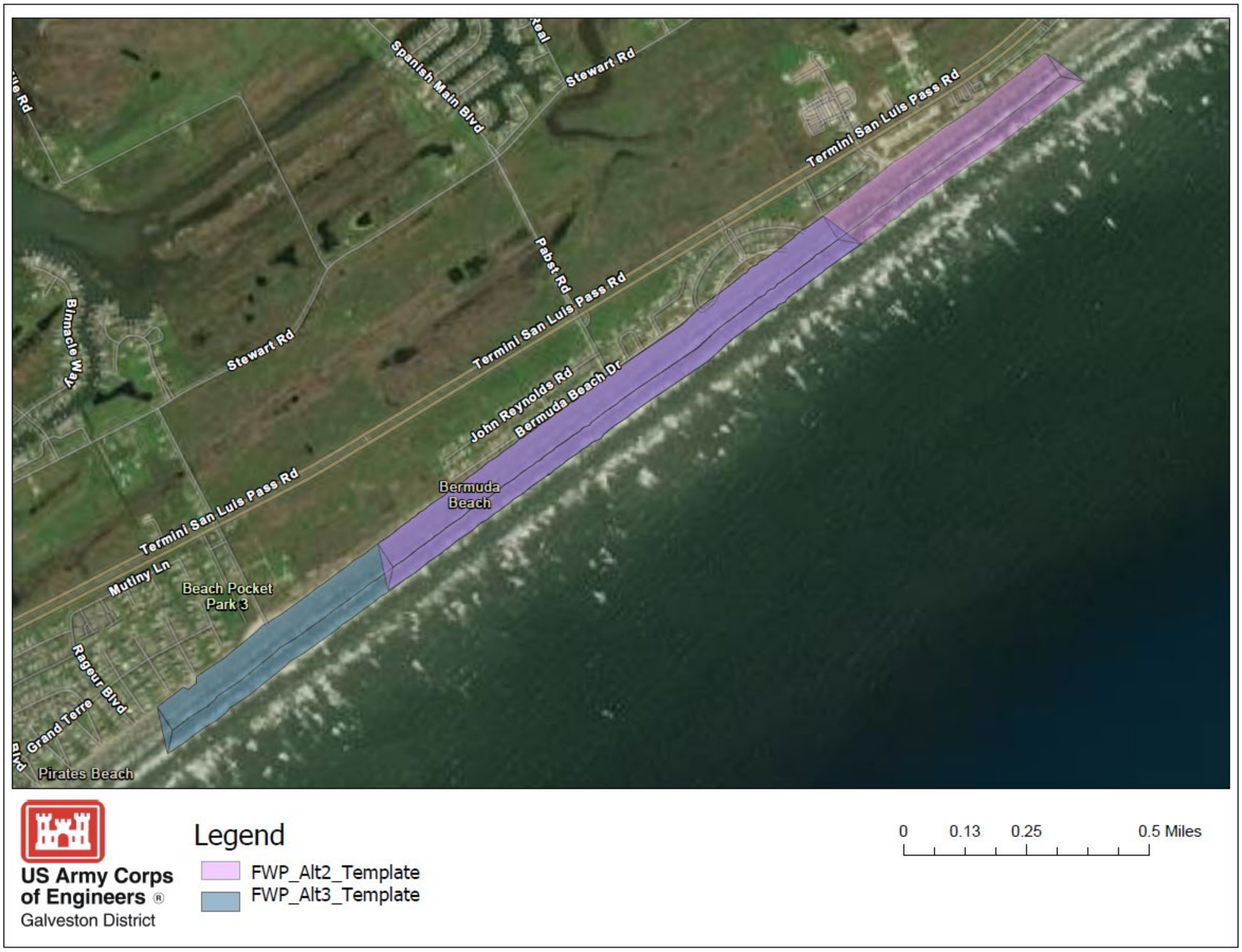


Figure 6: Alternative 2 and 3 Overlap

(The remainder of this page intentionally left blank.)

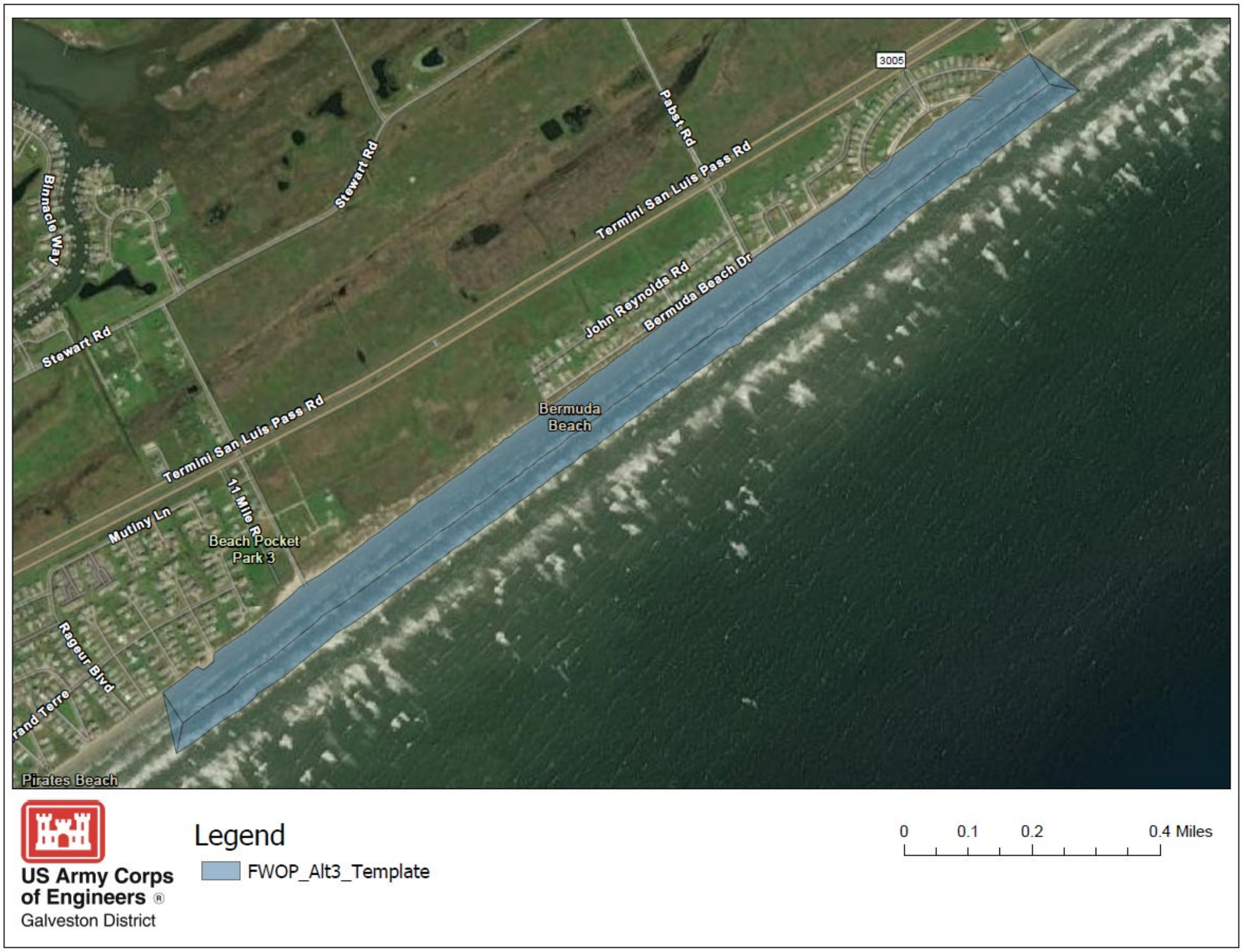


Figure 7: Alternative 3

8.2 Recommended Plan

The recommended plan is Alternative 2 as discussed in Section 6 and shown in Figure 5 above.

9 Existing Real Estate Interests

Existing federal real estate interests and projects, along with existing non-federal sponsor real estate interests are outlined below.

9.1 Existing Federal Real Estate Interests

The federal government has no existing interests within the project footprint or within the immediately adjacent areas. Federal interests on Galveston Island are limited to the north eastern end of the island as indicated in Figure 8.

Figure 8: Federal RE Interests on Galveston Island

9.2 Existing Federal Projects

The federal government has no existing projects within the proposed project footprint or in immediately adjacent areas.

9.3 Coastal Barrier Resource Act (CBRA)

The Coastal Barrier Resource Act (CBRA) established the John H. Chafee Coastal Barrier Resource System (CBRS) in 1982. Galveston Island has one CBRS unit, classified as an Otherwise Protected Area (OPA), consisting of 1.5 miles of shoreline, 2,627 wet acres, and 812 acres of emergent land. The Galveston Island CBRS OPA unit is located 1.92 miles from the southernmost point of Alternative 2 (recommended plan). There are no CBRS units within the project footprint.

(The remainder of this page intentionally left blank.)

Figure 9: CBRS Unit on Galveston Island

(The remainder of this page intentionally left blank.)

9.4 Existing NFS Real Estate Interests

The City of Galveston, however, does have property interests in the project vicinity and intersecting with the project footprint (Figure 10). Alternative 2 (Recommended Plan) intersects with 40 parcels owned by the City of Galveston.

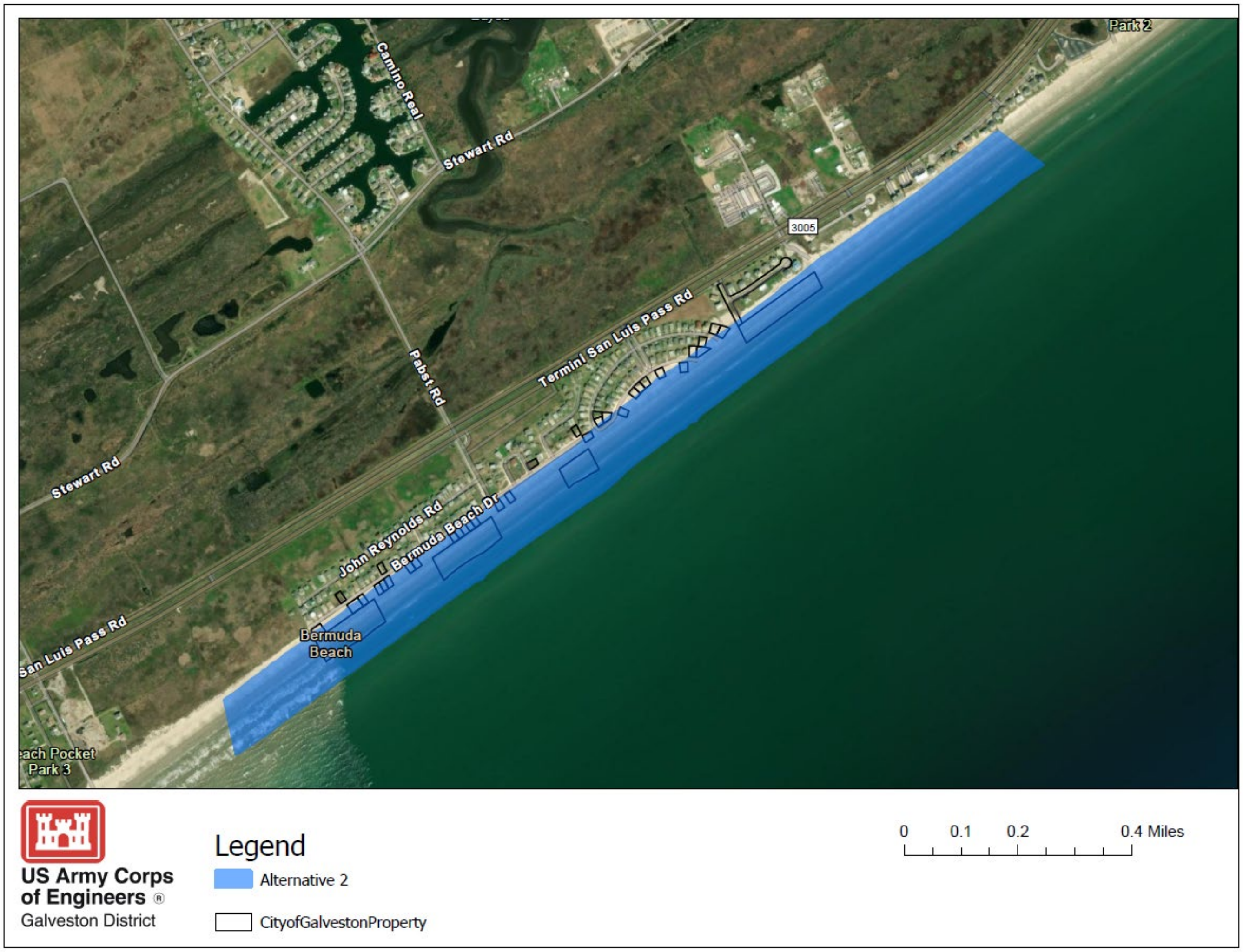


Figure 10: City of Galveston Properties in the Project Alignments

9.5 Texas GLO Real Estate Interests

Texas Natural Resource Code, Section 61.001 defines "public beach" as "any beach area, whether publicly or privately owned, extending inland from the line of mean low tide to the vegetation bordering on the Gulf of Mexico to which the public has acquired the right of use or easement to or over the area by prescription, dedication, presumption, or has retained a right by virtue of continuous right in the public since time immemorial, as recognized in law and custom." The "public beach" includes the state-owned beach, commonly referred to as the "wet beach," extending seaward from the line of mean high tide (or mean higher high tide in areas where the land was patented prior to 1840) and may also include the "dry beach." The dry beach extends landward from the line of mean high tide to the line of vegetation. The "public beach" includes both the state-owned wet beach and the areas of the dry beach seaward of the vegetation. The "public beach" area is subject to a public easement. Therefore, it is understood the State of Texas, managed by the GLO, owns the portion of the beach seaward of the vegetation. Figure 11 below depicts all lands seaward of the red CSRM (Coastal Storm Risk Management) line as the “public beach”. For the purposes of this project, the CSRM line serves as the project’s landward construction limit.

Texas Natural Resource Code, Section 61.011 states the Commissioner of the Texas GLO “shall promulgate rules” on the matter of “(2) protection of the public easement from erosion or reduction caused by development or other activities on adjacent land and beach cleanup and maintenance.”

In a prior PCA dated October 1, 2020 between the Park Board and the GLO for a similar beneficial use (BU) project at Babe’s Beach in Galveston utilizing material from the Galveston Ship Channel, the work plan within the PCA specifically identified GLO’s responsibilities. Those responsibilities included identifying, documenting, and conferring with USACE on the exact location and extent of the project area, as well as contracting with USACE to utilize dredged material to renourish an extent of beach identified and agreed upon between USACE, GLO, and the Park Board by executing a Supporting Agreement with USACE.

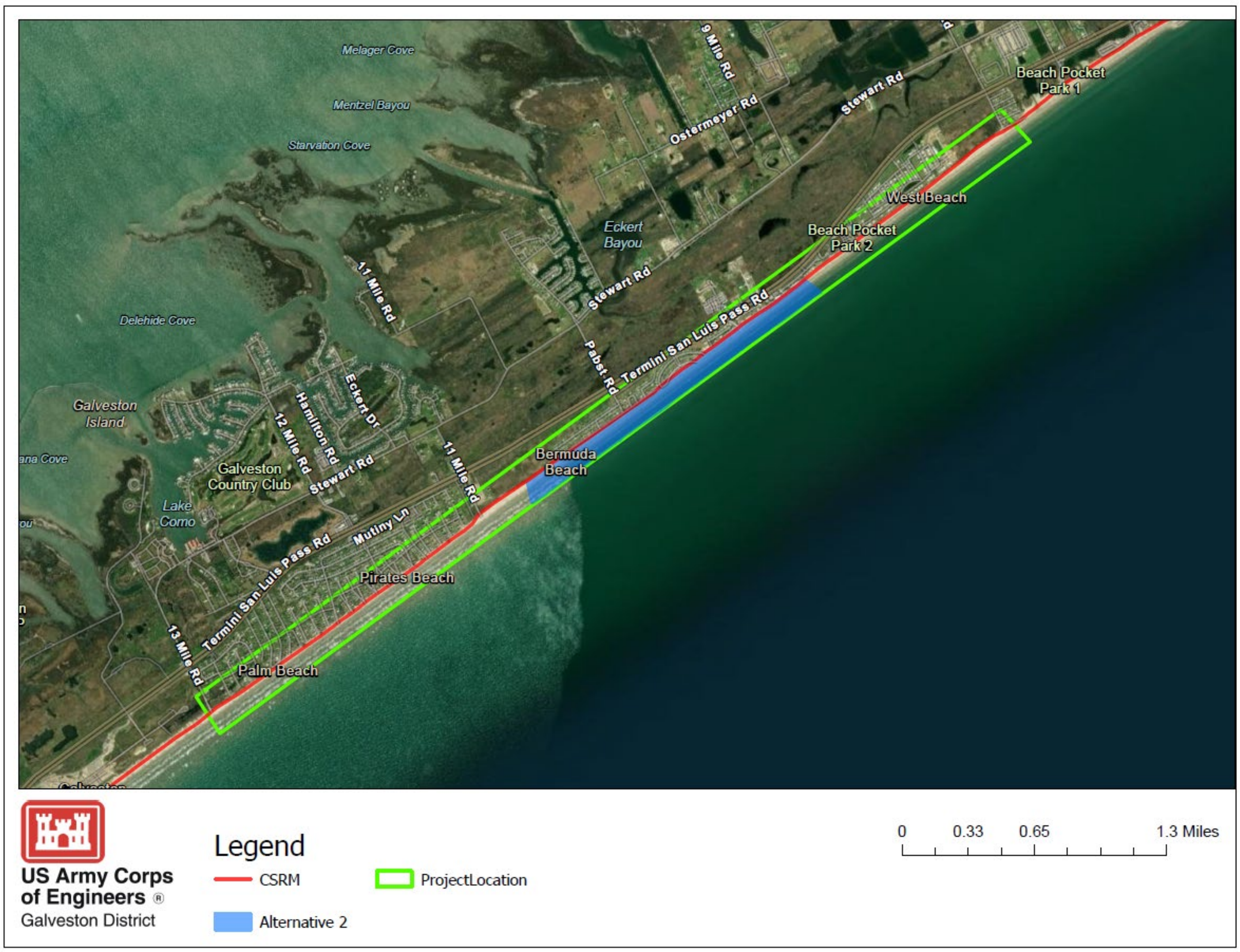


Figure 11: Texas Public Beach

Galveston Island boasts 40 open and operating public beach access points along the shore. Of the 40 access points, six are located within or directly adjacent to the proposed project footprint. Alternative 2 contains three access points directly within the footprint. Table 1 and Figure 12 outline the public access points in the project vicinity. According to the City of Galveston, Pocket Park #3 (Beach Access Point #13), which is located between the access point 12 (Bermuda Beach) and 14 (11 Mile Road) is currently closed.

Table 1: Public Beach Access Points

Beach Access Point #	Name	Beach Access Point #	Name
9	Pocket Park #2	12	Bermuda Beach
10	10 Mile Road (Hershey Beach)	14	11 Mile Road
11	Spanish Grant	15	Palm Beach/Pirates Beach

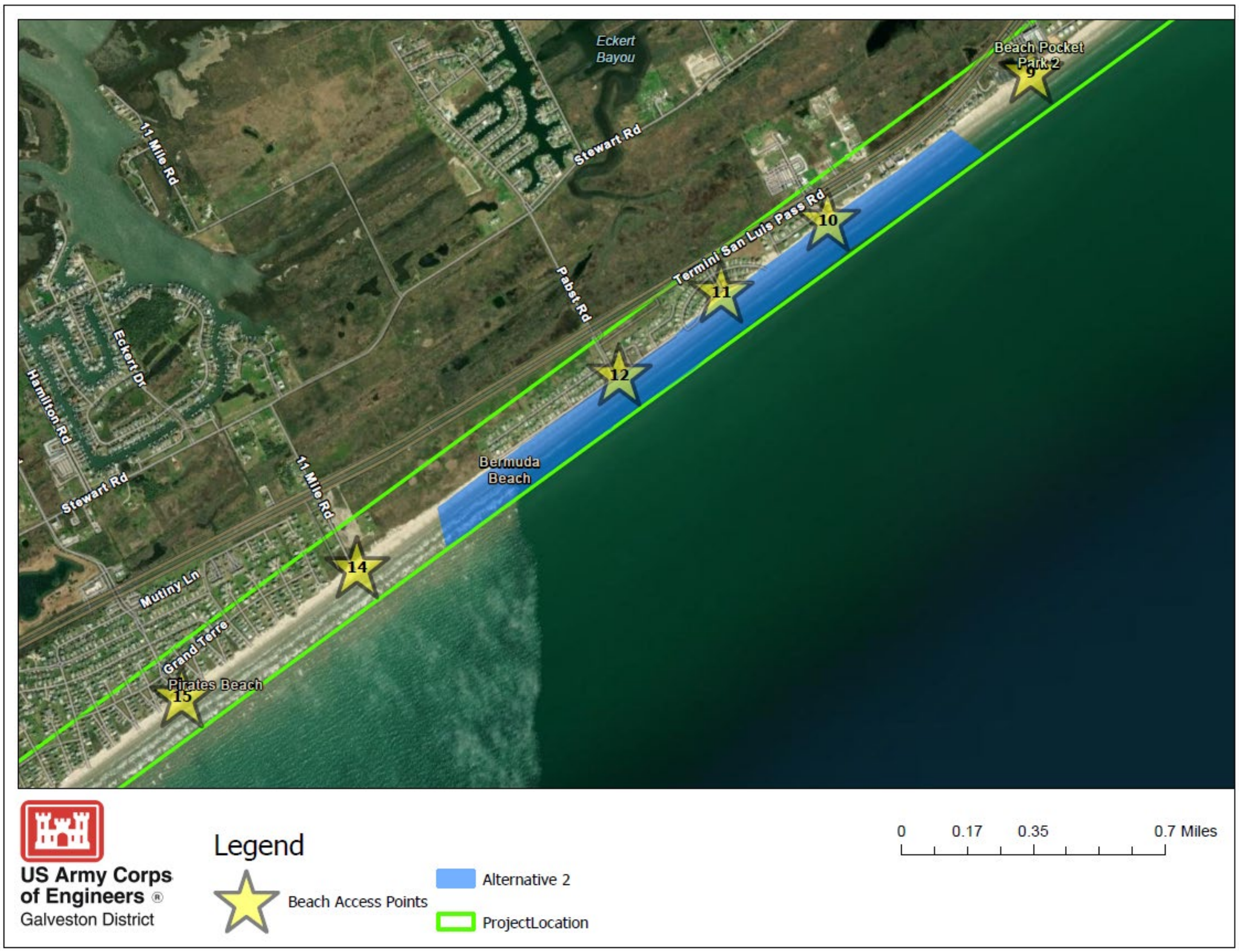


Figure 12: Public Beach Access Points

(The remainder of this page intentionally left blank.)

