Draft Environmental Assessment for the Aransas National Wildlife Refuge Dagger Point Coastal and Marine Habitat Protection and Restoration Project

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Prepared for
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This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposed action and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500-1509) and Department of the Interior (43 CFR 46; 516 Departmental Manual 8) and U.S. Fish and Wildlife Service (USFWS) (550 Series - Fish and Wildlife Service Manual 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment (USFWS 2020).

1 Purpose and Need

1.1 Proposed Action

USFWS is proposing to construct a shoreline protection and bluff stabilization project for the eroding shoreline of Aransas National Wildlife Refuge (ANWR) along San Antonio Bay, particularly along Dagger Point (Figure 1). Relative sea level rise, wave impacts, and tropical storms have caused erosion and loss of uplands and marsh along a 5-mile length of the eastern shoreline. The proposed action is to construct a segmented rock breakwater parallel and offshore of the existing shoreline and provide toe protection to stabilize the eroding bluffs.

All structures would be constructed with materials that would better withstand storm impacts and wave energy while protecting coastal habitats. The proposed structures and construction methodologies are proven approaches used in similar environments in Texas and the U.S. Gulf of Mexico coast. A traditional low-crested rubble-mound (rock) breakwater structure is proposed as the conceptual design because it can be efficiently maintained and adapted once it is constructed, compared to other construction materials and methods.

A proposed action is often iterative and may evolve during the NEPA process as the agency refines its proposal and gathers feedback from the public, tribes, and other agencies. Therefore, the final proposed action may be different from the original. The proposed action would be finalized after the public comment period for the EA (USFWS 2020).

1.2 Location

ANWR consists of five units. These units include the Aransas (Blackjack), Tatton, Lamar, Myrtle Foester-Whitmire, and the Matagorda Island units. The proposed project will occur on the eastern

side of the Blackjack Unit on the San Antonio Bay shoreline. The Blackjack Unit is bounded by St. Charles Bay on the west, San Antonio Bay on the east, and the Gulf Intracoastal Waterway along the south. It is 10 miles long northeast to southwest and 2 to 7 miles wide northwest to southeast. No activities are proposed on the other four units and only the Blackjack Unit is described in detail. For further information on the remaining units, please refer to the Aransas National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment (CCP) (USFWS 2010).

1.3 Background

National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act (NWRSAA) of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the CFR and Fish and Wildlife Service Manual (USFWS 2020).

ANWR (Aransas Unit), originally comprising 47,261 acres, was established on December 31, 1937, by Executive Order 7784, "*...as a refuge and breeding ground for migratory birds and other wildlife...*" This acquisition was implemented under the authority of the Migratory Bird Conservation Act of 1929 (45 U.S. Statutes at Large [Stat.] 1222), which also established that ANWR is "*...for use as an inviolate sanctuary...for any other management purposes...for migratory birds...*" (16 United States Code [U.S.C.] § 715d). Additionally, this unit, composed of the Blackjack Peninsula, has a designated proclamation boundary or buffer zone, adding an additional 12,934 acres of jurisdiction over open waters surrounding the peninsula for the protection of waterfowl (Presidential Proclamation No. 2314 [1938], and No. 2478 [1941]). The proclamation boundary (50 CFR, Part 32.8) was established to "*...effectuate the purposes of the Migratory Bird Treaty Act of July 3, 1918...designated as closed area in or on which hunting, taking, capturing or killing...is hereby prohibited*." The ANWR Complex is unique in its representation of four broadly distinct coastal habitats: barrier island, peninsular, coastal upland prairie, and shoreline. With increasingly diminishing habitats along the Texas Gulf Coast, ANWR plays a critical role in coastal habitat preservation and management (USFWS 2010).

The mission of the NWRS, as outlined by the NWRSAA, as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is:

> *"to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*(USFWS 2010)

The NWRSAA mandates the Secretary of the Interior in administering the National Wildlife Refuge System to (16 U.S.C. 668dd(a)(4)):

•Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
•Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;
•Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife;
•Ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses (USFWS 2010).

1.4 Purpose and Need for the Proposed Action

The purpose of this proposed action is to protect the existing shoreline by reducing wave energy and slowing the rate of erosion. The project would also help to preserve the remaining estuarine marsh and coastal bluff habitats and provide opportunities for habitat restoration. Additionally, public access and infrastructure, such as roads, parking areas, and viewing piers would be protected from continued erosion and wave impacts.

The eastern shoreline of the Blackjack Unit along San Antonio Bay is exposed to erosive forces due to water and wind acting on the shoreline. In general, the wave climate in San Antonio Bay consists of locally generated waves that are the result of seasonal wind patterns as well as tropical and extratropical storms. The primary wind and wave direction at the project area is from the southeast. Offshore barrier islands (Matagorda Island and San José Island) play a large role in sheltering San Antonio Bay by reducing wave energy from the Gulf of Mexico.

The project area consists of low-lying coastal marshes, low bluffs between 7 and 9 feet high, and high bluffs (up to 30 feet high) in the vicinity of Dagger Point. The shoreline has been subject to erosional forces and subsequent estuarine habitat shoreline loss that has been documented for several decades. The University of Texas Bureau of Economic Geology (UTBEG; Paine et al. 2016) has mapped coastal erosion rates along the Texas coastline from the 1930s to the 2010s. Using the UTBEG mapping application, the shoreline of ANWR along San Antonio Bay shows shoreline retreat rates of several feet per year in portions of the project area.

Hurricane Harvey made landfall in the project area in 2017, and ANWR staff observed approximately 40 feet of shoreline loss due to that event. In the long-term future, the ANWR shoreline will likely become more vulnerable to erosive forces from low-frequency, high-energy storms as climate change and relative sea level rise increase the intensity of storm events in the Gulf Coast region (Knutson 2020).

This project is needed to ensure ANWR can protect and preserve the resources it is intended to manage. The need for the proposed action is to meet USFWS's priorities as outlined by the NWRSAA and ensure that opportunities are provided for compatible wildlife-dependent recreational uses. This

project advances the missions of both USFWS and the NWRS through the conservation, management, and restoration of fish, wildlife, and plants that have been affected by storm impacts, long-term erosion, and habitat loss. The project also will help ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans (USFWS 2020).

2 Alternatives

2.1 Alternatives Considered

2.1.1 *Alternative A – No Action Alternative*

The current rates of erosion along the eastern shoreline of the Blackjack Unit are expected to increase due to a combination of factors. With continued atmospheric and ocean warming and thermal expansion of ocean waters, sea level rise rates are anticipated to accelerate compared to historic rates (Sweet 2017). The warming climate also increases the likelihood of more intense tropical cyclones such as Hurricane Harvey (Bhatia 2019).

The increasingly deeper waters of San Antonio Bay relative to the existing shoreline of the Blackjack Unit will allow higher wave energy to propagate closer to the existing shoreline and exacerbate the impacts of storm surge. Existing emergent marsh habitat is expected to convert to less productive open water habitat and scarping of the low and high bluffs will continue reducing habitat for migratory birds and other wildlife and aquatic habitat. Public access will be compromised, and ANWR infrastructure will require more maintenance and repair with the potential need to relocate access roads and parking areas.

2.1.2 *Alternative B – Proposed Action Alternative*

Under the Proposed Action Alternative, contractors procured by USFWS would construct a segmented rubble-mound breakwater offshore and parallel to a 5-mile length of the eastern shoreline of the Blackjack Unit and armored structural toe protection constructed at the base of eroding high bluffs with regrading of eroded low bluff scarps (Figures 2-5).

The use of breakwaters is a proven resilient method of shoreline protection that can be efficiently maintained and adapted as needed over time. The use of rock for the structure also provides potential oyster habitat by providing surfaces compatible for larval attachment. The protected areas behind the breakwater may allow for emergent marsh and submerged aquatic vegetation (SAV) habitat expansion and restoration.

The final breakwater design is ongoing. The conceptual design of the breakwater structures includes a maximum crest elevation between +3.0 to +4.0 feet North American Vertical Datum of 1988 (NAVD88) with a crest width of 10 feet (Figure 6). The side slopes of the bayward and landward sides of the breakwater are 5 feet horizontal to 1 foot vertical (5H:1V) The breakwater would be continuous around Dagger Point (Figure 5) but will contain gaps along the northern and southern alignments. The length of each northern and southern breakwater segment is expected to be 200 feet long, and will not exceed 500 feet long, with a gap of around 30 feet from the crest of each subsequent segment to allow for faunal ingress and egress. Each gap will be underlain by a rock sill to prevent scouring. The gap sill elevation will also be determined during final design but is expected to be below the mean lower low water (MLLW) elevation (0.95 feet NAVD 88) at 1.5 to 2 feet above the breakwater base elevation of -1.5 to -2.0 feet MLLW NAVD 88. Buffers of 20 to 30 feet between the breakwaters and any SAV and oyster reefs identified during the SAV and oyster reef survey will be established. Construction access for the offshore breakwaters would be marine-based to minimize impacts to uplands, SAV, and estuarine marsh habitats. A temporary offshore staging area in deeper water would be established for the transfer of equipment and rock material to shallow draft barges.