9.6 Privately-Owned Vacant Land

Engineering Regulation (ER) 1165-2-130, Federal Participation in Shore Protection, states “all costs assigned to the prevention of losses of undeveloped private lands are non-Federal, even though the beach may be public.” There is a 0.17-mile portion of undeveloped land along the beach proposed for placement. Because placement of material in front of this portion is anticipated to better protect nearby developed properties, it has been determined the PDT may recommend the placement be cost-shared in the same manner as the remaining placement. Undeveloped privately-owned lands within the project area are shown in Figure 13.

Figure 13: Undeveloped Private Land - Alternative 2

(The remainder of this page intentionally left blank.)

10 New Real Estate Requirements

The new real estate requirements are outlined below.

10.1 Alternative 2 – Recommended Plan

The recommended plan, Alternative 2, impacts 182 parcels, of which the City of Galveston owns 40. However, the entire footprint of Alternative 2 falls seaward of the CSRM line and within the GLO public beach. Therefore, no acquisition is required and USACE will secure an Authorization of Entry for Construction from the Texas GLO to accomplish the dredged material placement for BU on approximately 102 acres of beach as shown in Figure 5.

10.2 Access/Staging Areas

The assumption is that no access and/or staging areas beyond the limits of the project footprint will be required. This will be confirmed during the Design & Implementation (DI) phase. At the conclusion of the DI phase, when the project reaches 95% design, determinations can be finalized and the REP will be updated to include this information, as well as the duration for any temporary work area easements (Standard Estate #15), if determined to be necessary as described in Section 10.4.

10.3 Mitigation

There is no mitigation required for this project.

10.4 Estates

The NFS is responsible for securing and maintaining the minimum real estate interests required for the project prior to USACE awarding the contract for construction. As detailed in Section 6.2, the NFS will execute a separate PCA with the Texas GLO to provide LERRD. Construction of the complete project may require a variety of real estate interests as outlined below and in Table 2.

As detailed in Section 9.4, the Texas GLO is the state agency charged with managing the state-owned lands and private lands subject to the public easement from the line of vegetation seaward. The state's interest in the lands required for the project is codified into state law. Therefore, GLO holds the real estate interests necessary for the project and can provide the required LERRD for the project. A coastal boundary survey will be conducted to confirm the public easement prior to work beginning. CESWG-RE will seek a temporary Authorization of Entry for Construction from the GLO to cover the placement of dredged material and pipeline placement to move dredged material. The project will be a one-time placement activity with no operations and maintenance (O&M) responsibilities for USACE after the project's completion.

CESWG-RE used the same interest for numerous BU projects on Babe's Beach on Galveston Island, which also utilized dredged material from the Galveston Ship Channel to renourish the beach. The most recent nourishment of Babe's Beach kicked off on July 12, 2021. A similar project was completed on Babe's Beach in 2019 and 2015. All projects included a local entity executing a PCA with the GLO to facilitate construction and provide the LERRD.

Should any access/staging areas be identified outside of the limits of the project footprint, standard estate #15, Temporary Work Area Easement would apply. This easement is outlined in Section 10.4.1 below.

Table 2: Estates Required

Project Feature	Estates
Access/Staging Areas	Standard Estate #15 – Temporary Work Area Easement

10.4.1 Standard Estate

Standard Estate #15 – Temporary Work Area Easement

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), for a period not to exceed ___________________, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the ___________________ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

11 Borrow Material

All material necessary for the project will be obtained during normal maintenance cycles or from new work construction from the Galveston Entrance Channel. No additional sources of borrow are planned.

12 Recreation Features

There are no recreation features proposed for this project.

13 Timber Rights and Mineral/Energy Activity

There is no known timber activity within the project area.

Oil and gas exploration and production activities are prevalent in the southeast Texas area, however there are no wells or pipelines in the vicinity of the project location.

14 Facility/Utility/Pipeline Relocations

There are no pipelines in the vicinity of the project location or within the project footprint.

There are 11 suspected walkovers and/or existing pathways that provide access to the beach within the project vicinity, with all 11 falling within the recommended plan (Alternative 2) footprint. It is not anticipated that any relocations of these structures will be required, as the placement of dredged material on the wet beach is not expected to impact the structures (Figure 14).

(The remainder of this page intentionally left blank.)

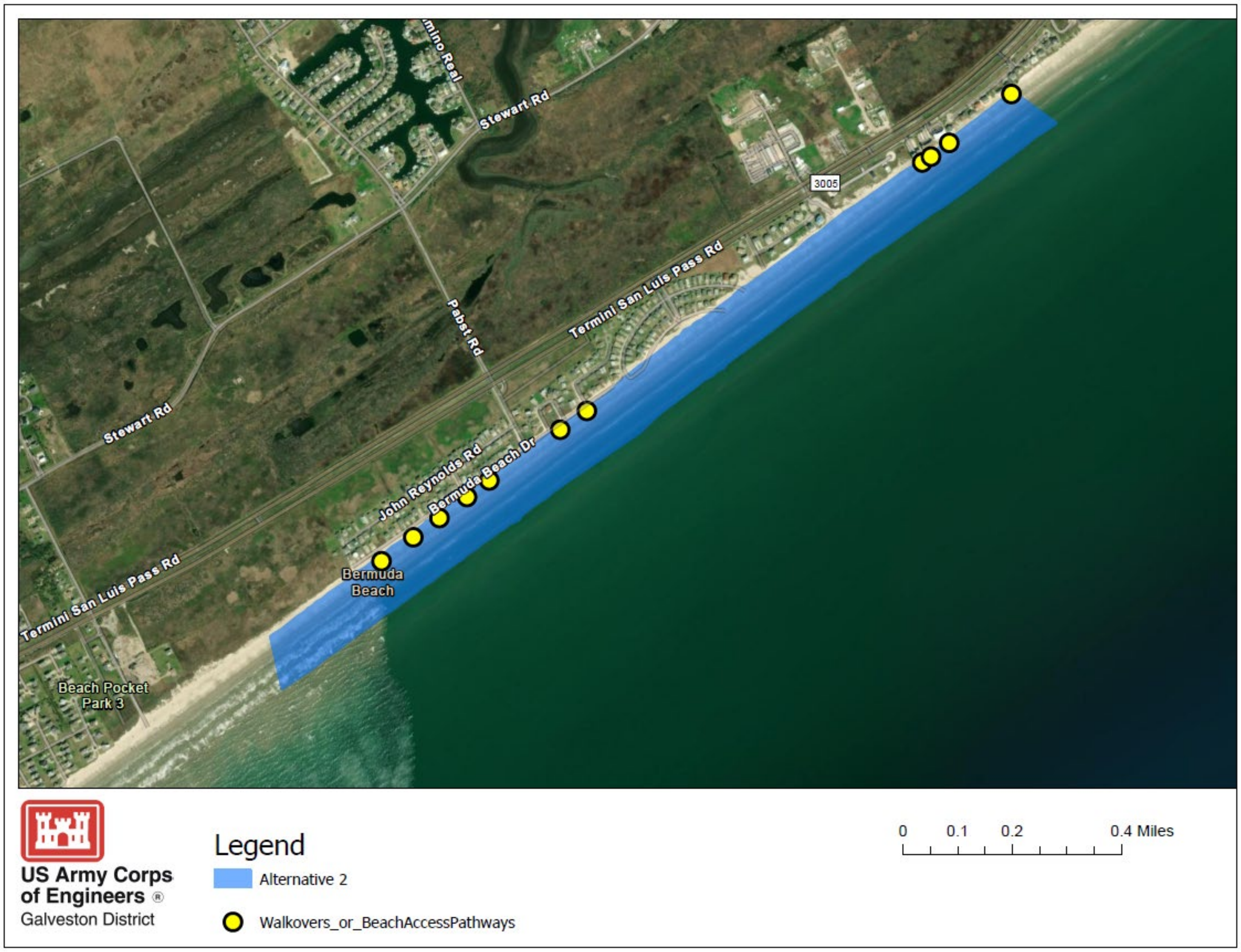


Figure 14: Walkovers

ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REPORT THAT AN ITEM IS A UTILITY OR FACILITY RELOCATION TO BE PERFORMED IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS AND COMPLETION AND APPROVAL OF FINAL ATTORNEY'S OPINIONS OF COMPENSABILITY FOR EACH OF THE IMPACTED UTILITIES AND FACILITIES.

15 Zoning

Zoning ordinances will not be enacted to facilitate acquisition for the proposed project.

16 Hazardous, Toxic, and Radioactive Waste (HTRW) or Other Environmental Contaminants

No recognized environmental conditions were identified within one mile of the project area that could be reasonably expected to affect the project area. An Environmental Assessment, Finding of No Significant Impact, and Clean Water Act Section 404(b)(1) Evaluation were prepared and included with the Detailed Project Report. There were no known contaminants identified within the lands required for the project.

17 Navigation Servitude

Navigation Servitude stems from the Commerce Clause of the Constitution of the United States (U.S. CONST. art.I, Sec.8, cl.3), and is defined as the dominant right of the Federal Government to use, control, and regulate the navigable waters of the United States and submerged lands thereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high-water mark, whereas in non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the ordinary high-water mark.

Navigation servitude is not applicable to this project.

18 Induced Flooding

There will be no induced flooding by virtue of the construction of the project.

19 Attitudes of the Landowner

The construction limits for this project fall within the beach/public easement of the State of Texas, managed by the GLO. The GLO is supportive of the project and intends to execute a PCA with the City of Galveston in support of the project. Coastal erosion, especially on the western end of Galveston Island, is a concern among the community. No public meeting was held for the project; however it is expected that nearby landowners will be supportive.

20 Public Law (PL) 91-646 Relocations

There are no residential, commercial, industrial, or farm properties that would be subject to relocation pursuant to PL 91-646.

21 Real Estate Costs

Total project costs for the recommended plan are estimated to be at least $22 million at October 2022 price levels. Pursuant to Policy Guidance Letter (PGL) 31 dated 11 January 2019, “for projects in which the value of real estate (lands, improvements, and severance damages) are not expected to exceed 15% of total project costs (total costs to implement project), a cost estimate (or rough order of magnitude) will be acceptable for purposes of the feasibility phase.” Real estate costs are estimated to be less than 1% of total project costs.

The baseline cost estimate (BCE) provided in this report (Table 3) is based on feasibility-level design and assumes no land costs. It accounts solely for the administrative costs of providing LERRD. The BCE also includes a small contingency to resolve any concerns with individual landowners with respect to ownership of the beach within the project area as it relates to the Texas Natural Resources Code 61 or the Texas Open Beaches Act (OBA).

Table 3: Baseline Cost Estimate (BCE) for Real Estate

NON-FEDERAL COSTS		Alternative 2 - TSP
Account	**Description**	**Cost**
01	Authorization of Entry for Construction (40 hrs. x $150/hr)	$6,000.00
01	Project Related Administration (40 hrs. x $150/hr)	$6,000.00
01	Contingency for Additional Landowner Coordination (150 hrs. x $150/hr)	$22,500.00
	Total Admin and Payments	$34,500.00
	Contingencies (25%)	$8,625.00
	Non-Federal Total	**$43,125.00**
FEDERAL COSTS		
Account	**Description**	**Cost**
01	Project Related Administration (120 hrs. x $125 per hour)	$15,000.00
01	Federal Review of NFS Additional Landowner Coordination (75 hrs. x $125 per hour)	$9,375.00
	Total Admin and Payments	$24,375.00
	Contingencies (25%)	$6,093.75
	Federal Total	**$30,468.75**
	GRAND TOTAL	**$73,593.75**

There are no costs associated with the 02 Relocations account.

(The remainder of this page intentionally left blank.)

22 Acquisition Schedule

The proposed plan is to secure a temporary Authorization of Entry for Construction from the Texas GLO to restore approximately 1.75 miles of public beach. Timeline for implementation of this project is heavily dependent upon the Operations Division dredging of the Galveston Entrance Channel, as well as the execution of a PCA between the City of Galveston and the GLO. As such, the acquisition schedule below is based not only on the signing of the PPA, but also the dredging and execution of the PCA. A timeline for execution of a PCA between the City of Galveston and the GLO is not available at this time. The REP will be updated when a timeline has been identified.

The acquisition schedule in Table 4 below outlines the milestones and approximate durations for the acquisition of LERRD for this project, which can be expected to be completed within five months. The durations shown below are the estimated average durations, however milestones may move quicker if preceding tasks are completed sooner than expected. The acquisition schedule does not include timelines for condemnations, as condemnation will not be necessary for this project.

Table 4: Acquisition Schedule

Milestone	Predecessor	Average Duration
Transmittal of Right-of-Way (ROW) drawings and instruction to proceed with acquisition along with required estate(s)	Immediately after PPA signed and PCA is executed	30 days
Obtain Coastal Boundary and Other Surveys	Upon transmittal of ROW drawings	60 days
NFS Attorney Certifies Availability of LERRD	Upon obtainment of surveys and review of ROW drawings.	30 days
Corps Certifies Availability of LERRD	Upon Attorney Certification of LERRD	30 days
Review LERRD Credit Request	Upon completion of the project and NFS submission of LERRD documentation	90 days
Approve or Deny LERRD Credit Requests	Upon conclusion of LERRD credit documentation review	10 days

23 Other Real Estate Issues

There are no additional real estate concerns at this time.

24 References

2021. Galveston County Appraisal District. Online GIS Viewer.

2021. Railroad Commission of Texas. Online GIS Viewer.

2021. Texas General Land Office. Online GIS Viewer.

Texas Natural Resources Code, Section 33

Texas Natural Resources Code, Section 61

(The remainder of this page intentionally left blank.)

Exhibit A: Risk Letter

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

May 27, 2022

Mr. Brian Maxwell
City Manager
City of Galveston
P.O. Box 779
Galveston, TX 77553

Dear Mr. Maxwell:

The intent of this letter is to formally advise the City of Galveston, as a potential Non-Federal Sponsor for the proposed Galveston Coastal Erosion CAP 204 project, of the risks associated with land acquisition prior to the execution of a Project Partnership Agreement (PPA) or prior to the Government's formal notice to proceed with acquisition. If a Non-Federal Sponsor deems it necessary to commence acquisition prior to an executed PPA for whatever reason, the Non-Federal Sponsor assumes full and sole responsibility for any and all costs, responsibility, or liability arising out of the acquisition effort.

Generally, these risks include, but may be not be limited to, the following:

a. Congress may not appropriate funds to construct the proposed project;

b. The proposed project may otherwise not be funded or approved for construction;

c. A PPA mutually agreeable to the Non-Federal Sponsor and the Government may not be executed and implemented;

d. The Non-Federal Sponsor may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations including liability arising out of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended;

e. The Non-Federal Sponsor may acquire interests or estates that are later determined by the Government to be inappropriate, insufficient, or otherwise not required for the project;

f. The Non-Federal Sponsor may initially acquire insufficient or excessive real property acreage which may result in additional negotiations and/or benefit payments under P.L. 91-646 as well as the payment of additional fair market value to affected landowners which could have been avoided by delaying acquisition until after PPA execution and the Government's notice to commence acquisition and performance of providing lands, easements, rights-of-way, relocations, and disposals (LERRD);

g. The Non-Federal Sponsor may incur costs or expenses in connection with its decision to acquire or perform LERRD in advance of the executed PPA and the Government's notice to proceed which may not be creditable under the provisions of Public Law 99-662 or the PCA as referenced in *ER 405-1-12 (Change 31; 1 May 98) Section 12-31 Acquisition Prior to PCA Execution.*

For any questions, please contact Nichole Schlund, Realty Specialist within the Galveston District Real Estate Division, at Nichole.L.Schlund@usace.army.mil or 409-766-3146.

Sincerely,

Timothy Nelson
Chief, Real Estate Division
Galveston District
U.S. Army Corps of Engineers

Exhibit B: Assessment of Non-Federal Sponsor Acquisition Capabilities

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1299
GALVESTON, TEXAS 77553-1299

REPLY TO
ATTENTION OF: USACE-SWG-RE

GALVESTON ISLAND COASTAL EROSION CAP 204 FEASIBILITY STUDY
CITY OF GALVESTON – NON FEDERAL SPONSOR

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY

I. Legal Authority:

a. **Does the sponsor have legal authority to acquire and hold title to real property for project purposes? (yes/no)**

No. The Texas General Land Office (GLO) is the agency charged with management of the public beach, both state-owned lands and any privately-owned lands subject to the public easement. The City of Galveston will enter into a Project Cooperation Agreement (PCA) with the GLO to execute this project. GLO will provide the LERRD for the project.

b. **Does the sponsor have the power of eminent domain for this project? (yes/no)**

No. See response for I.(a).

c. **Does the sponsor have "quick-take" authority for this project? (yes/no)**

No. See response for I.(a).

d. **Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? (yes/no)**

No.

e. **Are any of the lands/interests in land required for the project unable to be condemned by the sponsor? (yes/no)**

Yes. See response for I.(a).

II. Human Resource Requirements:

a. **Will the sponsor's in-house staff require training to become familiar with the real estate**

1

requirements of Federal projects including Public Law 91-646 (Home Relocation Assistance), as amended? (yes/no)

No.

b. **If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? (yes/no)**

N/A

c. **Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (yes/no)**

N/A. The Texas GLO has executed successfully on similar projects, including the numerous Babe's Beach beneficial use of dredged material projects on Galveston Island.

d. **Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? (yes/no)**

No. See response for I.(a).

e. **Can the sponsor obtain contractor support, if required in a timely fashion? (yes/no)**

Yes.

f. **Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) (If "yes," provide description)**

No.

III. Other Project Variables:

a. **Will the sponsor's staff be located within reasonable proximity to the project site? (yes/no)**

Yes.

b. **Has the sponsor approved the project/real estate schedule/milestones? (yes/no)**

Yes.

IV. Overall Assessment:

a. **Has the sponsor performed satisfactorily on other USACE projects? (yes/no/not applicable)**

Yes.

b. **With regard to this project, the sponsor is anticipated to be: highly capable/fully** capable/moderately capable/marginally capable/ insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation)

The NFS will be highly capable upon execution of a separate PCA with the Texas GLO.

V. Coordination:

a. **Has this assessment been coordinated with the sponsor? (yes/no)**

Yes

b. **Does the sponsor concur with this assessment? (yes/no)**

Yes

Accepted by the Non-Federal Sponsor:

Brian Maxwell (Signature)

City mgr

City Manager (Title)

8/16/22

(Date)

Prepared by:

SCHLUND.NICHOLE.1272245262 Digitally signed by SCHLUND.NICHOLE.1272245262 Date: 2022.08.16 15:13:04 -05'00'

NICHOLE L. SCHLUND
Realty Specialist
Real Estate Division
Galveston District
US Army Corps of Engineers

3

Appendix E – Economics

Galveston Island Coastal Erosion, City of Galveston, Galveston County, Texas

Section 204

Final Integrated Detailed Project Report and Environmental Assessment

February 2023

US Army Corps of Engineers
Galveston District

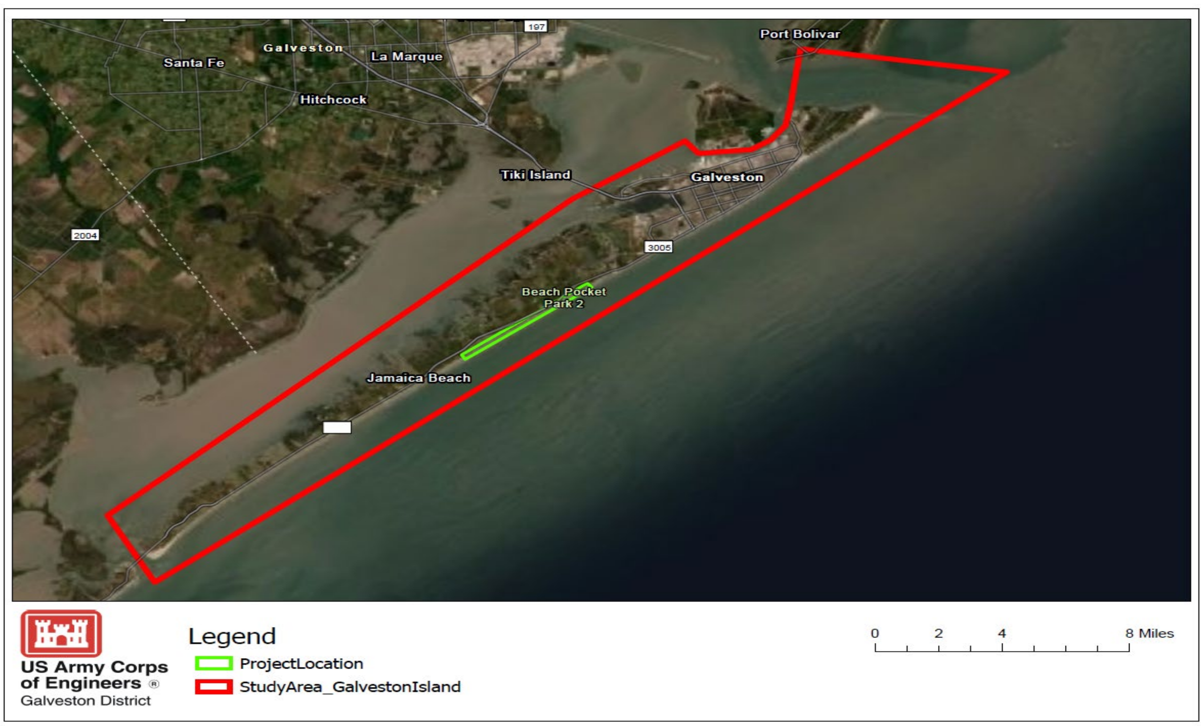
1 Introduction

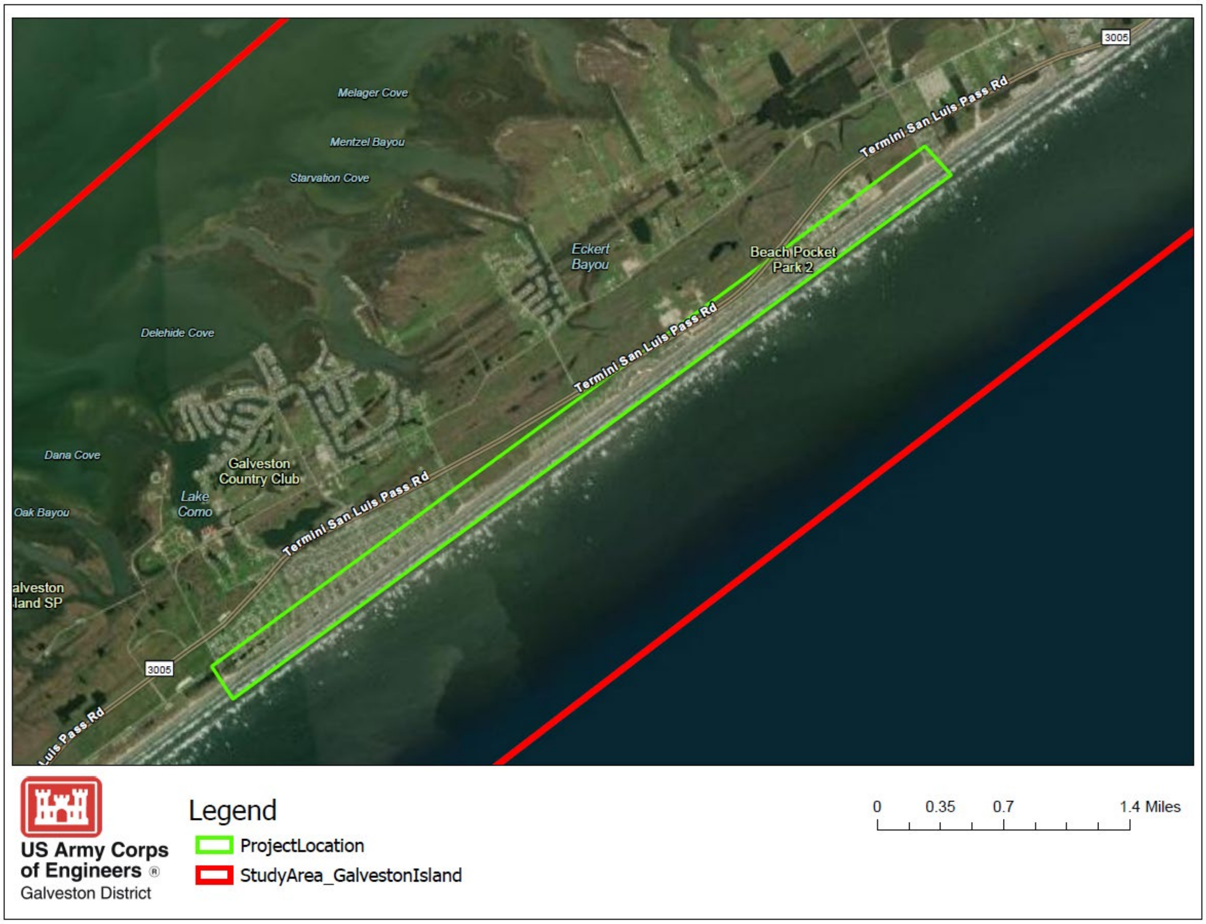
This report presents the economic analysis of using dredged material from the Federal Navigation Project for Galveston TX Harbor to provide coastal storm risk reduction measures on the West End Beach of Galveston Island TX. The analyses follow the U. S. Army Corps of Engineers (USACE) guidance for conducting economic evaluations as contained in EP 1105-2-58 dated 01 March 2019.

The economic benefits of providing coastal storm damage protection through beneficial use of dredged material are calculated in two steps. First, the projected Future Without Project Conditions (FWOPC) are compared to the Future With Project Conditions (FWPC). Then, the least-cost disposal plan associated with the Navigation maintenance dredging (base plan) is compared to the cost of providing the coastal storm damage protection. This analysis was conducted using the Fiscal Year 2023 Federal interest rate for water resources projects of 2.5%. A twenty-four (24) year period of analysis is used, based upon the period of protection determined by engineering erosion analysis.

2 Description of Study Area

The project location is situated in the center of Galveston Island, running parallel to FM 3005 stretching from 8 Mile Road southwest to Thirteen Mile Road.




Melager Cove
Mentzel Bayou
Starvation Cove
Eckert Bayou
Beach Pocket Park 2
Delehide Cove
Dana Cove
Oak Bayou
Galveston Country Club
Lake Como
alveston
land SP
Termini San Luis Pass Rd
Termini San Luis Pass Rd
Termini San Luis Pass Rd
Termini San Luis Pass Rd
Luis Pass Rd
3005
3005
US Army Corps of Engineers
Galveston District
Legend
ProjectLocation
StudyArea_GalvestonIsland
0
0.35
0.7
1.4 Miles

Galveston Island is a barrier island on the Texas shoreline of the Gulf of Mexico. The island sits approximately 50 miles southeast of Houston. The study area/potential project site lies on the west side of the island, beyond the western terminus of the Galveston Seawall. The area is generally identified as west of 61st Street and is primarily a residential area with a smattering of commercial businesses. The end of the study area is where the Galveston Island State Park property begins, traveling southwest along the Gulf Coast.

The proposed project will use the dredged material from the Federal Navigation Project for Galveston Harbor as beach-fill on a stretch of beach located on the West End of Galveston. Selected economic characteristics from the 2019 American Community Survey report the following:

1) Total Population of 8,556 with a median age of 51.3 years
2) The work force numbers approximately 4,200 with a white/blue collar split of 84%/16%
3) Total households number 3,744 with an average persons per household at 2.
4) Average household income is roughly $114,000 accompanied with a median income of $75,300
5) There are approximately 559 persons living below the poverty level of income.
6) Of the approximately 10,052 housing units, 37% are occupied and roughly 67% are owner-occupied.

   https://www.point2homes.com/US/Neighborhood/TX/Galveston-Bolivar-Peninsula/West-End-Galveston-Demographics.html

   (https://data.census.gov).

A more in-depth socio-economics section can be found in Chapter 4, Section 4.3 "Socioeconomics/Economics". Environmental Justice (EJ) is also addressed in more detail in the environmental appendix. Overall, however, this community is a rather affluent section of Galveston Island. Most of the homes in the study area serve as vacation or second homes. They have been built on stilts to withstand coastal storms. The process of essentially placing dredge material along a relatively small stretch of beach will have minimal EJ effects.

3 Benefit Methodology

The benefits to beach placement are determined by estimating the value of the erosion losses and damages that would occur without beneficial placement and comparing them to the erosion losses and damages that would occur with beneficial placement. The benefits equal the degree to which erosion losses and damages are reduced. For this analysis, the long-term erosion rate of 1.25 feet per year was used for both the FWOPC and FWPC based on hydraulic analyses. If protective measures are not implemented, it is anticipated that long-term erosion will continue at the current rate and eventually threaten shorefront structures along the beach. This location on the beach provides storm damage protection to residential properties, improves recreation benefits, and delays land erosion.

Thus, this economic analysis primarily follows practices of the PCX-CSRM pertaining to littoral erosion problems. The avoided damages are not related to depth-damage relationships nor a set of probabilistic storm events. Benefits are derived from delaying the inevitable encroachment upon the properties that would cause safety and/or legal issues that would arise as the private properties became part of the public beach/coastline. The PCX-CSRM was consulted at the start of this study to determine how to estimate benefits in an efficient manner for the CAP 204 program. Subsequently, New England District shared a similar study (Newbury Port Harbor, Plum Island North Point, Newbury Port, Massachusetts) as a go-by. Initially, per the coastal storm risk management economics technical guidance, no land loss damages prevented were included as benefits (littoral erosion land loss not policy compliant as NED benefits). Subsequently, engineering analysis indicated that approximately 15% of the erosion could be attributable to Gulf storm events and a modest amount of land loss damage prevented is now reflected in the benefits.

3.1 Future Without Project Condition (FWOPC)

The study evaluated 155 residential structures at risk of being undermined due to coastal erosion from 2023 to 2037. The value of each structure was determined using 2021 tax assessment records available from Galveston County Assessor Office, which stipulates in its methods of assessment that depreciated replacement costs are used for assessment and taxing purposes. Damages were analyzed for the FWOPC using ArcMap Geographic Information Systems (GIS) to overlay the erosion contours onto aerial photographs containing geo-referenced parcel maps. The hydraulic analysis estimated that the structures closest to the dune line would be impacted as early as 2023. The erosion contours were then advanced landward in annual increments at the 1.25 feet per year erosion rate. A structure was considered damaged when the erosion line reached the seaward edge of the parcel. The present value of the structure was determined for that same year using the current 2023 Fiscal Year Federal Discount Rate of 2.5%. The structure was considered a total loss and was not rebuilt once this occurred. Structure values totaling $150,053,000 for the FWOP condition are presented in Table E-2 below.

The local ability to respond to this erosion problem in the future is not known but likely limited. As homes start to erode, political pressure may force regulatory change as has happened historically in other locations along the Texas Gulf Coast.

3.2 Future With Project Condition (FWPC)

The FWPC assumes the placement of dredged material on the beaches within the study area. Coastal engineering analysis determined that the amount of material to be dredged will provide a beach fill with a berm length of approximately 1.7 miles linear feet that will last approximately 8-10 years, although several properties are expected to have some protection for up to 24 years. In the with-project condition, it was assumed that the erosion rate would remain at 1.25 feet per year, but the structures would be damaged up to 24 years later than in the FWOP condition. This is a onetime placement with no plans for renourishment. Therefore, while the project life is 8-10 years, the impact of the placement will last beyond those years. The present value was determined for structures in with-project condition based on the additional length of time before erosion undermined the structure. Structure values for the with-project condition are also presented in Table E-2.

Table E-2: Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
0	1,682,930	2029	6	0.862297	1,451,185	2034	11	0.762145	1,282,636
1	96,360	2035	12	0.743556	71,649	2041	18	0.641166	61,783
2	1,151,140	2023	0	1	1,151,140	2023	0	1.000000	1,151,140
3	387,520	2023	0	1	387,520	2023	0	1.000000	387,520
5	174,530	2036	13	0.72542	126,608	2041	18	0.641166	111,903
6	285,650	2036	13	0.72542	207,216	2041	18	0.641166	183,149
8	175,430	2023	0	1	175,430	2023	0	1.000000	175,430
11	426,110	2023	0	1	426,110	2023	0	1.000000	426,110
17	1,390,830	2023	0	1	1,390,830	2023	0	1.000000	1,390,830
18	1,334,980	2023	0	1	1,334,980	2023	0	1.000000	1,334,980
19	739,640	2036	13	0.72542	536,550	2043	20	0.610271	451,381
22	479,680	2038	15	0.690466	331,203	2046	23	0.566697	271,833
23	695,670	2025	2	0.951814	662,149	2034	11	0.762145	530,201
24	602,350	2038	15	0.690466	415,902	2044	21	0.595386	358,631
25	718,350	2023	0	1	718,350	2023	0	1.000000	718,350
26	1,109,670	2025	2	0.951814	1,056,200	2033	10	0.781198	866,872
28	701,790	2038	15	0.690466	484,562	2045	22	0.580865	407,645
29	506,360	2028	5	0.883854	447,548	2035	12	0.743556	376,507
30	490,640	2037	14	0.707727	347,239	2043	20	0.610271	299,423
32	361,910	2027	4	0.905951	327,873	2034	11	0.762145	275,828
35	700,950	2029	6	0.862297	604,427	2036	13	0.725420	508,483
37	619,520	2035	12	0.743556	460,648	2041	18	0.641166	397,215
38	679,840	2023	0	1	679,840	2031	8	0.820747	557,976

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP PROJECT CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
41	684,880	2035	12	0.743556	509,247	2042	19	0.625528	428,411
42	1,175,820	2023	0	1	1,175,820	2023	0	1.000000	1,175,820
43	589,240	2028	5	0.883854	520,802	2035	12	0.743556	438,133
44	708,550	2023	0	1	708,550	2023	0	1.000000	708,550
46	308,170	2030	7	0.841265	259,253	2037	14	0.707727	218,100
49	986,860	2026	3	0.928599	916,398	2033	10	0.781198	770,933
51	562,110	2033	10	0.781198	439,119	2039	16	0.673625	378,651
55	1,051,210	2023	0	1	1,051,210	2023	0	1.000000	1,051,210
59	958,900	2031	8	0.820747	787,014	2038	15	0.690466	662,087
61	460,280	2036	13	0.72542	333,896	2044	21	0.595386	274,044
63	743,260	2026	3	0.928599	690,191	2033	10	0.781198	580,634
68	348,370	2024	1	0.97561	339,873	2031	8	0.820747	285,923
69	442,790	2034	11	0.762145	337,470	2042	19	0.625528	276,977
76	503,780	2033	10	0.781198	393,552	2040	17	0.657195	331,082
77	952,150	2023	0	1	952,150	2023	0	1.000000	952,150
79	865,520	2030	7	0.841265	728,132	2037	14	0.707727	612,552
80	512,360	2023	0	1	512,360	2023	0	1.000000	512,360
82	926,600	2031	8	0.820747	760,504	2037	14	0.707727	655,780
83	712,170	2038	15	0.690466	491,729	2044	21	0.595386	424,016
86	781,370	2033	10	0.781198	610,405	2039	16	0.673625	526,350
88	698,510	2035	12	0.743556	519,381	2040	17	0.657195	459,057
89	1,240,200	2023	0	1	1,240,200	2023	0	1.000000	1,240,200
90	542,140	2029	6	0.862297	467,486	2035	12	0.743556	403,111
91	1,291,010	2033	10	0.781198	1,008,535	2041	18	0.641166	827,752

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
92	1,218,350	2023	0	1	1,218,350	2023	0	1.000000	1,218,350
95	1,054,340	2033	10	0.781198	823,649	2038	15	0.690466	727,985
97	549,920	2034	11	0.762145	419,119	2039	16	0.673625	370,440
98	1,513,160	2023	0	1	1,513,160	2023	0	1.000000	1,513,160
99	308,120	2035	12	0.743556	229,104	2041	18	0.641166	197,556
103	443,100	2038	15	0.690466	305,945	2043	20	0.610271	270,411
106	324,080	2035	12	0.743556	240,972	2040	17	0.657195	212,984
107	1,064,680	2034	11	0.762145	811,440	2039	16	0.673625	717,195
110	161,650	2035	12	0.743556	120,196	2040	17	0.657195	106,236
113	446,990	2033	10	0.781198	349,188	2038	15	0.690466	308,631
119	255,190	2032	9	0.800728	204,338	2038	15	0.690466	176,200
121	959,230	2023	0	1	959,230	2023	0	1.000000	959,230
122	1,338,400	2023	0	1	1,338,400	2023	0	1.000000	1,338,400
125	891,650	2025	2	0.951814	848,685	2029	6	0.862297	768,867
126	1,077,500	2027	4	0.905951	976,162	2032	9	0.800728	862,785
128	1,040,050	2026	3	0.928599	965,790	2030	7	0.841265	874,958
129	1,659,730	2028	5	0.883854	1,466,959	2033	10	0.781198	1,296,578
130	1,872,050	2028	5	0.883854	1,654,619	2033	10	0.781198	1,462,442
135	1,079,330	2023	0	1	1,079,330	2029	6	0.862297	930,703
138	1,233,200	2023	0	1	1,233,200	2027	4	0.905951	1,117,218
139	1,974,030	2023	0	1	1,974,030	2027	4	0.905951	1,788,374
140	959,700	2023	0	1	959,700	2029	6	0.862297	827,546
143	518,070	2036	13	0.72542	375,819	2043	20	0.610271	316,163
146	762,210	2038	15	0.690466	526,280	2045	22	0.580865	442,741

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
148	600,220	2038	15	0.690466	414,431	2045	22	0.580865	348,647
155	861,920	2023	0	1	861,920	2024	1	0.975610	840,898
156	1,018,280	2032	9	0.800728	815,366	2040	17	0.657195	669,209
160	469,130	2037	14	0.707727	332,016	2044	21	0.595386	279,314
161	248,470	2030	7	0.841265	209,029	2038	15	0.690466	171,560
165	433,330	2025	2	0.951814	412,450	2034	11	0.762145	330,260
167	683,000	2031	8	0.820747	560,570	2039	16	0.673625	460,086
168	506,830	2036	13	0.72542	367,665	2043	20	0.610271	309,304
182	371,030	2038	15	0.690466	256,183	2045	22	0.580865	215,518
184	1,000,870	2033	10	0.781198	781,878	2040	17	0.657195	657,767
186	733,560	2027	4	0.905951	664,569	2036	13	0.725420	532,139
187	491,840	2037	14	0.707727	348,089	2043	20	0.610271	300,156
193	537,610	2030	7	0.841265	452,273	2038	15	0.690466	371,201
197	601,400	2023	0	1	601,400	2031	8	0.820747	493,597
199	304,160	2030	7	0.841265	255,879	2038	15	0.690466	210,012
201	205,170	2030	7	0.841265	172,602	2038	15	0.690466	141,663
203	300,930	2031	8	0.820747	246,987	2038	15	0.690466	207,782
205	51,000	2031	8	0.820747	41,858	2038	15	0.690466	35,214
207	228,760	2030	7	0.841265	192,448	2038	15	0.690466	157,951
212	498,040	2029	6	0.862297	429,458	2037	14	0.707727	352,476
223	332,210	2033	10	0.781198	259,522	2040	17	0.657195	218,327
231	283,200	2032	9	0.800728	226,766	2040	17	0.657195	186,118
233	382,780	2033	10	0.781198	299,027	2040	17	0.657195	251,561
234	304,500	2032	9	0.800728	243,822	2040	17	0.657195	200,116
236	462,040	2032	9	0.800728	369,969	2040	17	0.657195	303,650

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
237	327,120	2033	10	0.781198	255,546	2040	17	0.657195	214,982
239	267,980	2033	10	0.781198	209,346	2040	17	0.657195	176,115
242	279,680	2033	10	0.781198	218,486	2040	17	0.657195	183,804
244	324,080	2033	10	0.781198	253,171	2040	17	0.657195	212,984
246	412,900	2033	10	0.781198	322,557	2040	17	0.657195	271,356
248	430,030	2034	11	0.762145	327,745	2041	18	0.641166	275,721
252	407,800	2035	12	0.743556	303,222	2041	18	0.641166	261,467
254	293,910	2033	10	0.781198	229,602	2041	18	0.641166	188,445
256	446,610	2033	10	0.781198	348,891	2041	18	0.641166	286,351
258	573,500	2035	12	0.743556	426,429	2042	19	0.625528	358,740
259	218,460	2035	12	0.743556	162,437	2042	19	0.625528	136,653
261	231,110	2035	12	0.743556	171,843	2042	19	0.625528	144,566
267	362,300	2035	12	0.743556	269,390	2042	19	0.625528	226,629
268	444,410	2036	13	0.72542	322,384	2043	20	0.610271	271,211
271	291,540	2036	13	0.72542	211,489	2043	20	0.610271	177,918
273	487,920	2036	13	0.72542	353,947	2043	20	0.610271	297,763
275	477,640	2037	14	0.707727	338,039	2043	20	0.610271	291,490
278	275,730	2037	14	0.707727	195,142	2043	20	0.610271	168,270
280	376,150	2036	13	0.72542	272,867	2043	20	0.610271	229,553
283	127,960	2023	0	1	127,960	2023	0	1.000000	127,960
287	280,250	2038	15	0.690466	193,503	2044	21	0.595386	166,857
289	397,140	2038	15	0.690466	274,211	2044	21	0.595386	236,452
291	697,730	2038	15	0.690466	481,759	2044	21	0.595386	415,419
293	778,330	2038	15	0.690466	537,410	2045	22	0.580865	452,104