The bluffs along the project area facing San Antonio Bay are eroding due to wave action at the toe of the bluff where it meets the shoreline and from wind action that mobilizes the unconsolidated sand exposed on the face of the bluffs. Waves that impact the toe of the bluff erode the toe and cause sloughing of the bluff face immediately above this area, further exposing loose sediment. This process manifests as a shearing-off of thin layers of the bluff face, which leaves vertical or extremely steep slopes along the face. The sand that is eroded from the bluff is then transported into the bay. This type of erosion does not allow the bluff to erode to a stable slope. Furthermore, the steep slope and continual erosion also prevents vegetation from taking root on the bluff face.

The preliminary design of the high bluff stabilization component of the project includes the installation of an armored toe to protect 4,200 feet of high bluffs from wave action from the bay (Figure 7). The bluff slope above the toe protection would be allowed to naturally adjust to a stabilized slope angle. Vegetation could then be established on the stable slope through natural recruitment or planting and seeding of desired plant species. Vegetating the slope would reduce erosional forces by reducing the velocity of wind reaching the bluff face surface and allowing the associated root mass to stabilize bluff sediment. A 1,300-foot length of the high bluff shoreline in the immediate vicinity of Dagger Point would be protected by a groin field consisting of a series of groins and breakwaters with sand fill (Figures 8-11). Based on the preliminary design, the groins would extend 150 feet from the shoreline and tie into a series of shore-parallel breakwaters. Up to 15,000 cubic yards of beach sand fill will be placed between the shoreline and breakwaters to an elevation of +3.0 feet NAVD88 and will be obtained either from a commercial sand supplier or from material dredged from the Gulf Intracoastal Waterway (GIWW). Conceptual design of the high bluff

groin field breakwater and groin structures includes a maximum crest elevation of +4.0 feet NAVD88 with a crest width of 10 feet (Figures 10 and 11). The side slopes of the bayward and landward sides of the high bluff protection breakwater and groins would be 3 feet horizontal to 1 foot vertical (3H:1V). The final details of the high bluff protection will be determined during final design after hydraulic modeling of the alternatives and additional input from project stakeholders.

The low bluff design consists of regrading the slope to a more stable profile and vegetating the bluff face. The steepness of the slope gradation will be based on slope stability calculations, aesthetics, and consideration for project area users, since the low bluff areas are more accessible to ANWR visitors.

Depending on the contractor's means and methods and the feasibility of construction, landside access of equipment, materials, and personnel may be used for construction of the high bluff protection and regrading of low bluffs. If needed, upland staging areas and temporary access ramps to the shoreline would be established near the fishing pier located 6,500 feet to the northwest of Dagger Point or from near the observation tower 9,300 feet to the south. The staging area would be complete with fueling, oil and lube stations meeting environmental storage, spill control and secondary containment requirements. Common to the industry and specified in a spill prevention, control and countermeasures plan (SPCC) covering planned work areas and environments. Heavy equipment would travel along the beach during low tide periods and mats would be used to minimize impacts to sensitive areas. Reshaping and stabilization of areas affected by construction activities would be performed as part of demobilization activities.

2.1.3 *Alternatives Considered, But Dismissed from Further Consideration*

A range of breakwater configurations and distances from the existing shoreline was evaluated to assess how different geometries and locations may perform under various wave and water level conditions, in regard to wave attenuation. Wave modeling was used to evaluate the wave attenuation performance of various breakwater configurations within the project area under a variety of meteorological conditions ranging from annual return-period winds to hurricane events. Overall, the model evaluation results showed an increase in the breakwater system's effectiveness for attenuating waves near the shoreline as the breakwater alignment was moved closer to shore, gapped portions of the alignment were replaced with continuous (no gaps) segments, sills were placed in the gaps, and a conventional structure type was assumed in lieu of a reef structure type. The proposed alternative design was identified by ANWR staff and project stakeholders as the optimal configuration for providing the highest amount of wave attenuation while avoiding impacts to SAV and oyster reefs and maintaining enough water depth for constructability.

2.2 Mitigation Measures and Best Management Practices

Mitigation measures include:

1. Avoiding impacts by not taking an action or parts of an action;
2. Minimizing impacts by altering or limiting the degree of an action; or
3. Compensating for impacts by repairing, rehabilitating, or restoring the affected environment.

Measures were considered during the development of the proposed alternative to reduce, avoid, or eliminate adverse environmental impacts. Best management practices (BMPs) can include a variety of alternatives that reduce or avoid impacts on resources but still achieve desirable results.

The alignment and footprint of the proposed breakwaters and bluff stabilization measures was selected to provide the greatest amount of shoreline protection while avoiding known SAV and oyster reef locations. The design also incorporated state and federal resource agency representative recommendations that buffers of 20 to 30 feet be established between the breakwater structures and any SAV and oyster reefs identified during the SAV and oyster reef survey.

Construction of the shoreline and bluff protection will be dependent on the chosen contractor's means and methods. Marine-based construction of the offshore breakwaters and bluff protection, if feasible, using shallow draft barges and temporary offshore staging is preferred to minimize impacts to SAV, oysters, emergent marsh, and upland habitats. Land-based access and staging may be needed for construction of the high bluff protection and regrading of the low bluffs if marine-based access is determined to be impractical. If landside access is needed, temporary staging areas and access ramps to the shoreline will be located in upland areas designated to minimize further impacts to the bluffs. Re-shaping and stabilization of areas affected by construction activities would be performed as part of demobilization activities.

2.2.1 *Threatened and Endangered Species Mitigation Measures and BMPs*

All Endangered Species Act (Section 7 Interagency coordination) mitigation measures and BMPs agreed upon in consultation efforts with USFWS's Corpus Christi Ecological Field Office would be strictly administered (USFWS 2020).

2.2.1.1 Whooping Crane Mitigation Measures and BMPs

To minimize disturbance to whooping cranes, construction activities on uplands and the shoreline would need to be regulated between October 30 and April 30. If whooping cranes are observed during construction, crews and equipment will maintain a 1,000-foot buffer from the crane and notify a Service representative. All booms and tall (>20 feet) equipment would be lowered at the end of each workday to minimize crane collision risk (USFWS 2020). If construction activities occur while cranes are on ANWR, BMPs would include arranging for a USFWS representative updating crews on crane activity near work sites as well as access to those work sites.

BMPs would also include equipment traffic and foot activity measures, such as maintaining a 1,000-foot buffer zone from any cranes encountered while accessing work areas or at work sites. Equipment will slow to a stop to allow cranes to move slowly into comfort zones on their own versus flushing them off-site. Any type of measure that reduces the energy expenditure of cranes would be utilized in the project area to minimize disturbances to cranes (USFWS 2020).

2.2.1.2 Northern Aplomado Falcon Mitigation Measures and BMPs

At this project location, northern aplomado falcons are unlikely to be encountered. However, during the March 15 through June 15 northern aplomado falcon nesting season, a 1,000-foot buffer around nesting sites must be maintained. Equipment operators must proceed slowly and avoid unnecessary stops to minimize disturbance to falcons. If construction occurs in the vicinity of known nesting areas during the nesting season, a biological monitor would accompany work crews and could halt work if a falcon is observed within 1,000 feet of the worksite. Additionally, all booms and tall (>20 feet) equipment would be lowered at the end of each workday to minimize falcon collision risk (USFWS 2020).

2.2.1.3 Migratory Bird Mitigation Measures and BMPs

ANWR is located in the Central Flyway, a route traveled annually by migratory birds and numerous waterfowl. As such, migratory birds are considered to be priority Federal trust species by USFWS on ANWR. If construction activities occur during the breeding season, it is recommended that a qualified biologist complete an assessment in the project area to determine risk to breeding birds. Construction crews should avoid engaging in potentially destructive or disruptive activities in the vicinity of migratory birds to reduce the risk of affecting birds, their nests, or eggs (USFWS 2010).

2.2.1.4 West Indian Manatee Mitigation Measures and BMPs

The endangered West Indian manatee is occasionally documented in the Coastal Bend area but needs further verification within ANWR (USFWS 2010). During in-water work in areas that potentially support manatees, all personnel associated with the project should be instructed about the potential presence of manatees and the need to avoid collisions with and injury to manatees. All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving) or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s) (USFWS 2013).

2.2.1.5 Sea Turtle Mitigation Measures and BMPs

If a sea turtle is observed within 100 yards of the active construction area or vessel movement, appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet to a sea turtle.

Operation of any mechanical construction equipment shall cease immediately if a sea turtle is seen within a 50-foot radius of the equipment. Activities may not resume until the turtle has left the project area of its own volition (National Oceanic and Atmospheric Administration, National Marine Fisheries Service [NOAA] 2006).

2.2.2 *Soil Mitigation Measures and Best Management Practices*

Contractors would provide erosion control methods (such as watering dry soils) and structures (such as silt fences and silt curtains) as necessary to prevent wind-borne dust and water-borne silt from leaving the immediate work areas (USFWS 2020).