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
295	628,300	2037	14	0.707727	444,665	2043	20	0.610271	383,433
299	520,800	2023	0	1	520,800	2023	0	1	520,800
315	1,604,500	2033	10	0.781198	1,253,433	2045	22	0.580865	931,997
316	1,567,530	2029	6	0.862297	1,351,676	2041	18	0.641166	1,005,047
320	1,515,540	2025	2	0.951814	1,442,513	2039	16	0.673625	1,020,906
321	1,142,340	2023	0	1	1,142,340	2037	14	0.707727	808,465
322	1,605,360	2023	0	1	1,605,360	2037	14	0.707727	1,136,157
323	1,670,850	2023	0	1	1,670,850	2025	2	0.951814	1,590,339
324	1,298,970	2025	2	0.951814	1,236,378	2039	16	0.673625	875,019
325	1,782,120	2027	4	0.905951	1,614,513	2041	18	0.641166	1,142,635
326	1,315,530	2029	6	0.862297	1,134,377	2042	19	0.625528	822,900
328	932,010	2028	5	0.883854	823,761	2041	18	0.641166	597,573
329	2,223,130	2027	4	0.905951	2,014,046	2041	18	0.641166	1,425,395
333	1,166,520	2027	4	0.905951	1,056,810	2041	18	0.641166	747,933
334	1,495,390	2024	1	0.97561	1,458,917	2039	16	0.673625	1,007,332
337	1,565,380	2025	2	0.951814	1,489,951	2039	16	0.673625	1,054,479
340	1,152,110	2024	1	0.97561	1,124,010	2038	15	0.690466	795,492
342	23,576,360	2023	0	1	23,576,360	2023	0	1	23,576,360
344	1,824,270	2023	0	1	1,824,270	2037	14	0.707727	1,291,085
345	91,000	2024	1	0.97561	88,780	2037	14	0.707727	64,403
346	1,149,750	2023	0	1	1,149,750	2037	14	0.707727	813,709
348	427,940	2023	0	1	427,940	2023	0	1	427,940
350	1,230,570	2023	0	1	1,230,570	2027	4	0.905951	1,114,836
352	926,910	2023	0	1	926,910	2026	3	0.928599	860,728

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 2 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
354	970,540	2023	0	1	970,540	2026	3	0.928599	901,243
355	1,598,040	2023	0	1	1,598,040	2023	0	1	1,598,040
356	900,510	2023	0	1	900,510	2023	0	1	900,510
358	659,710	2023	0	1	659,710	2025	2	0.951814	627,921
359	736,140	2023	0	1	736,140	2025	2	0.951814	700,669
360	765,200	2023	0	1	765,200	2025	2	0.951814	728,328
361	670,040	2023	0	1	670,040	2024	1	0.97561	653,698
363	966,780	2023	0	1	966,780	2024	1	0.97561	943,200
365	1,000,490	2023	0	1	1,000,490	2025	2	0.951814	952,281
366	858,470	2023	0	1	858,470	2025	2	0.951814	817,104
367	1,239,180	2023	0	1	1,239,180	2024	1	0.97561	1,208,956
368	7,915,290	2027	4	0.905951	7,170,862	2030	7	0.841265	6,658,858
369	7,587,360	2023	0	1	7,587,360	2026	3	0.928599	7,045,618
370	6,389,370	2023	0	1	6,389,370	2026	3	0.928599	5,933,165

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
0	1,682,930	2029	6	0.862297	1,451,185	2035	12	0.743556	1,251,353
1	96,360	2035	12	0.743556	71,649	2041	18	0.641166	61,783
2	1,151,140	2023	0	1	1,151,140	2023	0	1	1,151,140
3	387,520	2023	0	1	387,520	2023	0	1	387,520
5	174,530	2036	13	0.72542	126,608	2042	19	0.625528	109,173
6	285,650	2036	13	0.72542	207,216	2042	19	0.625528	178,682
8	175,430	2023	0	1	175,430	2023	0	1	175,430
11	426,110	2023	0	1	426,110	2023	0	1	426,110
17	1,390,830	2023	0	1	1,390,830	2023	0	1	1,390,830
18	1,334,980	2023	0	1	1,334,980	2023	0	1	1,334,980
19	739,640	2036	13	0.72542	536,550	2043	20	0.610271	451,381
22	479,680	2038	15	0.690466	331,203	2046	23	0.566697	271,833
23	695,670	2025	2	0.951814	662,149	2034	11	0.762145	530,201
24	602,350	2038	15	0.690466	415,902	2045	22	0.580865	349,884
25	718,350	2023	0	1	718,350	2023	0	1	718,350
26	1,109,670	2025	2	0.951814	1,056,200	2034	11	0.762145	845,729
28	701,790	2038	15	0.690466	484,562	2045	22	0.580865	407,645
29	506,360	2028	5	0.883854	447,548	2036	13	0.72542	367,324
30	490,640	2037	14	0.707727	347,239	2044	21	0.595386	292,120
32	361,910	2027	4	0.905951	327,873	2035	12	0.743556	269,100
35	700,950	2029	6	0.862297	604,427	2037	14	0.707727	496,081
37	619,520	2035	12	0.743556	460,648	2042	19	0.625528	387,527
38	679,840	2023	0	1	679,840	2032	9	0.800728	544,367

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
41	684,880	2035	12	0.743556	509,247	2042	19	0.625528	428,411
42	1,175,820	2023	0	1	1,175,820	2023	0	1	1,175,820
43	589,240	2028	5	0.883854	520,802	2036	13	0.72542	427,447
44	708,550	2023	0	1	708,550	2028	5	0.883854	626,255
46	308,170	2030	7	0.841265	259,253	2038	15	0.690466	212,781
49	986,860	2026	3	0.928599	916,398	2034	11	0.762145	752,130
51	562,110	2033	10	0.781198	439,119	2040	17	0.657195	369,416
55	1,051,210	2023	0	1	1,051,210	2031	8	0.820747	862,777
59	958,900	2031	8	0.820747	787,014	2039	16	0.673625	645,939
61	460,280	2036	13	0.72542	333,896	2045	22	0.580865	267,360
63	743,260	2026	3	0.928599	690,191	2034	11	0.762145	566,472
68	348,370	2024	1	0.97561	339,873	2033	10	0.781198	272,146
69	442,790	2034	11	0.762145	337,470	2043	20	0.610271	270,222
76	503,780	2033	10	0.781198	393,552	2040	17	0.657195	331,082
77	952,150	2023	0	1	952,150	2031	8	0.820747	781,474
79	865,520	2030	7	0.841265	728,132	2037	14	0.707727	612,552
80	512,360	2023	0	1	512,360	2023	0	1	512,360
82	926,600	2031	8	0.820747	760,504	2038	15	0.690466	639,785
83	712,170	2038	15	0.690466	491,729	2045	22	0.580865	413,674
86	781,370	2033	10	0.781198	610,405	2040	17	0.657195	513,513
88	698,510	2035	12	0.743556	519,381	2041	18	0.641166	447,861
89	1,240,200	2023	0	1	1,240,200	2023	0	1	1,240,200
90	542,140	2029	6	0.862297	467,486	2036	13	0.72542	393,279
91	1,291,010	2033	10	0.80051	1,033,467	2041	18	0.669978	864,948

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
92	1,218,350	2023	0	1	1,218,350	2023	0	1	1,218,350
95	1,054,340	2033	10	0.781198	823,649	2039	16	0.673625	710,230
97	549,920	2034	11	0.762145	419,119	2040	17	0.657195	361,405
98	1,513,160	2023	0	1	1,513,160	2023	0	1	1,513,160
99	308,120	2035	12	0.743556	229,104	2041	18	0.641166	197,556
103	443,100	2038	15	0.690466	305,945	2044	21	0.595386	263,816
106	324,080	2035	12	0.743556	240,972	2041	18	0.641166	207,789
107	1,064,680	2034	11	0.762145	811,440	2040	17	0.657195	699,702
110	161,650	2035	12	0.743556	120,196	2041	18	0.641166	103,644
113	446,990	2033	10	0.781198	349,188	2039	16	0.673625	301,104
119	255,190	2032	9	0.800728	204,338	2038	15	0.690466	176,200
121	959,230	2023	0	1	959,230	2023	0	1	959,230
122	1,338,400	2023	0	1	1,338,400	2023	0	1	1,338,400
125	891,650	2025	2	0.951814	848,685	2031	8	0.820747	731,819
126	1,077,500	2027	4	0.905951	976,162	2033	10	0.781198	841,741
128	1,040,050	2026	3	0.928599	965,790	2032	9	0.800728	832,798
129	1,659,730	2028	5	0.883854	1,466,959	2034	11	0.762145	1,264,955
130	1,872,050	2028	5	0.883854	1,654,619	2034	11	0.762145	1,426,773
135	1,079,330	2023	0	1	1,079,330	2028	5	0.883854	953,970
138	1,233,200	2023	0	1	1,233,200	2026	3	0.928599	1,145,149
139	1,974,030	2023	0	1	1,974,030	2023	0	1	1,974,030
140	959,700	2023	0	1	959,700	2028	5	0.883854	848,235
143	518,070	2036	13	0.72542	375,819	2043	20	0.610271	316,163
146	762,210	2038	15	0.690466	526,280	2045	22	0.580865	442,741

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
148	600,220	2038	15	0.690466	414,431	2045	22	0.580865	348,647
155	861,920	2023	0	1	861,920	2023	0	1	861,920
156	1,018,280	2032	9	0.800728	815,366	2040	17	0.657195	669,209
160	469,130	2037	14	0.707727	332,016	2043	20	0.610271	286,296
161	248,470	2030	7	0.841265	209,029	2038	15	0.690466	171,560
165	433,330	2025	2	0.951814	412,450	2034	11	0.762145	330,260
167	683,000	2031	8	0.820747	560,570	2038	15	0.690466	471,588
168	506,830	2036	13	0.72542	367,665	2043	20	0.610271	309,304
182	371,030	2038	15	0.690466	256,183	2044	21	0.595386	220,906
184	1,000,870	2033	10	0.781198	781,878	2040	17	0.657195	657,767
186	733,560	2027	4	0.905951	664,569	2035	12	0.743556	545,443
187	491,840	2037	14	0.707727	348,089	2043	20	0.610271	300,156
193	537,610	2030	7	0.841265	452,273	2038	15	0.690466	371,201
197	601,400	2023	0	1	601,400	2031	8	0.820747	493,597
199	304,160	2030	7	0.841265	255,879	2038	15	0.690466	210,012
201	205,170	2030	7	0.841265	172,602	2038	15	0.690466	141,663
203	300,930	2031	8	0.820747	246,987	2038	15	0.690466	207,782
205	51,000	2031	8	0.820747	41,858	2038	15	0.690466	35,214
207	228,760	2030	7	0.841265	192,448	2038	15	0.690466	157,951
212	498,040	2029	6	0.862297	429,458	2037	14	0.707727	352,476
223	332,210	2033	10	0.781198	259,522	2040	17	0.657195	218,327
231	283,200	2032	9	0.800728	226,766	2040	17	0.657195	186,118
233	382,780	2033	10	0.781198	299,027	2040	17	0.657195	251,561
234	304,500	2032	9	0.800728	243,822	2040	17	0.657195	200,116
236	462,040	2032	9	0.800728	369,969	2040	17	0.657195	303,650

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
237	327,120	2033	10	0.781198	255,546	2040	17	0.657195	214,982
239	267,980	2033	10	0.781198	209,346	2041	18	0.641166	171,820
242	279,680	2033	10	0.781198	218,486	2040	17	0.657195	183,804
244	324,080	2033	10	0.781198	253,171	2040	17	0.657195	212,984
246	412,900	2033	10	0.781198	322,557	2040	17	0.657195	271,356
248	430,030	2034	11	0.762145	327,745	2041	18	0.641166	275,721
252	407,800	2035	12	0.743556	303,222	2042	19	0.625528	255,090
254	293,910	2033	10	0.781198	229,602	2041	18	0.641166	188,445
256	446,610	2033	10	0.781198	348,891	2041	18	0.641166	286,351
258	573,500	2035	12	0.743556	426,429	2042	19	0.625528	358,740
259	218,460	2035	12	0.743556	162,437	2042	19	0.625528	136,653
261	231,110	2035	12	0.743556	171,843	2042	19	0.625528	144,566
267	362,300	2035	12	0.743556	269,390	2042	19	0.625528	226,629
268	444,410	2036	13	0.72542	322,384	2043	20	0.610271	271,211
271	291,540	2036	13	0.72542	211,489	2043	20	0.610271	177,918
273	487,920	2036	13	0.72542	353,947	2043	20	0.610271	297,763
275	477,640	2037	14	0.707727	338,039	2043	20	0.610271	291,490
278	275,730	2037	14	0.707727	195,142	2043	20	0.610271	168,270
280	376,150	2036	13	0.72542	272,867	2043	20	0.610271	229,553
283	127,960	2023	0	1	127,960	2023	0	1	127,960
287	280,250	2038	15	0.690466	193,503	2044	21	0.595386	166,857
289	397,140	2038	15	0.690466	274,211	2044	21	0.595386	236,452
291	697,730	2038	15	0.690466	481,759	2044	21	0.595386	415,419
293	778,330	2038	15	0.690466	537,410	2045	22	0.580865	452,104

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
295	628,300	2037	14	0.707727	444,665	2044	21	0.595386	374,081
299	520,800	2023	0	1	520,800	2023	0	1	520,800
315	1,604,500	2033	10	0.781198	1,253,433	2044	21	0.595386	955,297
316	1,567,530	2029	6	0.862297	1,351,676	2040	17	0.657195	1,030,173
320	1,515,540	2025	2	0.951814	1,442,513	2037	14	0.707727	1,072,589
321	1,142,340	2023	0	1	1,142,340	2023	0	1	1,142,340
322	1,605,360	2023	0	1	1,605,360	2023	0	1	1,605,360
323	1,670,850	2023	0	1	1,670,850	2023	0	1	1,670,850
324	1,298,970	2025	2	0.951814	1,236,378	2038	15	0.690466	896,894
325	1,782,120	2027	4	0.905951	1,614,513	2039	16	0.673625	1,200,480
326	1,315,530	2029	6	0.862297	1,134,377	2041	18	0.641166	843,473
328	932,010	2028	5	0.883854	823,761	2040	17	0.657195	612,512
329	2,223,130	2027	4	0.905951	2,014,046	2039	16	0.673625	1,497,556
333	1,166,520	2027	4	0.905951	1,056,810	2039	16	0.673625	785,797
334	1,495,390	2024	1	0.97561	1,458,917	2037	14	0.707727	1,058,328
337	1,565,380	2025	2	0.951814	1,489,951	2038	15	0.690466	1,080,841
340	1,152,110	2024	1	0.97561	1,124,010	2036	13	0.72542	835,764
342	23,576,360	2023	0	1	23,576,360	2023	0	1	23,576,360
344	1,824,270	2023	0	1	1,824,270	2023	0	1	1,824,270
345	91,000	2024	1	0.97561	88,780	2023	0	1	91,000
346	1,149,750	2023	0	1	1,149,750	2023	0	1	1,149,750
348	427,940	2023	0	1	427,940	2023	0	1	427,940
350	1,230,570	2023	0	1	1,230,570	2023	0	1	1,230,570
352	926,910	2023	0	1	926,910	2023	0	1	926,910

Table E-2 (Continued): Structure Valuation for FWOP and FWP Conditions									
		FWOP CONDITIONS				ALT 3 FWP CONDITIONS			
Structure ID	2021 Depreciated Replacement Values	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*	*Year Damaged*	*Study Year*	*Present Value Factor*	*Present Value*
354	970,540	2023	0	1	970,540	2023	0	1	970,540
355	1,598,040	2023	0	1	1,598,040	2023	0	1	1,598,040
356	900,510	2023	0	1	900,510	2023	0	1	900,510
358	659,710	2023	0	1	659,710	2023	0	1	659,710
359	736,140	2023	0	1	736,140	2023	0	1	736,140
360	765,200	2023	0	1	765,200	2023	0	1	765,200
361	670,040	2023	0	1	670,040	2023	0	1	670,040
363	966,780	2023	0	1	966,780	2023	0	1	966,780
365	1,000,490	2023	0	1	1,000,490	2023	0	1	1,000,490
366	858,470	2023	0	1	858,470	2023	0	1	858,470
367	1,239,180	2023	0	1	1,239,180	2023	0	1	1,239,180
368	7,915,290	2027	4	0.905951	7,170,862	2027	4	0.905951	7,170,862
369	7,587,360	2023	0	1	7,587,360	2023	0	1	7,587,360
370	6,389,370	2023	0	1	6,389,370	2023	0	1	6,389,370

4 Project Benefits

5.1 Coastal Storm Damage Reduction

The benefit of providing measures to manage the risk of coastal storm damage in the study area is equal to the reduction in annual damages between the FWOPC and FWPC.

The value of structure damages in the FWOPC is approximately $148.9 million compared to $133.2 million under Alternative 2 and $136.8 million under Alternative 3. Annual damages, presented in Table E-3, were calculated using the current 2023 Fiscal Year Federal Discount Rate of 2.5% for the 24-year life of the project. A total of 158 residential structures are expected to be damaged due to coastal erosion from 2023 to 2037 if risk reduction measures are not implemented.

Engineering analysis determined that not all the damaging erosion could be considered littoral; that approximately 15% of the erosion problem was attributable to storm damage. Based upon those parameters, land values obtained from the Galveston County Assessor's Office for 2021 were analyzed for potential land loss avoidance benefits. Based upon those values, the average per acre land value was roughly $942,000 with a resulting square foot value of $22.00. Using that last figure with approximately 27,000 linear feet of shoreline impacted and the landward erosion rate of 1.25 feet per year, annual eroded area was roughly 33,700 square feet with an overall value of $740.5K. Multiplied by 24 years, that resulted in total potential land loss valued at $17.8M under FWOP conditions and about $5.9M under FWP conditions, an overall life cycle benefit of $11.9M. Next, that overall benefit was amortized over an estimated 8 years of land loss delays avoided to arrive at an annual benefit of $1.6M. Finally, that figure has been multiplied by the 15% engineering portion assigned to storm erosion and a factor of 93% developed land for an overall benefit of just over $245K per year attributable to either placement site.

Table E-3: Annual Structure and Land Loss Damages Calculations

	FWOP	FWP ALT 2	FWP ALT 3
Total Damages over 24 years	$148,887,000	$133,227,000	$136,806,000
Capital Recovery Factor	0.0559	0.0559	0.0559
Annual Damages to Structures	$8,325,000	$7,449,000	7,649,000
# Structs Delay Dmg over 24 years	0	136	116
Annual Benefit (Structures)		**$875,600**	**$675,500**
Annual Land Loss Avoided		**$245,200**	**$245,200**

5 Recreation

Beach nourishment provides enhanced recreational benefits based on overall enhanced beach experience. There are a number of beach access points along the stretch of beach under consideration for both Alternative 2 and 3 (see Real Estate Appendix for detailed locations). These facilities basically consist of a paved unlined road off of FM 3005 leading to small unpaved parking lots of sand. The beach activities include typical ones: picnicking and swimming as well as strolling/walking and occasional bicycle riding on the compacted sand near the Gulf water.

Recreation Benefits were estimated using the USACE-approved Unit Day Value Methodology (Economic Guidance Memo 22-03, Oct 2021). Galveston Park Board provided visitation estimates for all areas generally defined as West End Beaches, which contain the overall study areas described earlier. Using cell phone tracking, approximately 53,000 visitors traveled to the West End of Galveston Island (baseline years 2018-2020). Using the study area length of 1.7 miles out of approximately 20 miles of beach overall, approximately 8.5% of visits (4,500) were allocated to the study area. With an average family size of 2.6 persons, that resulted in just over 12,000 person visits per year to the study area beach stretches.

Next, the Unit Day Value criteria were assigned both under FWOPC and FWPC and assigned an appropriate value per the economic guidance memorandum referenced above; the results are presented here:

Table E-4: Annual Recreation Benefits Calculations

UDV Criteria	Point Range	FWOPC Project Points	FWP Project Points
Recreation Experience	0-30	4	10
Availability of Opportunity	0-18	3	3
Carrying Capacity	0-14	2	5
Accessibility	0-18	6	6
Environmental Aesthetic	0-20	2	6
Total Points		17	30
Value/User/Day		$5.94	$7.28

Next, discussions with the Park Board indicated that under expected erosion conditions forecast, half the visitation would be expected to be lost. Thus, under FWOPC, annual recreation value was estimated at $35,900 ($5.94 x 6,000 visitors, rounded). Under FWPC, that same value would be approximately $87,800 ($7.28 x 12,000 visitors). Thus, the difference between the two annual values—$51,900—represents Annual Recreation Benefits for dredge material placement under both alternatives.

6 Benefit and Cost Comparison

The benefit of providing protection through beneficial use of dredged material is equal to the reduction in annual damages between the FWOPC and FWPC, plus land loss avoidance and recreation benefits obtained from beach sand nourishment. Benefits are then compared to the incremental cost of sand placement over the least-cost Federal Navigation Base Plan (open water disposal). In this case, the same amount of sand was considered for two different sections of beach on Galveston Island's West End. Essentially, twenty (20) more structures are protected in the stretch protected by Alternative 2 and is supported by the non-Federal Sponsor. Per policy, it is the National Economic Development (NED) Plan—$368K vs. $145K in Net Annual Benefits—and in this case also the Recommended Plan. Table E-5 below presents the two incremental project costs (including Interest During Construction—IDC) as well as the Net Annual Benefits associated with each of the two Alternatives/placement sites analyzed.