Additionally, any excavated native topsoil would be stockpiled and reused for reclamation purposes around the construction area. Access points would be designated and flagged to minimize soil compaction. Mats or boards would be used to access equipment during wet conditions to prevent rutting and soil loss (USFWS 2020). Temporary access ramps and staging areas, if needed, will be located in upland areas designated to minimize further damage to the bluffs. Re-shaping and stabilization of areas affected by construction activities would be performed as part of demobilization activities.

Barge traffic that transports crews, materials, and supplies would follow designated routes to avoid scouring and propeller scarring of SAV (e.g., seagrass) in the adjacent bays (USFWS 2020).

2.2.3 *Archeology Mitigation Measures and Best Management Practices*

If paleontological, archaeological, or historical remains (including burials or skeletal material) were encountered, all work would be immediately halted and a construction representative, contracting officer representative, contracting officer or a service representative would be notified. The contracting officer would notify the regional archaeologist, so the provisions of 36 CFR 800.7 and other relevant laws were followed. Work would cease in the immediate vicinity until permitted to resume by written order from the contracting officer. Work in other areas may proceed as approved by the contracting officer (USFWS 2020).

All mitigation measures discussed in consultation with the Texas State Historic Preservation Office in relation to this project would be strictly administered (USFWS 2020).

3 Affected Environment and Environmental Consequences

3.1 Affected Environment

The Aransas NWR comprises just over 116,000 acres of wildlife habitat in Aransas, Calhoun, and Refugio Counties, about 80 miles northeast of Corpus Christi along the Texas Coastal Bend. ANWR's geographically strategic location along the Central Flyway, further enhanced by the convergence of

several habitat types and its proximity to the Gulf of Mexico, makes ANWR a major stopover for birds during their fall and spring migration. Waterfowl, shorebirds, raptors, and songbirds are particularly abundant. The combination of mild winters, abundant food sources, and diverse habitats make ANWR a prime wintering area for many avian species, including the endangered whooping crane. These same features also make Aransas a haven for many other forms of endemic and resident wildlife, ranging from marine to temperate upland and subtropical species (USFWS 2020).

The affected environment under the proposed action is associated with the 5-mile length of the eastern shoreline of the Blackjack Unit on San Antonio Bay. Construction activities would be in an 210-acre area that consists of exposed shoreline, low and high estuarine marsh, SAV, open water, low and high bluffs, and red bay-live oak forest.

Resources potentially impacted by the proposed action and described in detail in this analysis include wildlife and aquatic species, threatened and endangered species, vegetation and habitat, soils, water quality, and air quality.

Resources that would not be impacted by the proposed action and are not analyzed in this EA include geology, water resources, visual resources, and wilderness.

3.2 Environmental Consequences of the Action

This section analyzes the environmental consequences of the action on each affected resource, including direct and indirect effects. This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource" or are otherwise considered important as related to the proposed action. Any resources that would not be more than negligibly impacted by the action and have been identified as not otherwise important as related to the proposed action have been dismissed from further analyses (USFWS 2020).

Tables 1 through 5 provide:

4. Descriptions of the affected resources in the proposed action area; and
5. Direct and indirect impacts of the proposed action and any alternatives on those resources,

Impact Types:

- Direct effects are caused by the action that occur at the same time and place.
- Indirect effects are caused by the action that occur later in time or farther in distance but are still reasonably foreseeable. This impact type also includes cumulative impacts which are often thought of resulting from incremental impact of the action when added to other past, present and reasonably foreseeable future action regardless of the source of such other actions.

> These impacts are the overall, reasonably foreseeable connected effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially when different actions affect different areas of the same resource. They can also accumulate over time from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effects on a resource. However, more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource (USFWS 2020).

Appendix 1 lists applicable statutes, executive orders, and regulations relative to these resources and lists steps ANWR would use to comply.

Table 1. Affected Natural Resources with Anticipated Direct and Indirect Impacts of the Alternatives.

Wildlife and Aquatic Species
About 39 species of mammals, 400 species of birds, and 100 species of reptiles and amphibians are found on ANWR. Coastal wetlands are a vital component of the Gulf Coast fishery and provide a tremendous food source that supports many of the Federal trust species on Aransas NWR. They provide spawning, nursery, and rearing habitat for many wetland and tidal-inlet dependent fish species; more than 20 have significant recreational, commercial, or prey value. The vast majority of these species occur or have the potential to occur on the Blackjack Unit (USFWS 2020). The primary species that have the potential to be affected are species associated with the bay, shoreline, high and low estuarine marsh, and oak-bay forest habitats on the Blackjack Unit. For a complete list of wildlife and aquatic species, please refer to the CCP.
Direct and Indirect Impacts: <u>Alternative A: No Action Alternative</u> Direct and indirect impacts to wildlife and aquatic species are expected to result from continuation of the existing condition. Erosion of ANWR shorelines and habitat loss is expected to continue, but at an increasing rate due to climate change, relative sea level rise, and more intense hurricanes. Direct impacts include the loss of low and high estuarine marsh, SAV, low and high bluffs, and the vegetation communities that occupy those habitats due to ongoing and future wind, wave, and storm effects. Indirect impacts include the effects on the species that inhabit, forage, nest, and breed in those habitats. <u>Alternative B Proposed Action</u> Both direct and indirect impacts to aquatic species are anticipated from the proposed action since the 210-acre project construction area of the proposed action will occur in coastal areas of ANWR. Direct impacts include disturbance and direct mortality of vegetation and less mobile wildlife species from construction activities. Identified SAV beds and oyster reefs will be avoided during construction, but the risk of incidental impacts during construction will be present. Noise and visual disturbances during construction could affect wildlife behavior. As construction progresses along the 5-mile project length, most wildlife should be able to disperse into surrounding areas.

Both direct and indirect impacts to upland species are anticipated from the proposed action since construction of the bluff stabilization component of the proposed action will occur on ANWR uplands adjacent to the shoreline. The affected uplands are classified as an oak-bay forest. Direct impacts include disturbance and direct mortality of vegetation and less mobile wildlife species from construction activities. Noise and visual disturbances during construction could affect wildlife behavior. As construction progresses along the 5-mile project length, most wildlife should be able to disperse into surrounding areas.

Construction may occur over multiple phases as funding becomes available and/or due to construction windows to avoid undesired tide conditions for marine-based construction of the breakwater structures. Should land access be required for bluff stabilization construction, then low tides may be desired. The cumulative duration of on-site construction activities could extend from 12 to 24 months.

Construction activities would include use of heavy equipment, machinery, and labor to construct the proposed action. Impacts to bay bottom habitats will be minimized by avoiding known oyster, SAV, and emergent marsh areas. Temporary access ramps and staging areas, if needed, will be located in upland areas designated to minimize further damage to the bluffs. Re-shaping and stabilization of areas affected by construction activities would be performed as part of demobilization activities. Marked equipment access corridors, marsh mats, and floating sectional platforms will be used to limit impacts to bay bottom and nearshore areas. Disturbance by vessel traffic, foot traffic, and construction equipment operations have the potential to flush birds and wildlife. Sufficient nearby habitat is available to provide security to displaced wildlife in the vicinity

Threatened and Endangered Species and other Special Status Species

Fourteen threatened or endangered species may occur on ANWR, with many of the habitat management activities focused on the whooping crane. Other federally listed threatened or endangered species that may be found locally in suitable habitat, incidentally or otherwise, include the Kemp's ridley sea turtle (endangered), loggerhead sea turtle (threatened), green sea turtle (threatened), hawksbill sea turtle (endangered), leatherback sea turtle (endangered), piping plover (threatened), Black Rail (threatened), rufa red knot (threatened), and aplomado falcon (endangered) (USFWS 2010). Of the threatened and endangered species on ANWR, the whooping crane and the northern aplomado falcon have the greatest potential to be affected by the proposed action. The endangered West Indian manatee is occasionally documented in the Coastal Bend area but needs further verification within ANWR. Additionally, sea turtles are known to occur in bay waters. The highly endangered Attwater prairie chicken is no longer found in the area. Other endangered mammals reported include the ocelot and jaguarundi, neither of which has been documented on ANWR (USFWS 2010). For a

complete register of listed species, special status species, and general wildlife. Please refer to the CCP (USFWS 2020).

Whooping Crane

The flagship endangered species at Aransas NWR is the whooping crane, one of the first species listed as endangered per the Endangered Species Act of 1973. Historical records indicate that whooping cranes have been known to winter on and around ANWR since at least the early 1900s, prior to refuge establishment. The entire Aransas-Wood Buffalo flock, the last wild flock of whooping cranes in the world, is dependent on this part of the Texas coast during the winter months. The project area is the nearshore and adjacent San Antonio Bay shoreline in the Blackjack Unit. In this area, cranes are occasionally visible in the marsh habitat next to the bay (USFWS 2020).

Whooping Crane Critical Habitat

Whooping Crane critical habitat designation includes most of the Aransas NWR; however, the official designation from 1978 states that it is "exclusive of those existing manmade structures or settlements which are not necessary to the normal needs or survival of the species." The project area is within designated critical habitat for whooping cranes. Whooping cranes are territorial birds and each pair requires several hundred acres of undisturbed wetlands in and around ANWR. Unmated sub-adults also require some suitable habitat that is not regularly defended by the paired cranes. ANWR still has many acres of suitable habitat classified as critical habitat for additional cranes and sub-adults to disperse (USFWS 2020).

Northern Aplomado Falcon

Northern aplomado falcons were released by the Peregrine Fund, Inc., on Matagorda Island and the Tatton Unit of the Aransas NWR in 1999, to help with the recovery of the species. The Peregrine Fund discontinued releases in 2003 because the habitat available for northern aplomado falcons was saturated on ANWR. Nest depredation negatively influenced the efforts on the Tatton unit, but all 13 nesting sites on Matagorda Island were eventually occupied. After Hurricane Harvey, only 6 nesting sites were used. Northern aplomado falcons are continually monitored as part of their recovery plan. There is no critical habitat designation on ANWR for the northern aplomado falcon (USFWS 2020).

Sea Turtles

The Kemp's ridley, loggerhead, hawksbill, green, and leatherback sea turtles occur within the Gulf of Mexico and may also occur within bay waters. Beginning in 2005, the first known nesting

by Kemp's ridley sea turtles was documented on Matagorda Island, and since then, nesting numbers have been steadily increasing (USFWS 2021). Kemp's ridley and green sea turtles are known to forage on seagrasses in Texas bays from Matagorda Bay to Laguna Madre (Valverde 2017). There is no critical habitat designation on ANWR for any of the five species of sea turtles.

Marine Mammals

The endangered West Indian manatee is occasionally documented in the Coastal Bend area but needs further verification within ANWR (USFWS 2010). Although manatees may not be common to ANWR, the project area consists of habitat similar to areas in the Coastal Bend region where manatees have been sighted. There is no critical habitat designation on ANWR for manatees.

Three species of dolphins have been documented at ANWR on or near Matagorda Island (USFWS 2010); these include Risso's Dolphin, Bottlenose Dolphin, and Clymene Dolphin. There is no critical habitat designation on ANWR for dolphins.

Direct and Indirect Impacts:

Alternative A: No Action Alternative

Direct and indirect impacts to threatened and endangered species, critical habitat, or special status species are expected to result from continuation of the existing condition. Erosion of ANWR shorelines and habitat loss is expected to continue, but at an increasing rate due to climate change, relative sea level rise, and more intense hurricanes. Direct impacts include the loss of low and high estuarine marsh, low and high bluffs, and the vegetation communities that occupy those habitats due to ongoing and future wind, wave, and storm effects. Indirect impacts include the effects on the species that inhabit, forage, nest, and breed in those habitats.

Alternative B: Proposed Action Alternative

Short-term direct impacts could occur on listed species but long-term benefits are expected to result from the proposed action. Direct effects that may temporarily disturb and displace listed species could occur from construction activities including noise and visual disturbances from vessel traffic, heavy equipment working in construction areas, and activities of construction crews in and around the project area.

Construction activities would occur within a 210-acre footprint in and adjacent to the nearshore coastal area. Cranes have been observed feeding and loafing in marsh areas in the proposed construction area. Feeding activities of the cranes could be temporarily affected by the proposed construction activities (USFWS 2020).

The West Indian Manatee, three species of dolphins, and five species of sea turtles are known to occur in the surrounding area (USFWS 2010).

No long-term, indirect impacts on listed species are associated with the proposed action because cranes, manatees, dolphins, and sea turtles have the ability to disperse to nearby similar habitats. Listed species are anticipated to use the project area after construction is completed.

Northern aplomado falcons are extremely mobile and can readily relocate to suitable habitat. No impacts on nesting falcons are anticipated from the proposed action since nesting has not occurred in the immediate vicinity of the project area. Other activities that falcons could engage in at the project site include hunting, resting, and perching. Aplomado falcons have suitable nesting, feeding, and resting areas throughout ANWR and if falcons were observed near the construction areas or on access roads leading to the project sites, mitigation measures would be initiated to reduce disturbance to falcons (USFWS 2020).

Direct effects on special status species in construction sites may include mortality of less mobile animals as well as temporary displacement by noise, equipment operation, and other human-induced disturbances in construction areas. Sufficient habitat is available in the immediate vicinity of the project areas to provide dispersal areas to wildlife-affected construction activities (USFWS 2020).

The majority of ANWR, including the project area, is designated as critical habitat. The official designation from 1978 states that the designation is "exclusive of those existing manmade structures or settlements which are not necessary to the normal needs or survival of the species." These "manmade structures" included the proposed breakwater and bluff stabilization structures the proposed action is attempting to construct. These structures will not be "necessary to the normal needs or survival of the species" and will not affect critical habitat designation or elements (USFWS 2020). Under Alternative B, seasonal restrictions, mitigation measures, and BMPs would be put into place to minimize disturbances to listed species. In addition to mitigation measures, there is sufficient habitat available in the immediate vicinity of the project areas to provide sanctuary for listed species from disturbances (USFWS 2020).

Vegetation and Habitat

ANWR consists of a wide variety of habitat types ranging from coastal to upland grasslands. The proposed action would take place on a 210-acre footprint in the nearshore tidal flat coastal and adjacent upland area of the Blackjack Unit. The location for the proposed action on the Blackjack Unit is classified as a tidal flat/pool community (salt marsh community), the tidal shore grassland (marshhay cordgrass and Gulf cordgrass communities), and the ridge and swale community on the low and high elevation bluffs (USFWS 2010).

The primary floral components of the tidal flat/pool community include smooth cordgrass, maritime saltwort, wigeongrass, shoal grass, saltgrass, seashore dropseed, bushy sea oxeye, sea lavender, camphor daisy, shore grass, Gulf cordgrass, sumpweed, groundsel, mesquite, and Texas prickly pear. Specialized components include blue-green algal mats, which are a mix of algae, diatoms, protozoa, and bacteria. The marshes, tidal flats and shallow tidal pools provide feeding, loafing, and roosting areas for many shorebirds, herons, egrets, cranes, and waterfowl (USFWS 2010).

Common fauna in the tidal flat/pool community include detritivores—marine worm, clam, ghost shrimp, and many tiny crustaceans; grass shrimp, juvenile brown shrimp, pistol shrimp, blue crab, marsh crab, mud crab, stone crab, hermit crab, marine snails, striped mullet, and killifish; shore flies, shore bugs, beach flea, fiddler crab, shorebirds, waders, herons and egrets, gulls, terns, black skimmer, clapper rail, seaside sparrow, Gulf saltmarsh snake, saltmarsh grasshopper, marsh rice rat, western pygmy blue and great white southern butterflies, tiger beetles, wolf spider, rice rat, raccoon, feral hog; and white-tailed deer. Rare and uncommon flora and fauna include black mangrove, wood stork, diamondback terrapin turtle, white mullet, blue crab, and the federally endangered whooping crane (USFWS 2010).

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The tidal shore grassland community is the gently sloped linear stretch of land found just inland from the tidal flat/pool community. It is densely covered with marshhay cordgrass and rimmed with Gulf cordgrass and bluestems along the upper edge. The Gulf cordgrass component occurs on saline clay soil types and may also include bluestems. Tidal shore grassland occurs on all units of ANWR along with the Gulf Cordgrass Community. Its open aspect and heavy rodent population appeal to a variety of raptors, including the white-tailed hawk, white-tailed kite, northern harrier, and loggerhead shrike. Also found here are a variety of sparrows, sedge wren, hispid cotton rat, pygmy mouse, racers, and coachwhip snake (USFWS 2010).

The topography of the ridge and swale community is a result of sand deposition due to wind and wave action that created the Ingleside Barrier similar to that of modern barrier islands. On the Blackjack Peninsula, the sandy ridges provide the elevation required for woody perennials to survive being flooded. The frequently flooded sandy swales grow an assortment of annuals and water tolerant herbaceous perennials (USFWS 2010).

The flora of the oak mottes and woodlands of the ridge and swale community is dominated by live oak, laurel oak, redbay, and lime prickly ash. The understory supports yaupon, greenbrier, and beautyberry. Mustang grape is also usually found growing among the trees. This habitat offers

wintertime cover and summertime shade for a variety of wildlife. The live oak thicket portions of the ridge and swale community is composed of mostly dense stands of live oak shoots. The grasslands are dominated by an array of mid- and tall-perennial bunchgrasses, the likes of which are rarely seen outside ANWR. Primary floral components include bushy bluestem, broomsedge, seacoast bluestem, silver bluestem, big bluestem, and others. These are joined by switchgrass, dropseeds, Gulf muhly, paspalums, sprangletops, and Indiangrass. Sawgrass, rattlepod, bulrushes, and sedges can be found in areas where water accumulates (USFWS 2010).

Direct and Indirect Impacts:

Alternative A: No Action Alternative

Direct and indirect impacts to vegetation and habitats are expected to result from continuation of the existing condition. Erosion of ANWR shorelines and habitat loss is expected to continue, but at an increasing rate due to climate change, relative sea level rise, and more intense hurricanes. Direct impacts include the loss of low and high estuarine marsh, low and high bluffs, and the vegetation communities that occupy those habitats due to ongoing and future wind, wave, and storm effects. Indirect impacts include the effects on the species that inhabit, forage, nest, and breed in those habitats. Indirect impacts also include continued erosion of soil and landmass, which would eventually impact access roads, pedestrian paths, and overall public access.