Table E-5: Benefit-Cost Comparison

Beneficial Use of Dredge Material - §204	Alternative 2	Alternative 3
FY 2023/(Oct '22) Total First Incremental Cost	**$14,427,000**	**$14,838,000**
IDC - @ 2.5% (5 mos. Construction schedule; IDC charged 3 mos.)	$30,000	$31,000
FY 2023 Total Investment	**$14,457,000**	**$14,869,000**
Capital Recovery Factor—24 years	0.0559	0.0559
FY 2023 Ann. Increment. Costs @ 2.5%; 24-Year Period of Analysis	**$808,000**	**$831,000**
Annual Land Loss Avoided	$248,000	$248,000
Annual Recreation Benefits	$52,000	$52,000
Annual Structures Benefits (using Galveston Co Assess Values 2021)	$876,000	$676,000
Total Annual Benefits	**$1,176,000**	**$976,000**
Net Annual Benefits	**$368,000**	$145,000
Benefit-Cost Ratio	**1.46**	**1.17**

Galveston Island Coastal Erosion CAP 204 Project

Public Comment Appendix F FINAL

Gulf of Mexico
Galveston, Texas

October 2022

Appendix F

Public Comments and USACE Responses

for

Galveston Island Coastal Erosion CAP 204 Project

Galveston, Texas

Matrix of Public Comments and USACE Responses

Letter Attachments

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
1	Matt Bomberger	Citizen	7/21/2022	Email	Y	Raven, As a new homeowner in Spanish Grant, I humbly support efforts to restore the dunes! Keep up the great work!	Concur
2	Melissa Dramberger	Citizen	7/21/2022	Email	Y	I have a home on Bermuda Beach Rd and strongly support all efforts to replace our beach that has been greatly eroded over the years Thanks	Concur
3	Alexia & Antonio Benavides	Citizen	7/21/2022	Email	Y	Dear Mr. Blakeway, We are very blessed to own a beachfront home in Bermuda Beach. We used to have a beautiful dune in front of our house, that got pretty much wiped out in 2019 during 3 smaller hurricanes, and has not come back. There used to be wildlife – bunnies, snakes and even a coyote living in front of the house. It would be great to restore some of the natural beauty of the gulf shoreline. To us – there is nothing like coming to the island, and being so close to nature and the elements. Since these hurricanes, we have done everything we could to "grow"/ restore the dunes in front of our house, but it is a very slow process, and any help is much much appreciated. Thank you for all your efforts in preserving the island for future generations.	Concur
4	Tammy Childress	Citizen	7/21/2022	Email	Y	My name is Tammy Childress. I live at Bermuda Beach on the West end of Galveston. We are in desperate need of beach replenishment. I have been out here for over 50 years. I remember when residents paid to replace the sand and plant sea oats. The last 2 years have been brutal for our beaches due to storms. I'm all for this project. Please help us.	Concur
5	June Boler	Citizen	7/21/2022	Email	Y	To dr raven blackwell I have a house on john reynolds rd and am in favor of your proposal.	Concur
6	Monte & Donna Vincent	Citizen	7/21/2022	Email	Y	Dr. Blakeway, As a homeowner since 2003 in Spanish Grant Beach Side, I have over the years become very concerned with the erosion problem on the West End. I am now a permanent resident of Galveston Island West End. I feel very strongly that the Nourishment program be continued. I know Brandon Hill and his team have worked very hard to find solutions to the existing situation. Discontinuing the nourishment program would undermine a lot of their efforts. This is very true after the serious erosion issues we have experienced here in the past two years at Spanish Grant. Thank you for your support in this matter.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
7	Katherine Stetzer	Citizen	7/22/2022	Email	Y	Dear Dr. Blakeway, I am writing to you personally regarding the Galveston Island Coastal erosion, CAP 204 project. Galveston is a historic community largely economically dependent on tourism and the ship channel business. They are inextricably linked. The beaches are eroding due to the many causes are all familiar with. But there are solutions, things can be done and I am glad to hear that you are part of that effort. I would like to add my personal support. Infrastructure: The island invests seriously in its infrastructure, roads, power, water etc. If these investments are to be secured, we need to build the beaches. Ecology: The island is a treasure trove of ecological specie. If we are to protect the animal and plant life of the island, we need to build the beaches. Economics: The island, as stated is dependent on tourism. If people are to travel to Galveston, we need to build the beaches. Also, the home owners in Galveston fund, by taxation the feasibility of Galveston. The home owners of the west end in particular are threatened by beach erosion. They will be forced to abandon structures, lose their investments, New builds will be impossible if the beaches are not available and preserved. The taxes collected from these properties is a significant percentage of the annual Galveston budget. The individuals and communities of the West End are ready and available to participate in the effort to preserve, rebuild the beaches. We pay hefty taxes and deserve the chance to survive on the island as we are significant participants in its economic future. We hope you will give your maximum effort to this project. I am including a link to an article I just read in the Rolling Stone Magazine about 4 women who were tasked with destroying 1200 tons of poison gas from Syria. An impossible task, that got done https://www.rollingstone.com/politics/politics-features/syria-war-chemical-weapons-sarin-1296374/ - How Four Women Destroyed 1,200 Tons of Poison Gas — and Defused a Crisis I am sure you can get this done.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
8	Greg & Teddi Wilson	Citizen	7/22/2022	Email	Y	Dear Dr. Blakeway, We are home owners in Spanish Grant on Galveston West End. We are writing to let you know that we enthusiastically support CAP 204 Project. The water surges since 2020 have done damage all along our beach area. We need this project to begin protecting our ROADS and Homes!	Concur
9	Rick Josselet	Citizen	7/23/2022	Email	Y	Good morning Raven. I am imploring you to please approve the dredge and move sand from the channel to the west end of Galveston Island. This has been identified as an urgent need by the city and the Corps of Engineering " The erosion at the west end of the Galveston seawall has been highlighted in the Beaches and Dunes Coastal Texas Study as an erosion hotspot. Resulting in the recommendation of the proposed 18-mile long beach and dune system along the Gulf-facing side of West Galveston Island. The GLO Sediment Budget builds upon the scaffolding created in the USACE SWG 50-year sediment management plan. Its updated modeling results show continued erosion on the west end (particularly cells 20 and 21) and should be incorporated into current and future efforts. " Please move this project forward. We own a home on the front row of Bermuda Beach. We know this is an urgent need. Erosion is bad for the city the county and its citizens. Let me know if you have questions or reservations. Thank you very much!	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
10	Carolyn Cerny Bilski	Citizen	7/24/2022	Email	Y	As the President of the Spanish Grant Beach Civic Association, and on behalf of our Board and Homeowners/Taxpayers, we respectfully request operations personnel to move forward with this proposed project to SAVE our coastal beaches, public infrastructure and our homes which contribute to the overall prosperity of Texas. AS part of the public comment process we once again request approval of this project and find no reason it should not move forward as soon as possible. Your attention to this matter is needed and appreciated. Respectfully,	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
11	Peggy Zahler	Citizen	7/24/2022	Email	Y	Dr. Blakeway, As a property owner in Spanish Grant Beach and President of the Civic Association during and after Ike, I respectfully request that my strong support for this project be considered and the project be approved by the USACE. I am Vice President of the West Galveston Island Property Owners Association and a member of the Park Board Beach Maintenance Advisory Committee. I have committed my time for several years to understand erosion issues and work toward protecting the West End property and infrastructure. Spanish Grant Beach (SGB) is now a subdivision of 67 properties. Since the 1960's we have lost several rows of properties to erosion. After Ike, I was not sure we could become a viable subdivision with our loss of infrastructure and 16 properties. With the strong commitment of some, we survived. I doubt we will be this fortunate in the future with lack of protection. I believe we are at the critical point of determining our future—survival or retreat and give up. The weather events are becoming more extreme thus SGB becomes more at risk. A different way of assessing options needs to be considered as well as regional assessments. With the ongoing supply chain issues, our ports are continually demonstrating their impact on the survival of our economy. To consider decisions that would limit cargo ship access to the Houston Port seems very short sighted. It is imperative that we explore all opportunities to protect ourselves and work together as a team. I request that you take the step to assess projects differently and support the Galveston West End CAP 204 proposed project. Please contact me if I can answer any questions or be of assistance.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
12	David & Cindy Hansen	Citizen	7/25/2022	Email	Y	Good morning Dr. Raven Blakeway, My wife and I recently learned of this effort and are in full support of it. We purchased a home in the Bermuda Beach community in April of 2018. It is our fulltime residence. We have experienced the degradation of the beach over the last few years and it is concerning, to say the least. The storms during 2020 / 2021 were particularly damaging, with the resulting damage including removal of any dunes that existed between our entry roadway (Bermuda Beach Road) and the beach. There are now times where the road is impassable to residents as well as emergency vehicles, and that can occur just during high tides, without the further impact of high winds or flooding. Much of the sand on the beach was also carried away in the erosion, as were the wooden walkways that once were needed to pass over the dunes without damaging them. We welcome any efforts in place or planned to restore the level of the beaches in our area and offer to help those efforts as we can.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
13	Jeff Thompson	Citizen	7/25/2022	Email	Y	Hi Raven, I am writing to you about the importance of fixing our beaches and to support the Galveston Island Coastal Erosion Project. I am over 40 years old and have been going down to Galveston my whole life and now have a beach house in Spanish Grant. During that time, I have seen a lot of change and beach (sand) erosion, with the land gone and so many houses gone permanently. Most of the erosion has been caused by man, dredging the ship channel, the sea wall, and dikes/jetties. It's defiantly caused by man otherwise 1000s of years ago we wouldn't have any intercoastal areas the beach would be right up on Tiki Island and were Kemah is for example and Galveston Island would be long gone. I see the best option is to constantly go up and down all the Island (Galveston) from San Luis Pass to the ship channel East of Galveston and keep adding sand year-round and building up sand dunes. To protect people, homes, rode's, and wildlife/ecosystem to support life. I liked the suggestion someone said of a cement wall, like those down the middle of the highway, burry those halfway in the sand and pile sand over those to make a sand dune, from the sea wall to San Luis Pass. Put a couple of nice walkways over them. Currently there isn't anything west of Galveston that you can call a sand dune. Basically non-existent, the two-foot-high sand dune in just part of Spanish Grant, was all but taken out by the CAT 1 Hurricane last September, and that was just about a 1-to-2-foot storm surge. From Spanish to Pirates there is no Sand Dunes to protect the land and homes. I know people are trying to capture sand with Christmas trees and appreciate the effort, but let's be honest that doesn't do anything, since the water/high tide comes right up to them. The jetties/dikes maybe doing more harm than good, probably making the water more turbulent and speeding up the erosion. Not sure it would work but what about a few huge barriers like dikes that can better hold the sand in or at least slow it down. Also, the barriers that were created years ago just North of Tiki Island isn't allowing the natural flow of sediments and erosion to come into the bay and intercoastal areas, to bring in more nutrients for plants and animals. I know it is to slow or stop a storm surge. A concerned citizen and neighbor, Thank you Jeff Thompson	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
14	Jen Spills	Citizen	7/27/2022	Email	Y	Good afternoon I am a homeowner in the Spanish Grant neighborhood on the West End of Galveston Island. My house is located at 12610 W. Buena Vista Dr. This is my full time residence and I work from home full time. I currently have no dunes on the public beach directly in front of my home and the small dune that I have in my yard is no match for high water and wind. I am begging for assistance and protection of my home, my investment, our beachfront. I urge you to please consider all options in expanding the sand dune beach restoration project to include our neighborhoods and to help us to protect our properties. This request is specifically asking for the placement of sand dregged from the Houston ship channel entrance on the west end of the island to our beachfront communities. The number of wildlife, visitors and property owners that this project will impact is great and I urge you to please	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
15	Sandra & Mike Chambers	Citizen	7/28/2022	Email	Y	Dear Dr. Blakeway, As a homeowner in the Spanish Grant Beach subdivision, we respectfully request operations personnel to move forward with this proposed project to SAVE our coastal beaches, public infrastructure and our homes which contribute to the overall prosperity of Texas. The tropical storms of recent years have done so much damage to our roads and the infrastructure which protects and provides safe access to and from our subdivision homes and beach. Our property taxes for our home have doubled, while the access roads around it have deteriorated and allowed water up under our houses. We need the dunes and beaches to protect our roads which provide safe access to and from our homes in addition to creating safe access to the public beach. In addition to safe access, we feel the obligation to restore the natural resources of Texas, that so many people enjoy all year long. It is painful to watch the tides wash our shorelines out to sea and take the hope of our community with it. That is why we are asking for the approval of this project request that it move forward as soon as possible. Your attention to this matter is needed and greatly appreciated.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
16	Kim Van Camp	Citizen	7/31/2022	Email	Y	Dr. Raven Blakeway I and my family have been regular visitors to the Island since the mid 1980s. At first it was just summer get togethers with kids, then once they grew up and got married with kids of their own, we started renting a house on the West End, at least once every summer. Watching your children and grandchildren enjoying themselves on the beach never gets old. Nine years ago my wife and I purchased a condo along the stretch of beach where a replenishment program has been proposed. Specifically we live in the Riviera II Condominium. Taken together the Riviera I, Riviera II and West Beach Grand form a close knit community of 101 units. Fifteen of the units house permanent residents. The long standing policy of the condos prohibiting short term rentals makes it unique environment, with lots of neighboring, little crime, little noise and plenty of family activity. I've observed over the years, and especially these last nine years, the beach erode to the point where there's far less room for beach goers to spread out. In some places the beach has narrowed to the point where high tides make movement up and down the beach difficult. At the current rate I foresee the water eventually lapping up to FM3005. Not so many years ago the beach was wide enough to support a good size well established dune in front of the condos. That has gone away. Now the water laps up to the building edges during a strong tide event, exposing parts of the buildings' foundations. The Continuing Authority Program Project known as "Galveston Island Coastal Erosion" is crucial to the continued safety and connectivity of the West End of the Island. The West End of the Island contains some of the most at-risk properties in Galveston thanks to erosion rates between -5 and -11 feet per year. It's not just the condos. Many of the adjacent neighborhoods have lost public streets, and now have rows of homes only accessible by driving on the beach. This project addresses a problem long acknowledged in USACE and ERDC documentation, as identified in and evidenced by the documents below. • 2012: City of Galveston Erosion Response Plan introduces short-term priorities which rank 61st to the end of Seawall and end of Seawall west to 13-mile Road as High Priority • 2016: ERDC and USACE SWG develop and publish	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
						a 50-year sediment management plan for Galveston Island • 2019: GLO Coastal Resiliency Master Plan Project R1-22 calls for shoreline stabilization and a feeder beach from end of seawall to 8-mile road citing "Many of the Galveston Island beaches are experiencing heavy rates of erosion with shoreline losses ranging from 1.6 feet to 11.5 feet per year since the year 2000". • 2021: USACE SWG Coastal Texas Study and GLO Sediment Budget Analysis and Modeling of the Texas Coast; The erosion at the West End of the Galveston seawall has been highlighted in the Beaches and Dunes Coastal Texas Study as an erosion hotspot. Resulting in the recommendation of the proposed 18-mile-long beach and dune system along the Gulf-facing side of West Galveston Island. The CAP 204 team has embraced the tenets of adaptive management and opened the door to future efforts which may finally explore the full breadth of recommendations contained throughout the publications above. The alternative (2) that was selected places material directly in front of some of the most vulnerable residences on Galveston Island, which lie approximately 5 miles from the current BUDM site. I understand that this project has exceeded the 1.0 benefit to cost ratio requirement achieving a BCR of 5.62 and has both the State General Land Office and the City of Galveston's support to address the incremental cost associated with the BUDM. The community support to address the erosion crisis on the West End of Galveston Island is extensive. I say that as a full time Galveston resident. Galveston is where we attend church, have friends, pay taxes and engage in community dialog. We acknowledge the additional hurdles moving the material further west presents which must be overcome. We understand that in the discussions of this project thus far USACE SWG Operations has raised concern that the proposed placement of material on the West End could result in restriction of the dredge plants. Regardless, we sincerely hope practical solutions can be found to mitigate these concerns. I write to you to show my support and that of our condo community for this effort and urge the Galveston District to push forward with this concept. We know that no project can jeopardize the districts mission of maintaining an unencumbered channel, this	

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
						fact is paramount, however, the erosion crisis on the West End is just as absolute and something must be done. Thank you.	