Alternative B: Proposed Action Alternative

Under the proposed Alternative B, minor short- and long-term impacts to vegetation and habitats are anticipated from the proposed action within the 210-acre project construction area in the tidal flat/pool, tidal shore grassland communities. Direct impacts include destruction of native habitat due to construction equipment operation. Identified SAV beds and emergent marsh will be avoided during construction, but the risk of incidental impacts during construction will be present. Noise and visual disturbances during construction could affect wildlife behavior. As construction progresses along the 5-mile project length, most wildlife should be able to disperse into surrounding areas. Long-term direct and indirect beneficial effects on vegetation and habitats from the proposed action are anticipated after construction based on the amount of ANWR habitat protection and restored.

Table 2. Affected Physical Resources with Anticipated Direct, and Indirect Impacts of the Alternatives.

Soils
The soils of the Texas coastal prairie and marsh are characterized by vertisols, mollisols, alfisols, and entisols at their broadest levels (Godfrey et al., 1973). For additional information on soils, please refer to the CCP. The soils in the project area are in the Galveston-Mustang-Dianola soil association. These soils are nearly level to undulating, rapidly permeable, non-saline to extremely saline, sandy soils in low coastal areas (USFWS 2020).
Direct and Indirect Impacts: <u>Alternative A: No Action Alternative</u> Direct impacts to soils are expected to result from the existing condition. Erosion of ANWR shorelines is expected to continue, but at an increasing rate due to climate change, relative sea level rise, and more intense hurricanes. Direct impacts include the loss of sediment due to ongoing and future wind, wave, and storm effects. Indirect impacts include continued erosion of soil and landmass, which would eventually impact access roads, pedestrian paths, and overall public access. <u>Alternative B: Proposed Action Alternative</u> Under the proposed Alternative B, minor short- and long-term impacts to soils are anticipated from the proposed action within the 210-acre project construction area in the tidal flat/pool, tidal shore grassland communities. Direct impacts include damage to soils due to construction equipment operation. Long-term benefits to soils from the proposed action are anticipated after construction due to the erosion protection provided by the proposed structures.
Air Quality
The U.S. Environmental Protection Agency monitors air quality through a scale known as the Air Quality Index. This scale is based on the National Ambient Air Quality Standards (NAAQS). ANWR is located in a remote area along the South Texas Gulf Coast about 40 miles from Victoria and 80 miles from Corpus Christi, Texas. The entire Texas Coastal Bend area from Victoria south to the Lower Rio Grande Valley is included in the near-nonattainment standard for all atmospheric pollutants including ozone, sulfur dioxide, and hydrogen sulfide, as specified by federal air quality regulations (USFWS 2020). The greatest air quality concern comes from the petrochemical industry, regulated by the Texas Commission on Environmental Quality (TCEQ), which sets standards along with the U.S. Environmental Protection Agency (EPA). Infrequent construction activities occur on the Complex and can generate temporary dust (USFWS 2020).

Direct and Indirect Impacts:

Alternative A: No Action Alternative

No impacts on air quality are expected from the continuation of current condition.

Alternative B: Proposed Action Alternative

The proposed action could result in direct short-term impacts to air quality during construction. The sources of these impacts are associated with the use of heavy equipment for construction and vessels used to move rock, equipment, and personnel. Direct impacts to air quality are based on emissions from vessels such as tow boats and air boats and construction equipment such as excavators, dozers, and loaders. Air quality associated with the proposed action is not expected to have any measurable changes and is not expected to contribute to measurable negative impacts on air quality.

Water Quality

Water resources on Aransas NWR are primarily managed with infrastructure (dams, impoundments, and levees) to allow for the maintenance of reservoirs, flooding of rice fields, and movement of water. ANWR is authorized to divert and use water not to exceed 7,685 acre-feet per year to fill the reservoirs for the operation and maintenance of ANWR and recreational purposes. Water quality has been tested periodically at various locations on ANWR, and harmful levels of contaminants such as agricultural chemicals are not significant. However, ANWR periodically tests water quality, particularly at wetlands frequented by migratory birds, to address any potential concerns (USFWS 2020).

Floods commonly occur during summer precipitation events. Human alterations along the floodplains associated with building of roads and other infrastructure and changes or complete removal of native vegetation have reduced the capacity of the natural systems to slow and store floodwaters. There are no managed water resources in any of the project footprints (USFWS 2020).

Direct and Indirect Impacts:

Alternative A: No Action Alternative

Impacts on water quality from the continuation of current condition are associated with increased turbidity caused by the movement of sediment into the water column from erosion of the shoreline and bluffs. Some coastal erosion is normal; however, excessive erosion leads to increased saltwater turbidity, diminished water quality, and the loss of sediments. The loss of sediments translates into the loss of habitat. Once these sediments have reached the Gulf of Mexico, recovery is unlikely and expensive.

Alternative B: Proposed Action Alternative

The proposed action could result in direct short-term impacts on saltwater quality during construction of the project. The source of these impacts are associated with the use of heavy equipment for construction and vessels used to move rock, equipment, and personnel. Direct impacts to water quality are based on turbidity generated from vessels such as tow boats and air boats and construction equipment such as excavators, dozers, and loaders. Water quality associated with the proposed action is not expected to have any measurable changes and is not expected to contribute to measurable negative impacts on air quality. No direct impact to freshwater quality is anticipated with the proposed action.

Table 3. Affected Visitor Services with Anticipated Direct, and Indirect Impacts of the Alternatives

Visitor Services
ANWR provides the six priority public uses of the NWRS (including hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that are compatible with refuge purposes and the NWRS mission. In addition, three approved secondary uses occur: picnicking on the Blackjack Unit, beachcombing (which includes swimming and picnicking), and camping on Matagorda Island. Bicycling also occurs but only as an incidental public use on the auto tour loop on the Blackjack Unit and Matagorda Island. There are no special accommodations provided for this type of use. For a detailed analysis of all public-use activities on ANWR, please refer to the CCP (USFWS 2010). ANWR has been identified as one of the top 10 places in the nation for watching wildlife. It is the wintering home of the endangered whooping crane, attracts over 65,000 visitors each year from all over the world, and is a critical economic driver for local communities. The Rockport Chamber of Commerce in Texas estimates that whooping crane-related activities result in annual gross economic benefits of $6 million to the local economy. Birders from across the country and international visitors visit ANWR annually with peak visitation occurring during the whooping crane wintering season (USFWS 2010).
Direct and Indirect Impacts: <u>Alternative A: No Action Alternative</u> Under the no action alternative, there would be negative indirect impacts on priority wildlife-dependent public uses on ANWR. Continued erosion and habitat loss could affect the visitor experience through the possible loss of road access and facilities supporting public use along this shoreline. <u>Alternative B: Proposed Action Alternative</u> Under the proposed action, short-term indirect impacts to some of the wildlife-dependent public uses on ANWR would occur due to portions of the construction area being restricted from fishing, hunting, and wildlife observation to ensure public safety. Long-term beneficial impacts would occur on ANWR from the proposed action. Visitor uses would be enhanced by protecting the resources and habitats enjoyed by the public to provide a positive visitor experience. Slight improvements and efficiencies are built into the new designs to withstand future weather events as well as to improve visitor experience. Efficiencies in public use infrastructure should return visitation to pre-hurricane numbers with the possibility of a slight increase. Public access would be

reestablished to the construction area to restore the six priority public uses of the NWRS to the project site.

Table 4. Affected Cultural Resources with Anticipated Direct, and Indirect Impacts of the Alternatives

Cultural Resources
ANWR has been inhabited by native peoples for thousands of years. Artifacts from the area suggest that the earliest humans arrived between 6,000 to 8,000 years ago. They hunted bison and mammoths. About 4,000 years ago, a culture of people known as the "Aransas" inhabited areas from around Copano Bay south to Baffin Bay. They were nomadic hunter-gatherers and apparently left the Gulf Coast at about 1200 to 1300 A.D., leaving little trace of their lifestyle, other than some shell tools and spear points, reflecting a culture adapted to the bays. North of Aransas, in neighboring Calhoun County, Karankawa Indians occupied Matagorda Bay and Matagorda Peninsula, and moved down the Coastal Bend around 1400 A.D. in areas previously occupied by the Aransas. Karankawas populated the shoreline and wandered about the area, leaving behind evidence of their existence (USFWS 2020). The most current cultural resources survey was conducted in 1994 on the Blackjack and Live Oak Peninsulas and the Tatton unit (USFWS 2020). A marine cultural resource assessment survey for the project area was conducted in 2020-2021 (SEARCH 2021). One hundred thirty-four magnetic anomalies or anomaly clusters, 13 acoustic contacts, and three acoustic reflectors were detected in the remote sensing record. Three magnetic anomalies were identified as potential submerged cultural resources.
Direct and Indirect Impacts: <u>Alternative A: No Action Alternative</u> No manufactured impacts to cultural resources are expected from continuation of the current condition. However, accelerated erosion along the ANWR shoreline would continue to expose artifacts currently preserved and protected by USFWS policy to remain in place. <u>Alternative B: Proposed Action Alternative</u> Under Alternative B, no impacts to cultural resources are anticipated. Demolition activities and reconstruction efforts are in the same footprint as remaining infrastructure. The marine cultural resources survey that was conducted in 2020-2021 identified three magnetic anomalies that could potentially indicate submerged cultural resources. Although, these three areas are not within the

breakwater footprint, they may be in the construction corridor. ANWR is coordinating with the Texas Historical Commission (THC) on the three areas and will work with THC on recommended buffers and impact minimization.