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
17	Saba Bou-Chebl	Citizen	7/31/2022	Email	Y	For over 25 years, I have been a homeowner in the Bermuda Beach Subdivision. I have a vested interest in the Galveston Island Costal Erosion Project. Therefore, I am writing to you to include my two cents worth of input. The way I see it, this project would be a win-win-win for all parties concerned. First, it would be a great benefit for homeowners like me. We need the additional protection that this project would provide. In my 25 years of ownership, I have seen 2 rows of houses that have washed away due to erosion and hurricanes. Second, it would be a great benefit for the City of Galveston. Every time that a row of houses is washed away, Galveston's tax base is greatly decreased. Also, by dredging ship channel and using the spoils for this project, allows for larger tankers/cargo ships to go to the port of Houston. Lastly, this project would benefit USACE. USACE was set up to oversee large projects that help the American public and communities. This project would do exactly that and would be included on the long list of USACE achievements. To wrap up this E-mail, I implore you to look favorably on this project. If you have any questions or concerns, please contact me.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
18	Bermuda Beach Improvement Committee (BBIC) Board of Directors	Committee Board	8/1/2022	Email	Y	Dr. Blakeway, The Board of Directors of the Bermuda Beach Improvement Committee (BBIC) would like to submit this letter of support for the movement of sand to the west end of Galveston Island. Our neighborhood and the surrounding neighborhoods have not been able to recover from the loss of the dry sand on the beaches that existed prior to Hurricane Ike. Our neighborhood has continually had wave impacts to our public streets since Hurricane Ike demolished the pre-existing dune system. Our neighborhood has been trying to rebuild the dune system since this initial devastation, but has not had enough dry sand on the beaches in order to accumulate sand to a height of more than 2-4' above the mean high tide line. Our continued efforts are permitted by the City of Galveston, but fully funded by our neighborhood. These dunes also are the last line of protection before the roads and rows of homes along Bermuda Beach. The proposed project would slow the coastal erosion process and thus provide a level of protection to the public infrastructure and private properties along Bermuda Beach. The Draft Detailed Project Report and Environmental Assessment (DDPR-EA) and Finding of No Significant Impact (FONSI) indicated the project is feasible, environmentally acceptable, and economically justified. Again, we support the beneficial reuse of this sand source on the beaches of the west end of Galveston island.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
19	Marvin J. Schneider	Citizen	8/1/2022	Email	Y	Dr. Blakeway, This message is to encourage you to assist in breaking the log jam that is evidently holding up a go forward decision on the USCAE Project to place dredge sand on the Galveston Island beaches. I am a Spanish Grant Beach long time homeowner. For over 20 years now I have been an active supporter of Galveston Island beach protection program proposals. For a time I served on the SGB Beachfront Protection Committee. There have been some halting successes over that time. But there have been significant failures too, notably the Jerry Patterson effort to renourish the beach from the Seawall to Jamaica Beach. When the idea to use Houston Ship Channel dredge material to periodically renourish GI beaches was introduced, I was really impressed that such a logical, productive and sustainable proposal was being brought forward. But I'm told by GI community leaders that the effort is in danger of failing again. And for reasons I don't quite understand. The need for the Project is so obvious that I won't comment further on justification. I'm told that you have an important role in trying to wedge the project forward. Please do everything in your power to make this important proposal come to fruition.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
20	Yuxuan Wang	Citizen	8/2/2002	Email	Y	Dear Dr. Blakeway, Hope this email finds you well. We are the Wangs, owners of 12636 W Ventura Dr, Galveston in the Spanish Grant neighborhood. Our house is at the end of the street next to the beach, and because of its beachfront location, we have personally witnessed the erosion crisis on the west end, not only from normal tidal movements but also devastating storms. For example, the natural dune system seaward of our house was completely wiped out in 2020 due to storm surges by Hurricane Laura, Tropical Storms Beta and Delta. After the storms, we obtained dune restoration permit and spent tens of thousands of dollars importing beach quality sands and restored the dune in late 2020. To our sadness, the restored dune was slowly eroded away by tidal wave inundation, and it was completely wiped out by Hurricane Nicolas in September 2021. It has become clear to us that individual homeowner's effort to fight with erosion is simply unsustainable in our area of the shoreline due to the high rates of erosion and frequent wave inundation. We are in urgent need of the the Army Corps' expertise and help to protect our neighborhood and homes from the erosion. We are delighted to learn the proposed CAP 204 project to import sands to nourish the west end. This program is much needed in our area to protect public roads and private houses which contributes to both Galveston's history and future. We enthusiastically support the CAP 204 project and hope for its approval. If any more information is needed, do not hesitate to contact us.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
21	Barbara Hammer	Citizen	8/2/2022	Email	Y	I have had a house on Bermuda Beach since the early 70. My family house was on the front when we bought it. We replenished in front of our house 4 times. We rebuilt after Alicia, we had some damage after Jerry, rebuilt the dunes. In 2000 we decided to more our house back across the street in hopes of saving it. When we moved back, there were houses in front of us but now they are gone. Our community has worked hard to do everything we can to replenish the dunes but we need help. Please help us with the sand from the ship channel. My whole family loves Galveston and it's beaches. Please help us keep our beloved Bermuda Beach. Thank you	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
22	Jason Stark	Citizen	8/3/2022	Email	Y	Dr. Raven Blakeway, I am writing to you to support CAP 204 Project which would result in the placement of 530,000 cubic yards of material from the Sands of Kahala Beach Subdivision (Sun Bather Ln.) to just past the Bermuda Beach Subdivision. I have owned a condo at West Beach Grand for the past ten years and have watched the erosion take its toll on our beach, previous dunes, and now our building. As you may be aware, the erosion is so great that we cannot keep dunes in front of our property. This puts us at significant risk for not only a storm event, but even a heavy rain or anything else that may cause a high tide. Without protection our electrical system to our entire building can easily be wiped out. I have grave concerns as we continue to attempt to maintain the property at high costs. The building itself has 32 units that all contribute to the health of Galveston. My family personally tries to get to the island at least 2 times a month and we do bring economic contribution beyond our taxes. There are also full-time residents at West Beach Grand that have communicated that they do not have anywhere else to go should something happen to our building. We pride ourselves on taking care of each other and our building, however the erosion events has made this difficult and quite costly. If this project were approved, we could breathe a sigh of relief and continue to focus on bettering our property to attract more to the island, increase property values, and continue to add to the engine of the Galveston economy. I have noticed great results with the nourishment project for Babe's Beach and I hope that it will come to fruition for West Beach as well. There are many communities from the seawall past Bermuda beach that are at risk of literally falling into the ocean. Please consider these people, their property, and their quality of life when making decisions such as this. I would be happy to discuss this further and answer any questions you may have.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
23	Jerry Mohn	Citizen	8/4/20022	Email	Y	Dr. Raven Blakeway – please allow me to introduce myself, I am President of the West Galveston Island Property Owners Association, which consist of 40 property owner associations on West Galveston Island. We have been in existence since 1993 and our main focus is to protect and preserve the natural resources and quality of life on the west end. We are very supportive under the Continuing Authorities Program Section 204 for the Galveston Island Coastal Erosion Project. The proposed project intends to place beach quality sand on the west end, approximately 530,000 cubic yards of sand dredged from the Houston ship channel entrance and nourish the beaches from the Sands of Kahala Beach subdivision to just pass the Bermuda Beach subdivision. The hurricanes from 2021 caused extensive damage to the beaches and dunes on West Galveston Island and this program will certainly help in restoring and stabilizing the beaches. An aggressive nourishment program is the most viable solution to help minimize further losses and CAP Section 204 will certainly be beneficial to West Galveston Island.Thank you for this opportunity and please let me know where I can be of assistance or to provide information	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
24	Robyn Carlson	Citizen	8/4/2022	Email	Y	Hello, We are the Carlsons...Richard, Robyn, and Jacob. We are writing to you in support of the CAP 204, the Galveston Island Coastal Erosion plan. Our family has owned our condo at West Beach Grand for the last eight years. It has always been our dream to own a home on the beach and when my mother passed away in 2013, we used my small inheritance to make our dream come true. We do not rent our condo to vacationers, but use it ourselves every weekend we can. We have made lifelong friends there also. We have watched our son and his friends grow up on the beach and even have the annual beach picture with his two besties hanging in his room. We hope to continue this tradition and one day see my grand babies here too, but we have seen an extreme amount of beach erosion during our eight years in Galveston. We are in dire need of your support to replenish the sand on the West End in order to ensure all families with the same dream as ours will have their opportunity to enjoy Galveston and all its wonders and entertainment. We love studying birds, little creatures and shells and also exploring new restaurants in town. We don't want our time on Galveston to end! We truly appreciate your time and attention and, hopefully, your support of the replenishment program.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
25	Tri Vu	Citizen	8/6/2022	Email	Y	Dear Dr. Blakeway, First of all I wish you happy weekend and end of summer. I want to express my gratitude as a property owner of a beachfront property when I hear about your project of beach nourishment. After last year hurricanes, the sand has been washed away as well as the dunes was damage. Many properties were destroyed in my neighborhood. We tried to repair but we met extreme resistance from the GLO and city of Galveston. As Once beautiful beach is now looks ugly.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
26	Beatrice (Dee) Pipes	Citizen	8/6/2022	Email	Y	Dear Dr. Blakeway: The Continuing Authority Program Project known as "Galveston Island Coastal Erosion" is crucial to the continued safety and connectivity of the West End of the Island. The west end of the Island contains some of the most at-risk properties in Galveston thanks to erosion rates between -5 and -11 feet per year. You know this. I have a condo in the Riveria II unit. We have NO beach at normal high tide. We are in danger of losing our foundation at abnormally high tide. Riviera II condominium tower is defenseless without dunes or adequate beach seaward of us. We now stand with the foundation exposed. We desperately need you to approve and begin work on the CAP 204 project. The CAP 204 team has embraced the tenets of adaptive management and opened the door to future efforts which could support the long-standing City of Galveston efforts. The alternative that was selected places material directly in front of some of the most vulnerable residences on Galveston Island, which lie approximately 5 miles from the current BUDM site. This project has exceeded the 1.0 benefit-to-cost ratio requirement achieving a BCR of 5.62 and has both the State General Land Office and the City of Galveston's support to address the incremental cost associated with the BUDM. My email illustrates the enormous community support to address the erosion crisis on the west end of Galveston Island. I acknowledge the additional hurdles moving the material further west presents which must be overcome but urge the beginning of the project in parallel with resolving the material movement question. Thank you for the wonderful work that you and the Regional Planning and Environmental Planning Center do. Thank you for your consideration.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
27	Volker and Christine Neugebauer	Citizen	8/6/2022	Email	Y	Dear Dr. Blakeway, My wife and I are residents at the Riviera II, 11947 San Luis Pass Rd, Unit 207, Galveston, TX 77554. As you may know, this property boarders on the beach directly. Due to the massive loss of shoreline over the past few years and especially since the 2020 storm season, the building is directly affected by and exposed to the elements, especially safety, during times of high water and storms. This jeopardizes our property, our livelihood, and our wellbeing. We have been Galveston residents for nearly 30 years, though our primary residency for the past few years has been in Lubbock, TX, but we plan to retire in Galveston at the Riviera II in a few years. That is why in 2015 we bought this property that we fell in love with the moment we saw it. Ours is not the only property affected. The West End of Galveston Island in general has many at-risk properties because of the significant annual erosion rates, resulting in the loss of public streets, rows of houses, and houses now only accessible from the beach side. We are located between the Spanish Grant and Bermuda Beach neighborhoods, and this area is defenseless without protective measures such dunes or adequate beach. The situation is urgent. The foundations of many, if not most of these houses, are exposed. Therefore, the proposed project is needed urgently. An aggressive nourishment program is the most viable solution to protect our homes and neighborhoods, to minimize further losses, and importantly, to assure the safety and connectivity of the West End of Galveston Island. It is our understanding that the proposed project meets the requirements of a cost benefit ratio analysis, and is supported by the General Land Office and the City of Galveston as well as by the Community. We pray that USACE go forward with this project to mitigate the erosion crisis here. Please accept this letter as an expression of our unconditional support and urgent request for the proposed project. Please let us know if additional information is need or if there I anything else we can do.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
28	Suzanne & Steve Harter	Citizen	8/6/2022	Email	Y	My husband and I are in favor of the CAP 204 Project which would result in the placement of sand dredged from the Ship Channel to our beach home at 11827 Sunbather. Because of the 2020 Storms most of the beach and dune protecting my home is now gone, leaving my home with little protection from additional storm events. I have lost approximately 50 feet of bulkhead and dunes in front of my home in the past two years. I have attached an excerpt from our November 2020 proposal for dune restoration. Since this picture we have lost more of our yard. We urge the Galveston District to support this concept as the erosion crisis continues to grow.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
29	Terri Muniz	Citizen	8/6/2022	Email	Y	Mr. Blakeway, As a permanent homeowner beachside Galveston in Spanish Grant I implore that the “Galveston Island Coastal Erosion” facilitated under the Continuing Authorities Program Section 204 (CAP 204) be approved and implemented as soon as possible. Since purchasing my home, in the last 8 years, the beach adjacent to my residence has endured the constant erosion from storms impacting Louisiana but whose storm surges have wiped away our dunes, beach elevation and beach width. Most concerning is that the beach erosion will very soon have the Gulf flowing through my house. We need sand urgently. I live at 12428 E. Ventura Dr. and your records will verify how very vulnerable I am at loosing my home due to the beach erosion, not 25 years from now, but most likely in the next couple of years if the project does not get authorized and implemented. There is the human element of loosing your home and there are also the economic impacts that I trust you understand. As recommended by the City of Galveston Development Services Coastal Resources Division Memo, I also we implore that Colonel Blackmon instruct the USACE SWG staff to facilitate the direct placement of dredged material from the Houston Ship Channel on the west end of Galveston Island in the 2025 channel maintenance cycle.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
30	Marc Feldman	Citizen	8/7/2022	Email	Y	Dr. Blakeway, This letter is sent to you in support of the current efforts to 'renourish' the beaches on the western end of Galveston Island, particularly from the end of the Seawall west to 13 Mile Road. This effort is essential to the safety and continuity of the western side of the Island and to curtail the present erosion crisis being experienced all along the Gulf side. A significant amount of beach was washed away during Hurricane Ike and in the succeeding years leading to the current situation where there is nearly NO sand or vegetation buffering and protecting the side of the Island facing the Gulf and much less land mass protecting FM 3005 or providing homes to beach centered nature. This lack of beach surface has allowed wave action to remove many of the dunes previously in place protecting structures and roads in the last several years. The loss of beach has also greatly affected the flora and fauna populations of the area, reducing what used to be plentiful amounts of plants, birds and other wildlife. The beach renourishment projects that have already taken place to the east have greatly benefited those locations with increased tourist and leisure activity, but there is little room for wildlife or lateral expansion in those areas. Increasing the beach size west of the Seawall will encourage more biota and recreation in the public beach areas to the west. As it is now, most of those areas are near capacity on the weekends and typically well used during the rest of the week on any sunny day. New Island housing will certainly be constructed towards the West End in any event and additional beach will help alleviate crowding and encourage responsible development and use. The benefits of the project to replenish beaches to the west will certainly significantly outweigh the cost in the long term in both revenue and environmental protection. Loss of buildings and infrastructure is definitely not in the best interest of the many Island Communities and will assuredly not be cheap nor easy to replace or recoup. Increasing the beach zones on the west side of the Island will have a positive effect for all parties concerned for decades to come. Please support and enable this important and critical endeavor and encourage the swiftest implementation possible.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
31	Christopher Criner	Citizen	8/8/2022	Email	Y	Dear Dr. Blakeway, I am Christopher Criner, a resident of Spanish Grant (Beachside) subdivision at 12436 E. Ventura Dr. Galveston, 77554. My wife and I have had our house since just after Hurricane Alicia in 1983. Since that time, we have gone from using our home as a weekend retreat to becoming full time residents in the mid 1990's. As you can imagine, we are intimately familiar with the loss of homes and property as well as the significant loss of beach that continues every year along the West End of Galveston. Throughout these decades we have made every effort available to us to try and slow down the erosion and restore and maintain sand dunes and our neighbor's property lines. As you are undoubtedly well aware, we on the West End continue the fight but sadly, Mother Nature is inevitably the victor. The proposed beach renourishment project is something we have been hoping and praying would come to fruition someday. This program is our last resort, and we want you to be aware of just how badly we want and need your help. I can list all of the benefits of this program ad nauseum and if you think it will help then please let me know and I will gladly do so. However, the main thing is that this is the only effort put forth that will really accomplish the task of protecting the West End.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
32	Andy Vorster	Citizen	8/8/2022	Email	Y	Re: Galveston Island Coastal Erosion CAP204 project. I'm a resident in Bermuda Beach at 13204 bermuda beach drive Galveston. My email to you as a plea for help. My community and I need massive help. In fact we are in dire need, as we face a crisis that with help from you I believe could be avoided. For the last 12 years we have been fortunate enough to call Bermuda Beach our home. It's a beautiful place we raise our kids and our grandkids. Our lives are here, here our homes are here but now we live with the threat, every year, of possibly losing our homes completely. Each summer as the storms roll through tremendous beach erosion occurs. So much so it is now an erosion crisis. When I first moved here to Bermuda Beach there was a beautiful wide beach and the sea was a long way from our homes. There were wide luscious dunes that protected our homes from the sea and were a beautiful ecosystem Now, every year, every summer with storm season the sea gets closer and closer and the beach gets narrower and narrower. I never envisioned when I first moved here the sea would be such a threat to my community and our homes. As I'm sure you're well aware, the dunes that we're in front of our homes on Bermuda Beach drive and once protected us were finally washed away completely last year. And last year Galveston did not even suffer a direct hit from a hurricane- we just happened to be on the dirty side of several storms and yet so much damage was done and beach eroded that we now have no protection at all for our homes and have a very real risk of losing them. There is now nothing between us and the sea to protect us and the sea is getting dangerously close. Although we have started trying to rebuild the dunes again ourselves it will take several years to establish them sufficiently for them to be able to protect our homes from the sea in the summer months. This is why we desperately need your help. We need an aggressive beach replenishment program such as the one proposed that will bring in massive amounts of beach quality sand and widen the beach enough keep the sea away and give us time to grow back the dunes enough to protect our homes and community. This can be done and I believe according to the proposal this is the right project to achieve that. Not only does the proposed project protect our	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
						community's homes in the west end of Galveston and so Galveston's tax dollars but using sand dredged from the ship channel protects Galveston's income from the ship channel. I'm not an engineer or a microbiologist and so I don't propose to continue by tolling to you the benefits of the proposed project on the ecosystem or to the finances of the city. I am a home owner, a wife, a neighbor, a member of a community that makes our home in Bermuda Beach Galveston and all I want to do is impress upon you our dire need for this project to go ahead and to please plead with you to find a way to help us. September used to be my favorite month of the year. I love spending time with family at home and enjoying join the beach but now I live in fear from mid August to the end of September that we will lose our home and way of life. Time is running out for us without your help. We all know too well we might not even make it through this years storm season. We could lose everything this year but if we do make it through we plead with you to please help us by supporting the project and making sure it goes ahead to aggressively bring in sand and replenish the beach as proposed. This is critically urgent. I beg you, please do not think of Bermuda beach as just an another area on the map. We are a community. This is where we live. this is where we raise our kids and our grandkids . These are our lives and our homes that are in jeopardy unless the beach restoration project can go ahead .Please make the erosion crisis in the west end of Galveston a priority and see the project is approved to go ahead.	

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
33	Dan Kellog	Citizen	8/8/2022	Email	Y	My family is a longtime owner of beach front property on west Galveston Island. It has been a nightmare of worry concerning when erosion from the next storm will undermine our home. The GLO and City have not been friendly parties in giving approval of preferred methods of protecting the beach from erosion - due to extreme unjustified restrictions of what method is allowed to protect the beach from erosion. Property owners have been and are continuing to be sitting ducks knowing that their time will come to loose property to a future storm as many many have in the past. Beach erosion of West Galveston Island is an obvious financial loss to the City of Galveston and to the State of Texas from reduced tourism and tax revenue, let alone the lack of providing enjoyment to Texas' families. We are in favor of the CAP 204 Project and desperately want to have sand placed from Sands of Kahala Beach Subdivision to Bermuda Beach Subdivision. We look forward to the approval of and the initiation of the project.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
34	Nancy Ho	Citizen	8/9/2022	Email	Y	My name is Nancy Ho. Along with Thang Duong (my husband), Trung Ho (my brother), and and Tammy Ha (his wife), we are the owners of the "Sunbather By The Sea" LLC. We have recently acquired our beach front property, but the house is very dear to us. As such, we only wish for the well being of not only our property, but the whole of the beach community as well. We are so glad to hear about your project regarding beach nourishment especially since hearing about the damages that resulted from previous storms. Hearing from our neighbors about the idleness the City of Galveston has shown, we are worried about what could happen in the future if no action is taken. That being said, we are in full support of the CAP 204 Project and having better protection, such as sea walls, placed from Sands of Kahala Beach Subdivision to Bermuda Beach Subdivision. Please let us know what we could do to further our support. Thank you	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
35	Jill VonOsten	Citizen	8/9/2022	Email	Y	I am writing to express our families support of the CAP 204 Project – sand renourishment from Sands of Kahala Beach Subdivision to Bermuda Beach Subdivision. My family has owned our house at 11819 Sunbather Lane for more than 15 years now. We rebuilt our home and property following Hurricane Ike, and then again after Hurricane Harvey. Since losing our neighborhood's Geo tube during Ike, each year we have lost property and had damage from even the smallest storms and high tides because there is no dune left, no sea wall, no beach renourishment, no protection from the surf. Our ability to protect our property has been severely limited by city and GLO restrictions on homeowners and there seems to be little interest in helping this part of the Galveston community. The devastating loss of our home seems inevitable if action is not taken soon. We love our home and support any project that will preserve it and the beach we have left. Please, please take action on the CAP 204 project. And please let us know what more we can do to protect our home and support this initiative. Thank you.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
36	Lisa Brogdon	Citizen	8/10/2022	Email	Y	Good Morning, Question- This is a pasted comment of where the placed sand will take on West end of our beach. It mentions just past Bermuda Beach but not in front of Spanish Grant which has all the public traffic. Why not cover Spanish Grant Beach too? We need the build up so bad! See below It will facilitate the placement of approximately 530,000 cubic yards of beach-quality sand dredged from the Houston Ship Channel Entrance on the West end of the Island. This template is predicted to stretch from the Sands of Kahala Beach Subdivision to just past the Bermuda Beach Subdivision. I am a full time retired resident.	Concur
37	Lisa Brogdon	Citizen	8/10/2022	Email	Y	Never mind I thought the Kahala beach is running from west to east! Thank I feel stupid, lol I’m so happy to have our dunes restored! It’s been a long time coming!	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
38	Port of Houston Authority	Industry	8/11/2022	Email	Conditional	Attached letter	The USACE determined the proposed action responds to the need to provide beneficial use of dredged material (BUDM) as described in Section 204 of the Water Resources Development Act of 1992, as amended. • The USACE concurs there should be no impact that would threaten or extend draft restrictions for the Galveston Bay entrance channel. The current action does not intend to impose or extend draft restrictions for the Galveston Bay entrance channel during dredging as this would require the project's BUDM to be delayed or reduced as described in Section 12.2 and 1.9.2 of the Detailed Project Report and Environmental Assessment (DPR-EA). • Under the Section 204 authority, the Federal project cost limit and cost apportions between the Federal and non-Federal sponsors are detailed in Chapter 9 "Costs and Cost Sharing" of the DPR-EA. Additionally, the USACE Galveston District will perform market research to determine if capable dredging equipment is available to execute the work prior to requesting the Section 204 project funding as described in the Executive Summary and Section 12.1 of the DPR-EA. • The City of Galveston, the project's Non-Federal sponsor, will enter into agreements with the Department of the Army and the Texas General Land Office to ensure all regulatory, lands, easements, and rights of way are approved prior to project implementation. Additional details on real estate requirements for this action can be found in Section 12 and Appendix D of the DPR-EA. • Section 204 provides the USACE authority to place material "in connection with dredging for

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
							construction and maintenance of an existing authorized federal navigation project". Thus, if material cannot be obtained from the Galveston Entrance Channel, the USACE does not have authority to complete the project at that time. The authorization and approvals for the project would remain valid until conditions allow use of the channel material or the project is terminated. • The Galveston District's Operations Division initiates the contracts to dredge during operations and maintenance and emergency dredging, thus would approve the project before implementation.
39	City of Galveston	Government	8/12/2022	Email	Y	Attached letter	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
40	Shannon McCann	Citizen	8/13/2022	Email	Y	Dear Mr. Blakeway, My family has owned a beach house on Sunbather Lane in the Sands of Kahala for 15 years. All of the cousins and brothers and sisters take turns sharing the house during the summer, but the best times are when we overlap. Our house has been the site for many family and friend gatherings, so it's a place full of great memories. The beach house and Galveston are like a second home to me. We have lost so much beach since Ike and Harvey, and it will take the dunes years to rebuild themselves. We are all in favor of beach nourishment and will do whatever we can to help. Thank you.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
41	Stephenie Cox	Citizen	8/14/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect this treasure.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
42	Shane Smith	Citizen	8/14/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
43	Stephenie Cox	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect this treasure.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
44	Tammy Kidd	Citizen	8/14/2022	Email	Y	Dear Dr. Blakeway, I am a property owner in Bermuda Beach, Galveston, Texas. When we bought our home in 2004, Bermuda Beach had some dunes and beach. Unfortunately, over the years, storms and hurricanes have taken many yards of the beach. In 2008 Hurricane Ike took the front row of houses and the most seaward street, Bermuda Beach Drive. Bermuda Beach Dr. is now a beach sand road and is the only ingress and egress for the homes on the front row. Our community is one of the most at-risk areas on Galveston Island. We and other neighborhoods, such as Spanish Grant and the West Grand and Riviera condominiums, are defenseless without dunes or adequate beach. Over the years, our subdivision has done everything it can to try to slow the erosion crisis in our neighborhood. We have made it a priority to do what we can to save our beach and our homes. With our own funding and volunteer hours, we have joined with Artist Boat and planted dune grass and plants, we have built sand fencing, and we have tried to protect the dunes that we have by posting signs and roping off walk areas. Unfortunately, many years we have watched our countless hours of hard work and money disappear when the dunes are washed away. The last couple of years, they were washed away, not with a hurricane hitting us directly, but only with high tides and small storms. Our neighborhood is defenseless to even mild storms. During bad storms, Bermuda Beach Dr. is sometimes inaccessible. The risk to lives in our neighborhood when emergency vehicles cannot access homes must be taken into consideration. We plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. I, and my family and friends, love Galveston Island. The people, the city and the beaches hold a special place in my heart. I have been going to Galveston since I was a child and consider myself beyond lucky to have a home on the island. I sincerely hope that you and the Corp of Engineers will help protect our beaches and homes.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
45	Kelli Layden	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends and family at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect this treasure.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
46	Mary Jan Lantz	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, Bermuda Beach, as well as most of Galveston Island, has experienced an average annual erosion rate of approximately 3 to 5 feet. This erosion rate not only affects homes, it also affects critical infrastructure including FM3005, the main hurricane evacuation route for the west end of the Island. Other threatened public safety interests include Galveston fire stations, clean water holding tanks, recreational activity areas, and local wildlife nesting grounds. As a resident of Galveston Island, I strongly support the use of dredged materials for shoreline stabilization, especially for Bermuda Beach. Following Hurricane Ike, the Bermuda Beach neighborhood lost Bermuda Beach Drive, which is the only access to many homes. Water and sewer lines were also destroyed. As you can see it is imperative the USACE SWG staff facilitate the direct placement of dredged material from the Houston Ship Channel to the west end of Galveston Island for the protection of all these things mentioned above. Furthermore, most coastal communities in the United States maintain beach nourishment programs and we celebrate your decision to finally mitigate the ongoing erosion of Galveston Island and the Bermuda Beach coastline. We sincerely thank you for your consideration.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
47	Derek Hollingsworth	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect it!	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
48	Port of Texas City	Industry	8/15/2022	Email	Conditional	August 15, 2022 Re: Proposed U.S. Army Corps of Engineers Galveston Island Coastal Erosion, Galveston, Texas Study (Study) Dear Dr. Blakeway: Regular maintenance dredging to avoid draft restrictions or emergency dredging to resolve draft restrictions must be a priority to the Galveston District. The Port of Texas City, like many others, is a proponent of beneficially using dredged material and recognizes the value of beach renourishment to the economy of Galveston Island. However, our concern is that expanding the scope of beach renourishment will negatively impact safety and waterborne commerce along the Houston Ship Channel due to the logistics of moving the material further. The expansion of scope for beach renourishment to western Galveston Island would require an additional 20-30% of time to perform the required maintenance dredging per the Study. This is an undue burden on the dredging fleet, which will cause delays to the maintenance and emergency dredging of the main channel, including the Inner Bar Section. Draft restrictions limit the import and export cargo that vessels can carry, and can cause the following issues: 1. Increases safety risk due to unexpected shoaling. 2. Increases the number of vessel movements required to carry the same cargo, which bears both a safety and emissions burden. 3. Increases the costs to consumers for imports and decreases the global competitiveness of exports, harming the region's economy. We respectfully ask the Army Corps to consider the safety and economic harm to the region that would be caused by expanding beach renourishment to western Galveston Island.	The current action cannot increase costs or schedule to the existing Federal operations and maintenance dredging contracts to avoid disruption to navigation (Section 12.2 and 1.9.2 of the DPR-EA). Please review the response to the Port of Houston Authority for additional details.

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
49	Greater Houston Port Bureau	Industry	8/15/2022	Email	Conditional	Attached letter	The current action cannot increase costs or schedule to the existing Federal operations and maintenance dredging contracts to avoid disruption to navigation (Section 12.2 and 1.9.2 of the DPR-EA). Please review the response to the Port of Houston Authority for additional details.
50	Tammy Kidd	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, After sending my last letter, I realized that I did not explain that Bermuda Beach expects the erosion on our beaches to worsen, even more than its usual amount, due to the fact that the City and the GLO has recently widened our on beach parking area by over 200'. If the City and State expect our small neighborhood to handle a larger influx of the public for parking, more should be done to help minimize the erosion that will undoubtedly be multiplied due to the vehicles that are allowed to drive onto the beach. Additionally, every year the buffer between the beachfront of Bermuda Beach and FM 3005 is decreasing due to erosion. FM 3005 is the main evacuation route for the West End. This project is needed not only for the protection of Bermuda Beach infrastructure but also for 3005. We again plead with the Army Corps of Engineers to move forward with this project. Thank you for your consideration.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
51	Kathryn Kidd Organ	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I have been a visitor to Galveston Island for many years. We often visit our friends at their home in Bermuda Beach. Before Hurricane Ike, Bermuda Beach had nice dunes and a relatively large beach. In 2008 Hurricane Ike took the front row of houses, the dunes, and much of the beach. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect this treasure.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
52	Michael Cox	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I thank you in advance for your time and consideration. For most of my life, like many of the millions of Texans, I have been a frequent visitor of the West nd of Galveston. I have watched as the beaches that I remember as a child have been lost to the gulf and continue to erode. Some of our friends in Bermuda beach shared with us that the USACE is considering a beach renourishment program for that portion of the island. I am excited to hear that the program will build back part of what we have lost and hopefully give our current and future generations the opportunity to experience the treasure that is Galveston and the Gulf. Please consider this short note a sincere request and encouragement for the Corp to proceed with the proposed renourishment program on behalf of the millions of Texans that have come to cherish this special environment. Again I thank you for your time and I thank you in advance for your efforts. Michael Cox	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
53	Lara Hudgins Hollingsworth	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, My family and I have been enjoying Galveston for my whole life (50+ years!). We were lucky enough to have friends that introduced us to Bermuda Beach. Before Hurricane Ike, Bermuda Beach had beautiful dunes and a relatively large beach. Unfortunately, Hurricane Ike did considerable damage to the beach (and many of the homes). Because my friends live there, I have been acutely aware of the herculean efforts of the Bermuda Beach residents to try and slow the erosion crisis. They have planted dune grass and plants, built sand fencing, and reduced the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. I have heard that you all are contemplating including Bermuda Beach in a renourishment program and I desperately hope that you will do so. Undoubtedly it will make a substantial difference for all Texans enjoyment of Galveston beaches if the US Army Corps of Engineers moves forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston Island and its beaches. Please help to protect this treasure!	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
54	B.K. Layden	Citizen	8/15/2022	Email	Y	I am a 4th generation Houstonian and we love going to Galveston, in particular the west end. We took our children for their first beach visit to the west end pocket park that was there before Ike. We have a granddaughter on the way and I would love to be able to take her to the west end beaches for her first beach visit just like her Dad did. Also I have a family member that has a home in Bermuda Beach, which we use on a regular basis. I can not imagine not being able to enjoy the beach. Having dunes would help save the homes on the west end. The Bermuda Beach residents have tried diligently to slow the erosion crisis in the neighborhood by planting dune grass and plants, building sand fencing, and reducing the foot traffic across where the dunes should be. Unfortunately, even the smallest of storms wipes away years of progress. My family and I plead with the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. We love Galveston island and its beaches please help to protect them so other generations can enjoy them the way I have.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
55	Donald Kidd	Citizen	8/15/2022	Email	Y	Dear Dr. Blakeway, I am a property owner in Bermuda Beach, Galveston, Texas. When we bought our home in 2004, Bermuda Beach had some dunes and beach. Unfortunately, over the years, storms and hurricanes have taken many yards of the beach. In 2008 Hurricane Ike took the front row of houses and the most seaward street, Bermuda Beach Drive. Bermuda Beach Dr. is now a beach sand road and is the only ingress and egress for the homes on the front row. Our community is one of the most at-risk areas on Galveston Island. We and other neighborhoods, such as Spanish Grant and the West Grand and Riviera condominiums, are defenseless without dunes or adequate beach. Over the years, our subdivision has done everything it can to try to slow the erosion crisis in our neighborhood. We have made it a priority to do what we can to save our beach and our homes. With our own funding and volunteer hours, we have joined with Artist Boat and planted dune grass and plants, we have built sand fencing, and we have tried to protect the dunes that we have by posting signs and roping off walk areas. Unfortunately, many years we have watched our countless hours of hard work and money disappear when the dunes are washed away. The last couple of years, they were washed away, not with a hurricane hitting us directly, but only with high tides and small storms. Our neighborhood is defenseless to even mild storms. During bad storms, Bermuda Beach Drive is sometimes inaccessible. The risk to lives in our neighborhood when emergency vehicles cannot access homes must be taken into consideration. My family strongly encourages the US Army Corps of Engineers to move forward with the project of using dredge material measures for the beaches west of the seawall, including Bermuda Beach. I, my family, and friends, love Galveston Island. We as a community have the opportunity to turn back the effects of erosion on the middle part of the island by renourishing the beaches with the dredged material. There is no better use for the dredged material than this. I sincerely hope that you and the Corp of Engineers will help protect Galveston's beaches, our homes, and the coastal lifestyle enjoyed by millions of Texans.	Concur

No	Name	Affiliation	Comment Date	Type	Support (Y/N/Other)	Comment	USACE Response
56	Port of Texas City; Jason Hayley	Industry	8/18/2022	Email	Conditional	Attached letter	The current action cannot increase costs or schedule to the existing Federal operations and maintenance dredging contracts to avoid disruption to navigation (Section 12.2 and 1.9.2 of the DPR-EA). Please review the response to the Port of Houston Authority for additional details.
57	Sonya Porretto	Individual	8/15/2022	Mail	N	Attached letter	All the lands, easements, rights-of-way, relocations, and disposal areas required to construct, operate, and maintain the project were considered during plan formulation. Additional information on the role of the City of Galveston and Texas General Land Office can be found in the Real Estate Plan, Appendix D, particularly sections 6.1 through 6.3 and Section 9.4. Erosion rates for the project area were obtained from the University of Texas Bureau of Economic Geology, a well-established research unit, that is an industry standard for measuring erosion rates along the Texas coast. Erosion rate estimates for the project area can be reviewed in section 2.3.7 in the Detailed Project Report and Environmental Assessment. The individual’s objection to the project is noted.
58	Albert Slechten	Individual	8/8/2022	Mail	Y	Attached letter	Concur

PORT HOUSTON
THE INTERNATIONAL PORT OF TEXAS

August 11, 2022

via email: Raven.Blakeway@usace.army.mil

Dr. Raven Blakeway
Biologist, Environmental Branch
Regional Planning and Environmental Center
Southwestern Division
U.S. Army Corps of Engineers
2000 Fort Point Rd
Galveston, TX 77550

Re: *Proposed U.S. Army Corps of Engineers Galveston Island Coastal Erosion, Galveston, Texas Study (Study)*

Dear Dr. Blakeway:

The Port of Houston Authority (Port Houston) appreciates the opportunity to comment on the *Proposed U.S. Army Corps of Engineers (USACE) Galveston Island Coastal Erosion, Galveston, Texas Study,* and the Tentatively Selected Plan (Plan), and to share our concerns about potential consequences for the Galveston Bay area navigation system and our Houston Ship Channel customers and industrial partners.

Port Houston is a proponent of beneficially using dredged material and can support the Plan with the conditions outlined below. We have partnered with the USACE Galveston District (District) for many years and were instrumental in implementing the successful and very beneficial application of material removed for the Houston Galveston Navigation Channel, HGNC, for coastal protection and beach nourishment along the eastern portions of Galveston Island. While availability of beach-quality material is limited within the navigation channel, its benefit to Galveston beaches is evident over the last decade.

However, we are concerned that without several conditions, expanding or extending the use of this limited resource to western portions of Galveston Island will add costs and delays that negatively impact the District's ability to maintain navigation safety and efficiency for the Houston-Galveston Bay navigation system. Since 2012, the HSC Inner Bar section (between Station 0+000 to 21+752.821) has been responsible for 4 out of 6 of the Houston Ship Channel's major draft restrictions, spanning a total of 765 days. These restrictions and the funds required to relieve them make it imperative that the Plan does not adversely affect the entrance channel's maintenance dredging cycle. These draft restrictions limit the quantity of commerce that ships can carry to and from the entire Galveston Bay Port complex and its customers and industry partners, which imposes significant burdens on the region's economy and increases strains on the nation's supply chain. Avoiding and removing these draft restrictions for the region's navigation system is an urgent necessity on a constant basis that cannot be compromised.

Unless the Army Corps imposes several conditions and careful reviews for each dredging procurement, transporting and placing dredge material on the western portions of Galveston Island will increase the cost and time needed to maintain the Galveston Bay entrance channel for navigation. The draft Study recites dredging contractor estimates that the increased sail time for placement in West Galveston would add 20-30% to the time needed to perform the required navigation maintenance dredging, with corresponding cost increases and reductions in daily production. If the Army Corps adds the additional transport and placement of dredge material on West Galveston as a contract option, a dredging contractor would typically load the bulk of its increased mobilization costs and other risks up front in its bid for the basic contract for dredging the ship channel.

The requirement may also reduce competition for the maintenance dredging contract. As mentioned in the draft Study, dredging contractors indicated that only large dredges or two small dredges could meet the time frame indicated in the Plan. In addition to raising prices, this requirement would place additional demands on valuable dredging assets for the nation's system, which is already stretched.

Operations and Maintenance funding for the Galveston District is currently insufficient to ensure full utilization of the Texas coast's authorized navigation channel dimensions. Extending dredge placement distances will place additional strain and limit the cost-effective use of the Gulf and East Coast dredging fleet, which is already responding to increased demand from Bipartisan Infrastructure Law funding, emergency supplemental work in response to storms impacting the Mississippi River region, and state, community, and private demands for additional work for beaches and coastal port channels. The Army Corps must take great care to ensure that the Galveston District's comprehensive maintenance dredging program for the region does not bear the burdens of this additional dredge asset time, expense, and demand.

Because of these concerns about the potential impacts on the entire Galveston Bay area navigation system, Port Houston, and our Houston Ship Channel industry partners, Port Houston can only support the Study and Plan if they include the following conditions:

1. There should be no impacts that would threaten to impose or extend draft restrictions for the Galveston Bay entrance channel.
2. Through an appropriate market test for each procurement, all incremental costs of dredging and disposal above the Federal Standard of disposal at the Ocean

PORT HOUSTON℠
THE INTERNATIONAL PORT OF TEXAS

Dredged Material Disposal Site should be funded from the account for construction of the West Galveston project and its state and local sponsors, so that there are no cost impacts on the already oversubscribed Galveston Operations and Maintenance program for the region’s navigation.

3. In addition to demonstrated funding capability, the City of Galveston must ensure that all regulatory, lands, easements, and rights of way are approved and secured prior to any request to utilize the material from the regularly planned or emergency O&M of the entrance channel.
4. The Plan should include a backup plan for the West Galveston Project to secure alternative sources of sediment material in instances when impacts to the cost or schedule of dredging the Galveston Bay entrance channel would be unavoidable.
5. The Plan must require Galveston District Operations Division approval before proceeding with each regular or emergency dredging cycle.

Sincerely,

Roger Guenther
Executive Director

Cc: Garry McMahan
Charlie Jenkins
Rich Byrnes

City of Galveston

OFFICE OF THE MAYOR & CITY COUNCIL
PO Box 779 | Galveston, TX 77553-0779
citycouncil@galvestontx.gov | 409.797.3510

Col. Rhett A. Blackmon
US Army Corps of Engineers Galveston District
2000 Fort Point Road
Galveston, TX 77550

Dear Colonel Blackmon,

We are writing to express our strong support for the Continuing Authority Program (CAP) Project known as Galveston Island Coastal Erosion CAP 204 ("CAP 204 Project") to address urgent beach erosion needs along the west end of Galveston Island.

With the Water Resources Development Act of 2022 (WRDA 2022) near final passage, Congress will send a strong directive prioritizing the critical importance of building, restoring, and maintaining coastal dunes and beaches for essential storm surge and environmental protection. When WRDA 2022 legislation is signed by the President, the Coastal Texas Study Recommended Plan authorization included in the bill will position the US Army Corps of Engineers (USACE) to receive funds appropriated by Congress for this historic multi-defense storm surge protection and beach dune system and restoration project.

Future congressional funding for the Coastal Texas Study project could take several years while severe beach and dune erosion continues escalating damage along Galveston west end beaches. The CAP 204 Project is crucial to the continued public safety and connectivity of the west end of Galveston Island.

In 2021, the USACE Coastal Texas Study and Texas General Land Office (GLO) Budget Analysis and Modeling of the Texas Coast highlighted the west end of Galveston as an erosion hot spot. Galveston Island's west end contains some of the most at-risk properties due to erosion rates between five (5) and eleven (11) feet per year. Neighborhoods have lost public streets, and now have rows of homes only accessible by driving on the beach. The Spanish Grant and Bermuda Beach neighborhoods and West Grand and Riviera condominium towers are defenseless without dunes or adequate beach.

As Congress prepares to make historic investments in storm surge protection along the upper Texas Gulf coast, including Galveston's west end, it is critical that additional beach is not lost in the interim. The CAP 204 Project enables action necessary to mitigate accelerating beach erosion to take place now. Embracing the tenets of adaptive management, the CAP 204 Project is a crucial effort which the USACE Galveston District ("the district") currently has underway. This project addresses the long-acknowledged erosion crisis on the west end of Galveston and remains consistent with and advances the beach and dune system goals of the Coastal Texas Study.

The CAP 204 project has exceeded the 1.0 benefit to cost ratio (BCR) requirement achieving a BCR of 5.62 and has both GLO and the City of Galveston support to address the incremental cost associated with the beneficial use of dredge material. The community support to address the erosion crisis on the west end of Galveston Island is innumerous. We acknowledge the additional hurdles moving the material further west presents which must be overcome. However, allowing accelerated erosion to continue along the west end only adds significant challenges and costs when proceeding with Coastal Texas Study project beach and dune system construction.

We write to urge the district to push forward with the CAP 204 project. We know that no project can jeopardize the districts mission of maintaining an unencumbered channel, this fact is paramount, however, the erosion crisis on the west end is just as absolute and something must be done.
We greatly appreciate the unique partnership the City of Galveston shares with the district. Your continued support and work on the CAP 204 project will demonstrate the tremendous benefits of this partnership to our community and the environment.

Sincerely,

Craig Brown
Mayor

Sharon B. Lewis
Councilmember, District 1

William Schuster
Councilmember, District 2

David Collins
Councilmember, District 3

Michael Bouvier
Councilmember, District 4

John Paul Listowski
Councilmember, District 5

Marie Robb
Councilmember, District 6

CC:

U.S. Senator John Cornyn
U.S. Senator Ted Cruz
U.S. Representative Randy Weber, 14^{th} District
State Senator Larry Taylor, 11^{th} District
State Representative Mayes Middleton, 23rd District

August 15, 2022

Dr. Raven Blakeway
Biologist, Environmental Branch, Regional Planning and Environmental Center, Southwestern Division
U.S. Army Corps of Engineers
2000 Fort Point Rd
Galveston, TX
via email: Raven.Blakeway@usace.army.mil

Re: Proposed U.S. Army Corps of Engineers Galveston Island Coastal Erosion, Galveston, Texas Study (Study)

Dear Dr. Blakeway:

Regular maintenance dredging to avoid draft restrictions or emergency dredging to resolve draft restrictions must be a priority to the Galveston District.

The Greater Houston Port Bureau (Port Bureau) is a proponent of beneficially using dredged material and recognizes the value of beach renourishment to the economy of Galveston Island. However, our concern is that expanding the scope of beach renourishment will negatively impact safety and waterborne commerce along the Houston Ship Channel due to the logistics of moving the material further.

The expansion of scope for beach renourishment to western Galveston Island would require an additional 20-30% of time to perform the required maintenance dredging per the Study. This is an undue burden on the dredging fleet, which will cause delays to the maintenance and emergency dredging of the main channel, including the Inner Bar area.

Draft restrictions limit the import and export cargo that vessels can carry, and can cause the following issues:

1. Increases safety risk due to unexpected shoaling.
2. Increases the number of vessel movements required to carry the same cargo, which bears both a safety and emissions burden.
3. Increases the costs to consumers for imports and decreases the global competitiveness of exports, harming the region’s economy.

We respectfully ask the Army Corps to consider the safety and economic harm to the region that would be caused by expanding beach renourishment to western Galveston Island.

To continue the dialog with industry leaders about these concerns, please contact CAPT Bill Diehl (USCG), Ret., P.E. at (713) 678-4300 or bdiehl@txgulf.org.

Sincerely,

Bernt Netland
Chairman, Greater Houston Port Bureau

Comment Entry No: 56

SENT VIA EMAIL

August 15, 2022

Dr. Raven Blakeway
Biologist, Environmental Branch, Regional Planning and
Environmental Center, Southwestern Division
U.S. Army Corps of Engineers
2000 Fort Point Rd
Galveston, TX
Raven.Blakeway@usace.army.mil

Re: Proposed U.S. Army Corps of Engineers Galveston Island Coastal Erosion, Galveston, Texas Study (Study)

Dear Dr. Blakeway:

Regular maintenance dredging to avoid draft restrictions or emergency dredging to resolve draft restrictions must be a priority to the Galveston District.

The Port of Texas City, like many others, is a proponent of beneficially using dredged material and recognizes the value of beach renourishment to the economy of Galveston Island. However, our concern is that expanding the scope of beach renourishment will negatively impact safety and waterborne commerce along the Houston Ship Channel due to the logistics of moving the material further.

The expansion of scope for beach renourishment to western Galveston Island would require an additional 20-30% of time to perform the required maintenance dredging per the Study. This is an undue burden on the dredging fleet, which will cause delays to the maintenance and emergency dredging of the main channel, including the Inner Bar Section.

Draft restrictions limit the import and export cargo that vessels can carry, and can cause the following issues:

1. Increases safety risk due to unexpected shoaling.
2. Increases the number of vessel movements required to carry the same cargo, which bears both a safety and emissions burden.

3. Increases the costs to consumers for imports and decreases the global competitiveness of exports, harming the region’s economy.

We respectfully ask the Army Corps to consider the safety and economic harm to the region that would be caused by expanding beach renourishment to western Galveston Island.

Sincerely,

Ramiro Barba
Executive Director

Cc: Jason Hayley

Comment entry no: 57

IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
GALVESTON DIVISION

Sonya Porretto, Plaintiff,	§ § §	
v.	§	CIVIL ACTION NO. 3:21-cv-00359
The City of Galveston Park Board of Trustees, *et al.*, Defendant.	§ § § §	

**NOTICE OF RESERVATION OF RIGHTS,
OBJECTION, AND PRESERVING ALL CLAIMS
RELATED TO PENDING LITIGATION**

Since this litigation has been filed, the Defendants continue to take actions related to the pending causes of action and allegations in the Third Amended Complaint. Ms. Porretto has already removed one case related to this proceeding which is styled *City of Galveston v. Sonya Porretto,* Civil Action No. 3:22-CV-00256.

Despite this pending litigation and numerous specific allegations in the Third Amended Complaint regarding the Defendants' use of false erosion ratings and improper scraping of the beachfront, the Defendants are participating in further actions to perpetuate the false and/or misleading information in order to obtain Federal funding.

Ms. Porretto recently learned the U.S. Army Corps of Engineers Galveston District ("COE"), in partnership with the Defendant, the City of Galveston, has prepared a *Draft Detailed Project Report and Environmental Assessment (DDPR-EA) and Finding of No Significant Impact (FONSI) for the Galveston Island Coastal Erosion, Galveston, Texas, continuing authorities study as authorized by Section 204 of the Water Resources Development Act of 2016* ("Joint Public Notice") which was open for public comment with such comments due on August 15, 2022.