Table 5. Affected Socioeconomic Resources with Anticipated Direct, Indirect, and Cumulative Impacts of the Alternatives

Socioeconomics
Local and Regional Economics Aransas, Calhoun, and Refugio Counties are rural, with their economies based mostly on farming, ranching, chemical industries, fishing, and tourism. Historically, the three counties were a sparsely settled area of huge cattle ranches, but early in the 20th century, the immense ranches began to break up, and in 1909, organized farming was introduced to this area of the Gulf Coast. Farming and agribusiness have remained the mainstay of the area. One of the largest single industries in the area is chemical manufacturing, primarily in Calhoun County (USFWS 2020). Aransas NWR, wintering home of the endangered whooping crane, attracts over 65,000 visitors each year from all over the world and is a critical economic driver for local communities. Hurricane Harvey, which significantly impacted the area in 2017, has had a drastic impact on socioeconomics throughout the region (USFWS 2020). Impacts of Hurricane Harvey not only interrupted visitor services and everyday management of ANWR, but also affected the oil and gas production in tri-county region. Hilcorp Inc. holds the primary mineral lease on ANWR. Hilcorp maintains access roads, pipelines, gravel pads, electrical lines, storage tanks, separating facilities, and compressor stations on ANWR in support of its oil and gas production activities. This entire infrastructure was damaged by the hurricane. In addition, a right-of-way pipeline easement for off-refuge oil and gas activities runs through ANWR. This operation includes storage tanks and separating facilities. Oil and gas revenues for Aransas County totaled $43.5 million for 16 active gas wells and one active oil well in 2016. Currently, there are 10 active gas wells and two active oil wells on Aransas NWR (USFWS 2020).
Direct and Indirect Impacts: <u>Alternative A: No Action Alternative</u> Under the no action alternative, there would be negative indirect impacts on socioeconomics at the local level. Continued erosion and habitat loss could affect priority wildlife-dependent public uses on ANWR and increase damage to infrastructure.

Alternative B: Proposed Action Alternative

Under the proposed action, protection and restoration of ANWR habitats would benefit socioeconomics for the entire region. The proposed alternative would have beneficial direct and indirect impacts at both the local and regional level. By enhancing priority uses and visitor experience, ANWR generates revenue for the local economy. The proposed alternative would restore and enhance habitats conducive to priority uses. With limited types of outdoor recreation available to the public in this area, protecting and restoring habitats to ANWR would be essential to increasing fishing, hunting, and ecotourism on ANWR. Increased capacity and improved access would support recent economic data for ANWR that estimates visitors contributed $6 million in tourism revenue to the Rockport-Fulton economy. Construction activities could also have beneficial economic impacts in the local area if supplies were purchased and equipment was rented in neighboring communities.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of agency programs and policies on minorities and low-income populations and communities (USFWS 2020).

USFWS has not identified any potential high and adverse environmental or human health impacts from this proposed action or any of the alternatives. USFWS has identified no minority or low-income communities within the impact area. Minority or low-income communities would not be disproportionately affected by any impacts from this proposed action or any of the alternatives (USFWS 2020).

Indian Trust Resources

DOI Environmental Compliance Memorandum 97-2 requires that all agency environmental assessments must address explicitly whether any Indian Trust Resources may be impacted by the action (USFWS 2020).

No Indian Trust Assets have been identified in the three-county area ANWR is contained within, which include Aransas, Calhoun, and Refugio Counties. There are no reservations or ceded lands present. Some archaeological resources exist on ANWR and are preserved in place by stabilization of the surrounding soils or protected by restricting human use. No significant impacts are anticipated from the implementation of this project as described in the EA (USFWS 2020).

Irreversible and Irretrievable Commitment of Resources
Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that this use could have on future generations. Irreversible effects primarily result from the use or destruction of specific resources that cannot be replaced within a reasonable period, such as energy or minerals. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored because of the action, such as the extinction of a threatened or endangered species or the disturbance of a cultural resource (USFWS 2020). None of the alternatives would result in a large commitment of nonrenewable resources. Project implementation would require the irretrievable commitment of fossil fuels (diesel and gasoline), oils, and lubricants used by heavy equipment and vehicles. In addition, management actions in this document would require a commitment of funds that would then be unavailable for use on other Service projects. At some point, the commitment of funds to these projects would be irreversible, and once used, these funds would be irretrievable. USFWS would implement BMP to minimize potential impacts (USFWS 2020).

3.3 Other Reasonably Foreseeable Connected Effects Analysis

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7) (USFWS 2020).

TABLE 6. Anticipated Cumulative Impacts of the Proposed Action and Any Alternatives

Other Past, Present, and Reasonably Foreseeable Activity Impacting Affected Environment	Descriptions of Anticipated Cumulative Impacts
Refuge Activities Past, present, and foreseeable future area impacts from land use activities include ground-disturbing activities such as demolition and construction, both on and off ANWR. Erosion on ANWR occurs mostly when roads are built or when land is cleared of its vegetation.	Impacts to soils from construction-related ground-disturbing activities include erosion, sedimentation, scouring, and nutrient loss. The proposed action could result in incremental impacts that could contribute to—but would not substantially change—the impacts that are already occurring to soil resources.

Prescribed burning also has occurred and continues to occur on both ANWR and adjacent lands but typically only in low or no wind conditions (USFWS 2020). Ongoing activities within the project area such as farming, prescribed burning, and managing exotic vegetation that occurs in and around ANWR do not approach compromising the Endangered Species Act when included with the proposed action (USFWS 2020). Some past, present, and reasonably foreseeable future ANWR activities (i.e., construction, herbicide spraying, flooding of croplands, and oil and gas development and extraction) may affect water quality. Water quality is also affected by local landowner use of fertilizer and herbicide and by increasing development along the coast (USFWS 2020). *Surrounding Land Use* Currently, smog or other air quality issues are not a large concern, as ANWR is about 40 miles from Victoria and 80 miles from Corpus Christi, Texas. There is also the use of water wells outside of ANWR, and use is likely increasing. Freshwater inflows come into the bays surrounding ANWR. These freshwater inflows, a major habitat component for some sea life (such as the blue crab) are controlled by river authorities upstream from ANWR. ANWR also experiences water contaminants and occasional oil spills that affect Matagorda Island, but Refuge staff is prepared for them with containment booms. Facilities such as the Chaparral and Exxon petrochemical operations that exist	All construction activities would occur within the 210-acre footprint of the proposed breakwaters and bluff stabilization structures. The proposed action would reduce the impact of wind, wave, and storm erosion on the San Antonio Bay shoreline of the Blackjack Unit. The proposed action does not contribute to cumulative impacts on natural resources when added to other past, present, and reasonably foreseeable future actions. The impact to water quality from the amount of fertilizer and herbicide contributed by ANWR is negligible and temporary (USFWS 2020). The greatest air quality concern comes from the petrochemical industry, regulated by the TCEQ, which sets standards, along with the EPA. However, air quality could be affected when the wind blows toward ANWR. A proposed power plant is being considered outside of Victoria, which may cause additional impacts to air quality. Other facilities, such as the Chaparral and Exxon petrochemical facilities, exist immediately outside of ANWR and may cause adverse air quality impacts (USFWS 2020). The proposed action is not anticipated to contribute to the impacts from land use activities of the surrounding areas. Ongoing activities within the project area under the proposed action do not approach

immediately outside of ANWR can contribute to water quality impacts (USFWS 2020). The State of Texas General Land Office manages waters and marshes surrounding ANWR. Cedar Bayou on the Matagorda Island unit is dredged on occasion depending on environmental needs. The dredging helps maintain the natural inflow and outflow of marine tides, which helps maintain the healthy bay ecosystem. If this area is not dredged from time to time, the exchange between gulf waters and bay waters that some species depend on is not allowed. Marine invertebrates are then affected, which in turn affects migratory birds (USFWS 2020). There are no known foreseeable activities adjacent to ANWR that would significantly alter existing conditions, affect life history requirements of local wildlife, or have negative repercussions on natural resources or designated critical habitat. Countywide burn bans are implemented occasionally but largely under unfavorable weather conditions. Effects from other ground-disturbing activities off ANWR are likely to remain consistent with pre-Hurricane Harvey levels (USFWS 2020).	compromising the Federal Clean Air Act, or the Clean Water Act, nor will they incrementally add to the impacts from nearby power plants, petrochemical facilities, wells, and dredging activities occurring in nearby areas (USFWS 2020).
Development and Population Increase Aransas, Refugio, and Calhoun Counties are rural with economies based mostly on farming, chemical industries, fishing, and tourism (USFWS 2020). The local economy has suffered for a variety of reasons after Hurricane Harvey and all surrounding communities support reestablishing infrastructure on ANWR in an attempt to revitalize tourism and to	ANWR beneficially affects the surrounding local area by providing jobs, contributing to the ecotourism industry, allowing for payments to counties or surrounding local governments through the Payments In Lieu of Taxes program, and revenue sharing. Most ANWR employees live in the surrounding towns, including Austwell, Rockport, and Fulton. Inevitably, some of their income is reinvested into the local economy. Recreation and associated

help stimulate the local economy in the tri-county region (USFWS 2020). According to the Economic Development Council, Aransas County (2016), Rockport and Fulton's primary industry is tourism. Hosting nearly one million annual visitors, the Rockport-Fulton area successfully supported more than 25 hotels and 40 RV parks, over 30 restaurants, a wide variety of events, more than 20 local attractions, and a diverse group of merchants and specialty shops. Aransas County spending by tourists has totaled more than $100 million annually (USFWS 2020). The amount of ground being disturbed could increase into the future on lands surrounding ANWR as population and associated developments increase (USFWS 2020). Total economic impacts of marine recreational fishing in the San Antonio Bay System were estimated at 206 jobs, $7.6 million in labor income, $11.6 million in value-added (contribution to Texas GDP), and $20.7 million in output (sales value of goods and services). Total annual economic impacts of marine recreational fishing in the Aransas Bay System estimated 638 jobs, $23.2 million in labor income, $35.7 million in value-added (contribution to Texas GDP), and $63.3 million in output (sales value of goods and services). The commercial catch for the Rockport area (all species) averaged 3.8 million pounds valued at $9.5 million, and catch for Port Lavaca/Port O'Connor area (all species) averaged 4 million pounds valued at $6.9 million (USFWS 2020).	spending indirectly benefit support services, such as hotels and restaurants, which also benefits the local economy (USFWS 2020). Cumulative impacts on socioeconomics would be beneficial under the proposed action by returning tourism to the region. The proposed action would bring back visitor services activities and once again attract visitors from around the world into the region to enjoy our natural resources. It would help bring back these opportunities to pre-hurricane levels with a possibility of a slight increase due to the efficiencies in administration and visitor services that are anticipated with the newly designed infrastructure (USFWS 2020).

Visitor Services ANWR provides opportunities for the public that are somewhat rare in the State of Texas, as most of the state is privately owned. There are also some opportunities for recreational fishing, swimming, camping, and hiking in surrounding State Parks and other national wildlife refuges. Due to the limited availability of public-use lands, however, these lands, and in particular the Aransas NWR, are treasured and depended upon to provide recreational and scenic amenities. The proposed action would return these opportunities to the area (USFWS 2020). Near ANWR, ranching (grazing and/or livestock production, game management, and hunting) and farming on private lands are major land uses. In the surrounding bays, recreational and commercial (finfish, oyster, crab, and shrimp) fishing in state waters is the primary activity. During the fall and winter, waterfowl hunting is also a significant activity in state waters. Oil and gas production on both land and water is an ongoing activity. Other recreational activities include bird watching, sightseeing, and photography by chartered boats and recreational boaters (USFWS 2020). Oil and gas production is present in the surrounding waters and on the northeast boundary of the Island. Pass Cavallo provides access to offshore oil and gas developments, deep-sea fishing, and commercial fisheries. Pass Cavallo is also a significant attraction for beachgoers, and for picnicking, camping, and fishing. On the southwest boundary, about 40 miles down the coast, Cedar Bayou Pass is an attraction for beachgoers, and for	Cumulative impacts from administration, public use, and recreation would be beneficial under the proposed action due to the lack of existing recreational fishing, hunting, and ecotourism opportunities in the local area and the loss of these activities on ANWR due to wind, wave, and storm impacts. The proposed action would help to restore priority uses and bring back visitor services and rejuvenate ecotourism in the region (USFWS 2020). There are no foreseeable activities adjacent to the project area that would significantly alter existing conditions or affect visitor services. This analysis considers the cumulative impacts of the proposed action in combination with other projects or management activities. There are no known state or federal actions (past, present, and reasonably foreseeable) occurring in the vicinity of ANWR or proposed in the future that could have potential cumulative impacts on visitor services when added to the impacts of the proposed action (USFWS 2020).

picnicking, camping, and especially for fishing (USFWS 2020).	
Climate Change Climate change is expected to affect ecosystems in a variety of ways. These impacts may include species range shifts, plant/vegetative community shifts, species extinctions, phenological changes, and increases in primary productivity. Another concern for coastal lands, including the Aransas NWR, is rising sea levels due to thermal expansion and melting glaciers. Impacts of sea-level rise can include inundation of coastal wetlands, increased salinity of coastal wetlands, increased flooding or storm surges, and shoreline erosion (USFWS 2020).	ANWR may be a minor contributor to climate change; however, the benefit it provides in keeping land in a predominantly natural or undeveloped state far outweighs the impact. The proposed action may help educate the public on the benefits ANWR provides to help address challenges related to climate change. Therefore, no negative cumulative impacts on climate change are anticipated with the proposed action (USFWS 2020).

3.4 Summary of Analysis

The purpose of this EA is to provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

3.4.1 *Alternative A – No Action Alternative*

The no action alternative would not meet the purpose and need of USFWS to provide the current level of managed resources to ANWR and facilitate priority use opportunities for the public. Continuation of the current condition would result in ongoing erosion and loss of habitat, vegetation, and soil that would, in turn, adversely affect public access and use.

3.4.2 *Alternative B – Proposed Action*

The proposed action would meet the purpose and need of USFWS to protect and restore ANWR resources sufficient to manage habitat requirements and visitor priority use activities on ANWR. This project would protect 5 miles of critically eroding shoreline and stabilize eroding bluffs.

Mitigation measures and BMPs have been developed to protect natural and cultural resources during construction activities. Upon completion of all construction activities, priority uses should return to pre-construction levels, which would not contribute to significant cumulative environmental impacts. The overall potential for adverse impacts would be minimal based on the nature of the action and the implementation of the mitigation measures and conditions described in the above analysis.

Construction activities under the proposed action would have direct and indirect impacts on some natural resources including wildlife and aquatic species, air quality, soils, vegetation, and water resources. Mitigation and BMPs will minimize impacts on these resources. There will be some beneficial long-term impacts on critical habitat for whooping cranes based on ANWR's protection of coastal and estuarine areas. Minimal impacts to archeological resources are anticipated since mitigation measures have dictated that potential marine cultural resources will be avoided during construction.

The proposed action to protect and restore ANWR resources is consistent in meeting the purpose and needs of USFWS because this project would ensure ANWR has provided for the conservation of fish, wildlife, plants, and their habitats within the System to ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations. The proposed action would also meet the purpose of establishment of ANWR. USFWS has determined that the proposed action is compatible with the purposes of ANWR and the mission of the NWRS.

3.5 Consultation and Coordination

The USACE individual permit application and the Environmental Assessment was submitted to the USACE on December 3, 2021. The application incudes the proposed shoreline protection and bluff stabilization for the eroding shoreline of the Aransas National Wildlife Refuge on the eastern shoreline of the Blackjack Unit along San Antonio Bay, particularly near Dagger Point. The permit (No. SWG-2018-00279) went out for public notice and comments were due by June 21, 2022. The USACE public comments letter was received on August 22, 2022, with comments from TPWD and a member of the general public. Anchor QEA sent a response to comments letter back to the USACE on August 23, 2022. At this point, Anchor QEA is beginning to work on the final design. To comply with S106 some adjustments have been made to the placement location of the proposed structure.

Approval is still pending for the State of Texas General Land Office Application for State Land Use – Coastal Lease which was submitted in December 2021. Additionally, the USFWS public review and comment of this document proper is yet to be completed. All efforts for this work have been jointly coordinated between Coastal Bend and Bays Estuary Program and Aransas NWR.

Public Outreach

Internal scoping of ANWR and regional office staff was conducted to identify issues, concerns, and strategies to protect and restore the eroding San Antonio shoreline of ANWR to a functional state for both wildlife utilization and priority uses.

A draft of this EA will be released for a 30-day public review period beginning on October 1, 2022. The comment period will end on October 30, 2022. A copy of the EA will be available for review on

ANWR website: https://www.fws.gov/refuge/Aransas/. Comments or questions can be directed to Joe Saenz, ANWR Manager at (361) 349-1139. Email comments can be provided to the following address: joe_saenz@fws.gov.