In addition, the materials for the Joint Public Notice show that other defendants are also involved and that the Joint Public Notice is inadequate.[1] While the Joint Public Notice states that it is on behalf of the COE and City of Galveston, that is inconsistent with the documents linked in the Joint Public Notice. The documents linked with the Joint Public Notice are inconsistent:

1) One document states the Non-Federal Sponsor is the City of Galveston ***in partnership with*** the Texas General Land Office ("GLO") (emphasis added) https://www.swg.usace.army.mil/Portals/26/DDPR204Galv8Jul22%20-%20DRAFT_1.pdf (p. ES-4); and,

2) Another document shows that the Galveston Park Board of Trustees ("Park Board") was the original Non-Federal Sponsor, despite the fact that the Park Board owns no beach property. https://www.swg.usace.army.mil/Portals/26/REPGalvDDPR204AppdxD27May22%20-%20DRAFT_1.pdf) (p. 11). That document states the Non-Federal Sponsor is solely the City of Galveston and suggests the GLO participated only in the feasibility portion of the project.

The Joint Public Notice documents include a letter dated November 23, 2020[2] from the Park Board specifically noting that the proposed project has an impact on the Seawall area. Ms. Porretto's beachfront property which is the subject of this case is along the Seawall. The Park Board states "Although the Seawall was designed to stand alone, it is susceptible to flanking. The presence of a wide beach seaward of the Seawall helps protect this infrastructure and preserve the residential, commercial, environmental and other assets located behind the structure." The Park Board did not provide anything to support these conclusory allegations and the letter is cited to merely to show that the Park Board acknowledges a project on the west side impacts the property on the Seawall.

The Joint Public Notice includes environmental assessments ("EA's") and findings of no significant impact ("FONSI") which Ms. Porretto asserts fails to comply with the requirements for a joint public notice, EA or FONSI.

---

[1] In a letter dated May 3, 2022, the Galveston City Manager represented that the City "remains willing and able to facilitate the funding of incremental cost which may arise through future approvals by our Industrial Development Corporation" ("IDC"). https://www.swg.usace.army.mil/Portals/26/DDPR204Galv8Jul22%20-%20DRAFT_1.pdf (p.65). A quick search of the Galveston City Council meeting agenda action items and IDC meeting agenda action items did not find where this position was approved if it was approved. The majority of the IDC Board members are councilmembers, including Galveston Mayor Brown, Councilmember Collins, Councilmember Robb, and Councilmember John Listowski. Notably, the August 16, 2022 Agenda for the IDC includes an agenda item to support the extension of a 4b Sales Tax which, in part, funds beach nourishment and according to the materials does not currently expire until April 1, 2029. https://galvestontx.gov/AgendaCenter/ViewFile/Agenda/4410?html=true

[2] The full letter is not included in the Joint Public Notice. https://www.swg.usace.army.mil/Portals/26/DDPR204Galv8Jul22%20-%20DRAFT_1.pdf (See, p. 61 *et seq.)*

For example, the Joint Public Notice documents fail to disclose the manmade alterations by scraping and excavation which altered the topography and created erroneous erosion/accretion rates as acknowledged by a 2015 Judgment in Ms. Porretto's favor where it was decided by final judgment that Porretto's property was accreting for the 24 years prior to the judgment. The continued use of uncorrected data after the 2015 Judgment shows a lack of good faith, especially given this pending litigation where the Third Amended Complaint specifically raises concerns with erosion data.

In an abundance of caution, Ms. Porretto is submitting the attached preliminary objection to the Joint Public Notice without waiving any rights, specific objections, and claims in the pending litigation with a full reservation of rights. A copy of the objection is attached as **Exhibit A**.

RESERVATION OF RIGHTS

Ms. Porretto reserves all rights to amend or supplement the objection to the Joint Public Notice in all respects, as may be necessary or appropriate, but shall be under no obligation to do so. Nothing contained in this Notice or attached objection shall constitute a waiver or release of any claims or rights. Further, nothing in the objection shall be deemed an admission or denial related to the pending litigation and all responses related to the pending litigation are reserved, preserved, and shall not be prejudiced.

/s/Deirdre Carey Brown

Deirdre Carey Brown, pllc
Texas Bar No. 24049116
FORSHEY & PROSTOK, LLP
1990 Post Oak Blvd., Suite 2400
Houston, Texas 77056
Ph 832-536-6910
Fax 832-310-1172
dbrown@forsheyprostok.com
Counsel for Ms. Porretto

CERTIFICATE OF SERVICE

I hereby certify that a copy of this Notice with attached Preliminary Objection was served via ECF to the parties identified below and via email to the parties listed below on August 15, 2022:

Via ECF
Autumn Dawn Highsmith autumn.highsmith@oag.texas.gov

Barry Abrams babrams@BlankRome.com, mhindman@blankrome.com, pljohnson@BlankRome.com

Catherine Bennett Hobson katie.hobson@oag.texas.gov

Deirdre Carey Brown dbrown@forsheyprostok.com, brown.hsllp@gmail.com, calendar@forsheyprostok.com, dcbfirm@gmail.com, deirdrecbrown@yahoo.com

Jason Bradley Binford jason.binford@oag.texas.gov

Jessica Amber Ahmed amber.ahmed@oag.texas.gov, erynn.campesi@oag.texas.gov, laura.courtney@oag.texas.gov

Shelly Magan Doggett shelly.doggett@oag.texas.gov, david.laurent@oag.texas.gov, laura.courtney@oag.texas.gov

Via E-Mail

Raven Blakeway,
Regional Planning and Environmental Center
2000 Fort Point Rd
Galveston, TX 77550
Raven.Blakeway@usace.army.mil

Federal Emergency Management Agency
Mitigation Division – Region 6
Attn: Charles Cook, Floodplain Mgmt. & Ins. Branch Chief
800 North Loop 288
Denton, TX 76209
Charles.Cook4@fema.dhs.gov

National Oceanic and Atmospheric Administration
Office for Coastal Management
Attn: Heidi Stiller, South Regional Director
2234 South Hobson Ave.
Charleston, SC 29405-2413
Heidi.Stiller@noaa.gov

U.S. Army Corps of Engineers
Galveston District, Regulatory Division
Attn: Joseph McMahan, Chief
P.O. Box 1229
Galveston, TX 77553-1229
Joseph.A.Mcmahan@usace.army.mil

U.S. Fish and Wildlife Services
Clear Lake Ecological Services Field Office
Attn: Amber Bearb
17629 El Camino Real #211
Houston, TX 77058
amber_bearb@fws.gov

U.S. Fish and Wildlife Services
Clear Lake Ecological Services Field Office
Attn: Amber Bearb
17629 El Camino Real #211
Houston, TX 77058
amber_bearb@fws.gov

Texas Commission on Environmental Quality
Attn: NEPA Coordinator
P.O. Box 13087
Austin, TX 78711-3087
NEPA@tceq.texas.gov

Ms. Marie Archambeault
Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711
reviews@thc.state.tx.us

Texas Parks and Wildlife Department
Attn: Laura Zebehazy
4200 Smith School Rd.
Austin, TX 78744
WHAB@tpwd.texas.gov

IDC Board Member Bill Coltzer bill@z6consulting.com> and bcoltzer@zgconsulting.com>;

IDC Board Member Terrilyn Tarlton-Shannon <terrilyn@sbcglobal.net>;

/ s/ Deirdre Carey Brown
Deirdre Carey Brown

EXHIBIT A

PORRETTO BEACH
WWW.PORRETTOBEACH.COM

Galveston Island, Texas
(6th to 10th, 11th to 12th, 14th to 16th, 26th to 27th 'On the Beach')

August 15, 2022

Sonya M. Porretto c/o
Porretto Beaches
Mailing Address:
7 East Dansby Drive
Galveston, Texas 77551
(281) 808-3431
smpbeach@aol.com

VIA: Email (10 Pages)

Dr. Raven Blakeway, Biologist,
Environmental Branch
Regional Planning and Environmental Center
2000 Fort Point Rd,
Galveston, TX 77550,
Raven.Blakeway@usace.army.mil.

Re: **OBJECTION TO JULY 15, 2022 , JOINT PUBLIC NOTICE DRAFT DETAILED PROJECT REPORT AND ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED U.S. ARMY CORPS OF ENGINEERS GALVESTON ISLAND COASTAL EROSION, GALVESTON, TEXAS STUDY**

Dear Dr. Raven Blakeway,

Please allow this communication to serve as:

> An **Objection** to the project identified in July 15, 2022, Public Notice of the "Draft Detailed Project Report and Environmental Assessment for the Proposed US Army Corps of Engineers Galveston Island Coastal Erosion Galveston Texas Study"

1. *Establishing Timely Response For Objection*
This objection has been delivered by email to your posted email address and copy mailed to your office located at 2000 Fort Point Rd Galveston, TX 77550, on August 15, 2022.

2. *Establishing "Standing" and "Stakeholder" For Objection*
The Law Dictionary defines a *Stakeholder* as, "A group organization ***or person*** who has a stake that can be affected by the organizations objective – policies and actions."

- I am a U.S. citizen, fourth generation resident of Galveston Island, Texas, and one of the largest historical accreting, dry, stable private beachfront real property owners along the east end of the original planned Galveston Island.
- My properties, rights, uses, characteristics, factual data, and ability to protect are required by local, state, and federal law thus, this objection serves as such exercised right.
- My historical properties and business operations upon these properties are located south of the original Seawall. The "legal" property descriptions as filed in Galveston County real estate records for over 100 years are attached in Exhibit 'A'.
- The Galveston County Central Appraisal District property identification numbers ***and*** Galveston County Tax Accessor Property identification numbers are also on record with Galveston County for over 60 years.

3. My Objection is based on one or more of the following omitted, contradicting, inconsistent and missing information required within the Public Notice therefore, the proposed project cannot be considered complete for comment until necessary data, documents and information is provided within the Public Notice. Until the necessary information is included complete within the Public Notice my objection stands based on the following:

33 CFR § 325.3 Public notice.

(a) *General.* The public notice is the primary method of advising all interested parties of the proposed activity for which a permit is sought and of soliciting comments and information necessary to evaluate the probable impact on the public interest. The notice must, therefore, include sufficient information to give a clear understanding of the nature and magnitude of the activity to generate meaningful comment. The notice should include the following items of information:

(1) Applicable statutory authority or authorities;

(2) The name and address of the applicant;

(3) The name or title, address and telephone number of the Corps employee from whom additional information concerning the application may be obtained;

(4) The location of the proposed activity;

(5) A brief description of the proposed activity, its purpose and intended use, so as to provide sufficient information concerning the nature of the activity to generate meaningful comments, including a description of the type of structures, if any, to be erected on fills or pile or float-supported platforms, and a description of the type, composition, and quantity of materials to be discharged or disposed of in the ocean;

(6) A plan and elevation drawing showing the general and specific site location and character of all proposed activities, including the size

relationship of the proposed structures to the size of the impacted waterway and depth of water in the area;

(7) If the proposed activity would occur in the territorial seas or ocean waters, a description of the activity's relationship to the baseline from which the territorial sea is measured;

(8) A list of other government authorizations obtained or requested by the applicant, including required certifications relative to water quality, coastal zone management, or marine sanctuaries;

(9) If appropriate, a statement that the activity is a categorical exclusion for purposes of NEPA (see paragraph 7 of Appendix B to 33 CFR part 230);

(10) A statement of the district engineer's current knowledge on historic properties;

(11) A statement of the district engineer's current knowledge on endangered species (see § 325.2(b)(5));

(12) A statement(s) on evaluation factors (see § 325.3(c));

(13) Any other available information which may assist interested parties in evaluating the likely impact of the proposed activity, if any, on factors affecting the public interest;

(14) The comment period based on § 325.2(d)(2);

(15) A statement that any person may request, in writing, within the comment period specified in the notice, that a public hearing be held to consider the application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing;

(16) For non-federal applications in states with an approved CZM Plan, a statement on compliance with the approved Plan; and

(17) In addition, for section 103 (ocean dumping) activities:

(i) The specific location of the proposed disposal site and its physical boundaries;

(ii) A statement as to whether the proposed disposal site has been designated for use by the Administrator, EPA, pursuant to section 102(c) of the Act;

(iii) If the proposed disposal site has not been designated by the Administrator, EPA, a description of the characteristics of the proposed disposal site and an explanation as to why no previously designated disposal site is feasible;

(iv) A brief description of known dredged material discharges at the proposed disposal site;

(v) Existence and documented effects of other authorized disposals that have been made in the disposal area (e.g., heavy metal background reading and organic carbon content);

(vi) An estimate of the length of time during which disposal would continue at the proposed site; and

(vii) Information on the characteristics and composition of the dredged material.

(b) *Public notice for general permits.* District engineers will publish a public notice for all proposed regional general permits and for significant modifications to, or reissuance of, existing regional permits within their area of jurisdiction. Public notices for statewide regional permits may be issued jointly by the affected Corps districts. The notice will include all applicable information necessary to provide a clear understanding of the proposal. In addition, the notice will state the availability of information at the district office which reveals the Corps' provisional determination that the proposed activities comply with the requirements for issuance of general permits. District engineers will publish a public notice for nationwide permits in accordance with 33 CFR 330.4.

(c) *Evaluation factors.* A paragraph describing the various evaluation factors on which decisions are based shall be included in every public notice.

(1) Except as provided in paragraph (c)(3) of this section, the following will be included:

"The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people."

(2) If the activity would involve the discharge of dredged or fill material into the waters of the United States or the transportation of dredged material for the purpose of disposing of it in ocean waters, the public notice shall also indicate that the evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, EPA, (40 CFR part 230) or of the criteria established under authority of section 102(a) of the Marine Protection, Research and Sanctuaries Act of 1972, as amended (40 CFR parts 220 to 229), as appropriate. (See 33 CFR parts 323 and 324).

(3) In cases involving construction of artificial islands, installations and other devices on outer continental shelf lands which are under mineral lease from the Department of the Interior, the notice will contain the following statement: "The decision as to whether a permit will be issued will be based on an evaluation of the impact of the proposed work on navigation and national security."

(d) *Distribution of public notices.*

(1) Public notices will be distributed for posting in post offices or other appropriate public places in the vicinity of the site of the proposed work and will be

sent to the applicant, to appropriate city and county officials, to adjoining property owners, to appropriate state agencies, to appropriate Indian Tribes or tribal representatives, to concerned Federal agencies, to local, regional and national shipping and other concerned business and conservation organizations, to appropriate River Basin Commissions, to appropriate state and areawide clearing houses as prescribed by OMB Circular A-95, to local news media and to any other interested party. Copies of public notices will be sent to all parties who have specifically requested copies of public notices, to the U.S. Senators and Representatives for the area where the work is to be performed, the field representative of the Secretary of the Interior, the Regional Director of the Fish and Wildlife Service, the Regional Director of the National Park Service, the Regional Administrator of the Environmental Protection Agency (EPA), the Regional Director of the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA), the head of the state agency responsible for fish and wildlife resources, the State Historic Preservation Officer, and the District Commander, U.S. Coast Guard.

(2) In addition to the general distribution of public notices cited above, notices will be sent to other addressees in appropriate cases as follows:

(i) If the activity would involve structures or dredging along the shores of the seas or Great Lakes, to the Coastal Engineering Research Center, Washington, DC 20016.

(ii) If the activity would involve construction of fixed structures or artificial islands on the outer continental shelf or in the territorial seas, to the Assistant Secretary of Defense (Manpower, Installations, and Logistics (ASD(MI&L)), Washington, DC 20310; the Director, Defense Mapping Agency (Hydrographic Center) Washington, DC 20390, Attention, Code NS12; and the National Ocean Service, Office of Coast Survey, N/CS261, 1315 East West Highway, Silver Spring, Maryland 20910-3282, and to affected military installations and activities.

(iii) If the activity involves the construction of structures to enhance fish propagation (e.g., fishing reefs) along the coasts of the United States, to the Director, Office of Marine Recreational Fisheries, National Marine Fisheries Service, Washington, DC 20235.

(iv) If the activity involves the construction of structures which may affect aircraft operations or for purposes associated with seaplane operations, to the Regional Director of the Federal Aviation Administration.

(v) If the activity would be in connection with a foreign-trade zone, to the Executive Secretary, Foreign-Trade Zones Board, Department of Commerce, Washington, DC 20230 and to the appropriate District Director of Customs as Resident Representative, Foreign-Trade Zones Board.

(3) It is presumed that all interested parties and agencies will wish to respond to public notices; therefore, a lack of response will be interpreted as meaning Regional Director of the Federal Aviation Administration.

(v) If the activity would be in connection with a foreign-trade zone, to the Executive Secretary, Foreign-Trade Zones Board, Department of Commerce, Washington, DC 20230 and to the appropriate District Director of Customs as Resident Representative, Foreign-Trade Zones Board.

(3) It is presumed that all interested parties and agencies will wish to respond to public notices; therefore, a lack of response will be interpreted as meaning that there is no objection to the proposed project. A copy of the public notice with the list of the addresses to whom the notice was sent will be included in the record. If a question develops with respect to an activity for which another agency has responsibility and that other agency has not responded to the public notice, the district engineer may

request its comments. Whenever a response to a public notice has been received from a member of Congress, either in behalf of a constitutent or himself, the district engineer will inform the member of Congress of the final decision.

(4) District engineers will update public notice mailing lists at least once every two years.

Thank you for your attention to this matter and please add me to your list of further public notices regarding this and other Galveston beach permitting applications submitted by the City of Galveston and Park Board of Trustees.

Regards,

Sonya M. Porretto

cc: db, an, nn

EXHIBIT A
Porretto Properties
(3 Pages)

Tract B:
Lots Eight (8), Nine (9), Ten (10), Eleven (11), Twelve (12), Thirteen (13), and Fourteen (14), in Block Six (6), in the City and County of Galveston County, Texas and only being all of those portions of the subject property lying South of the Seawall, together with that portion of the adjacent Street(s) and Alleys abandoned as set forth in Ordinance No. 78-46.

Tract C:
The Southerly portion of Lot Ten (10) of Block Sixty-seven (67), all in the City and County of Galveston, Texas and only being all of those portions of the subject property lying South of the Seawall.

Tract D:
Lots One (1), Two (2), Three (3), in Block Seven (7), in the City and County of Galveston, Texas, and only being all of those portions of the subject property lying South of the Seawall.

Tract E:
Lots Eight (8), Nine (9), and Ten (10), in Block Seven (7), in the City and County of Galveston, Texas and only being all of those portions on the subject property lying South of the Seawall.

Tract F:
Lots Eight (8), Nine (9), Ten (10) and Eleven (11), in Block Eight (8), in the City and County of Galveston, Texas, Lots Seven (7), Eight (8), Nine (9), Ten (10), Eleven (11) and Twelve (12), in the Northeast Quarter of Out Lot Twenty-four(24), One (1) through Fourteen (14), inclusive, in the Southeast Quarter of Out Lot Twenty-four (24), Lots One (1), an interest in Lot Two (2), Three (3) through Fourteen (14), inclusive, in the Northwest Quarter of Out Lot Twenty-Five (25), Lots One(1), Through Fourteen (14), inclusive in the Northeast Quarter of Out Lot Twenty-five (25), Lots One (1), Through Fourteen (14), inclusive, in the Southwest Quarter of Out Lot Twenty-five (25) and Lots One (1), Through Fourteen (14), inclusive, in the Southeast Quarter of Out Lot Twenty-five (25), Lots One (1) through Fourteen (14) in the Northwest Quarter of Out Lot Fifty (50) and the entire Northeast Quarter of Out Lot Fifty (50), all in the City and County of Galveston, Texas, and only being all of those portions of the subject property lying South of the Seawall, together with that portion of the adjacent Street(s) and Alleys abandoned as set forth in Ordinance No. 78-46.

Tract G:
The Southeast Quarter, of Out Lot Forty-nine (49), all in the City and County of Galveston only being all of those portions of the subject property lying South of the Seawall.

Tract H:
The Southwest Quarter of Out Lot Forty-nine (49), all in the City and County of Galveston only being all of those portions of the subject property lying South of the Seawall.

Tract I:
Lots Eight (8), through Ten (10), inclusive, and the East one-half (1/2) of Lot Eleven (11), in the Northeast Quarter of Out Lot Forty-eight (48) all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall.

Tract J:
The Northwest Quarter of Out Lot Seventy-two (72), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract K:
The Southwest Quarter of Out Lot Seventy-two (72), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract L:
The Southeast Quarter, of Out Lot Seventy-One (71), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract M:
The Northeast Quarter of Out Lot One hundred-nineteen (119), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract N:
The Southeast Quarter, of Out Lot One hundred-nineteen (119), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract O:
Part of Lots Eight (8) through Thirteen (13), inclusive, of the Northwest Quarter of Out Lot One hundred forty-one (141), all in the City and County of Galveston

and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract P:
Lots One (1) through seven (7), inclusive, of the Southwest Quarter of Out Lot One hundred forty-one (141), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Tract Q:
Lots Eight (8) through Fourteen (14), inclusive, of the Southwest Quarter of Out Lot One hundred forty-one (141), all in the City and County of Galveston and only being all of those portions of the subject property lying South of the Seawall, based on the Map of the City of Galveston in common use.

Comment entry no: 58

8/7/22

Dear Brandon Hill

Re. Norishment for the West End

Hi my name is Albert Shechter, I live at 11947 San Luis Pass Rd #307, Galveston TX 77554. I am writing to comment in favor of the Gap 204 Project. I am a retired 73 yr old Disabled Veteran, living right on the beach at Riviera II. Since I moved here in 2017 I've seen much of the beach erode along with the dunes which have disappeared. We desparately need your help to move ahead with the Norishment of the West end especially our 3 condo buildings. We really need your help.

Thank you for your attention.

Al Shechter
11947 San Luis Pass Rd #307
Galveston TX 77554
409-443-6883