List of Preparers

Ray Newby, Anchor QEA

4 References

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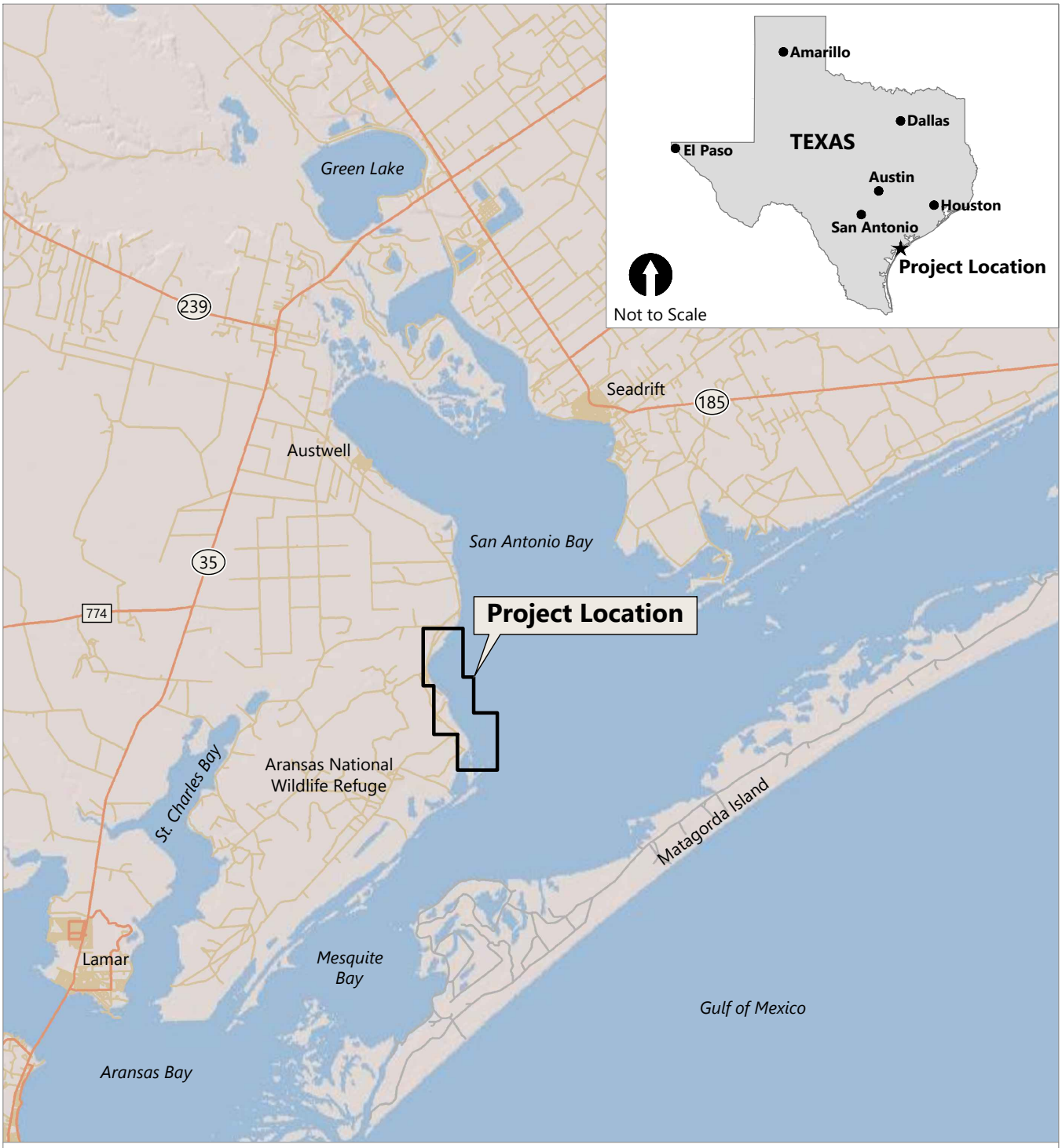
Appendix 1: APPLICABLE STATUTES, EXECUTIVE ORDERS, AND REGULATIONS	
Cultural Resources	
American Indian Religious Freedom Act, as amended, 42 U.S.C. 1996 – 1996a; 43 CFR Part 7 Antiquities Act of 1906, 16 U.S.C. 431-433; 43 CFR Part 3 Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7 National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810 Paleontological Resources Protection Act, 16 U.S.C. 470aaa –470aaa-11 Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001-3013; 43 CFR Part 10 Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971) Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)	Protection of potential cultural resources in the vicinity of the construction area will be needed as agreed upon during consultation with the Texas State Historic Preservation Office.

Fish and Wildlife	
Bald and Golden Eagle Protection Act, as amended, 16 U.S.C. 668-668c, 50 CFR 22	BGEPA prohibits the take of bald and golden eagles. No take of these species would occur from any of the alternatives.
Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450	No take of threatened or endangered species or adverse modification to designated critical habitat would occur from any of the alternatives. All mitigation measures discussed and agreed upon in consultation efforts on Section 7 of the Endangered Species Act with USFWS's Corpus Christi Ecological Field Office in relation to this project would be strictly administered.
Secretarial Order No. 3356.	The alternatives were designed to contribute towards the purpose of "increase outdoor recreation opportunities for all Americans, including opportunities to hunt and fish".
Migratory Bird Treaty Act (MBTA), as amended, 16 U.S.C. 703-712; 50 CFR Parts 10, 12, 20, and 21	The MBTA prohibits the take of species of birds listed under the four international migratory bird treaties signed by the U.S. (50 CFR 10.13). The ANWR would implement mitigation measures to avoid take of protected bird species.
Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)	The alternatives were designed to minimize impacts to habitat.

5 Figures



SOURCE: Basemap ©2014 Esri
HORIZONTAL DATUM: Texas State Plane South Central, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88)

0 5
Miles

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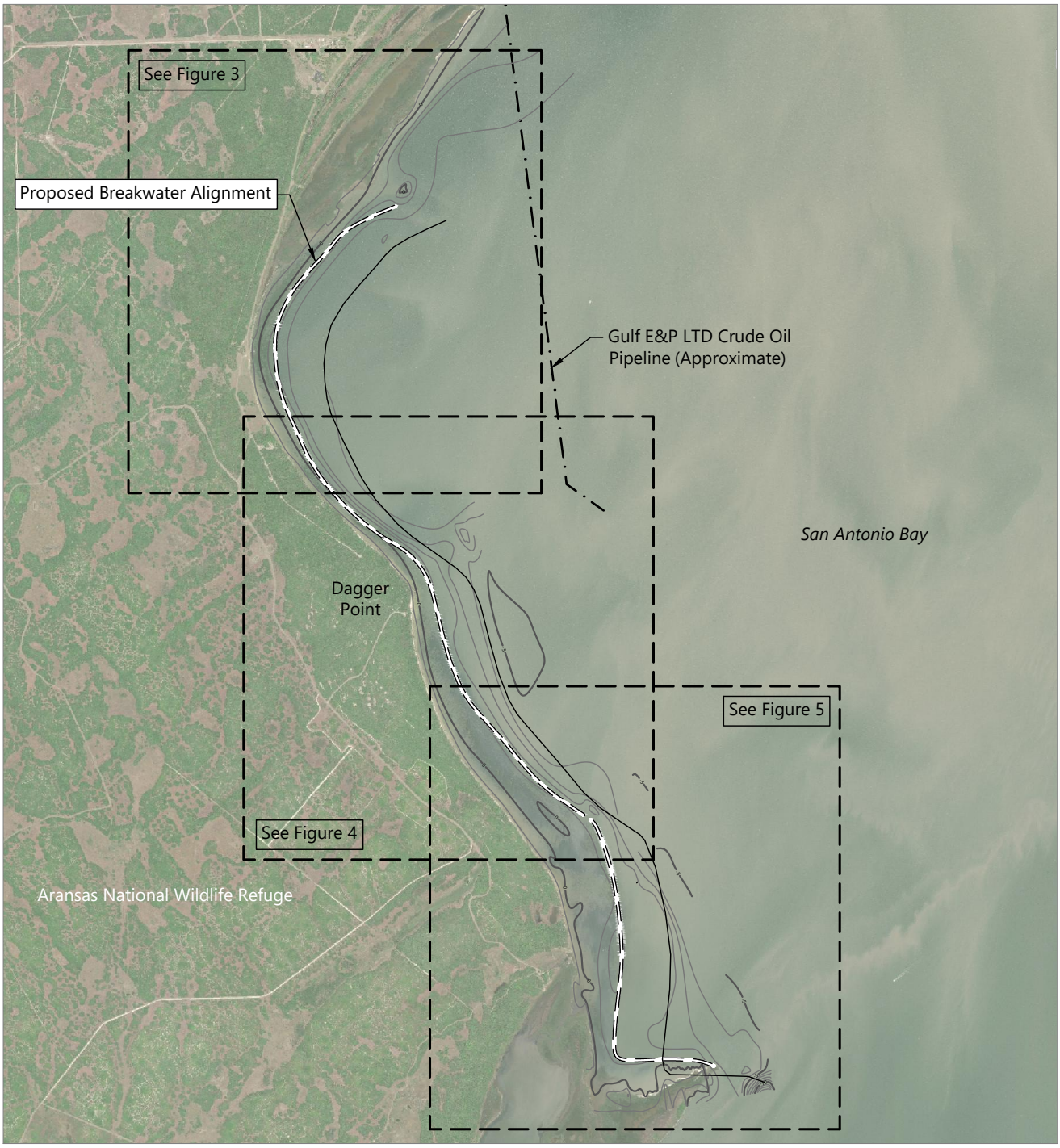
Filepath: K:\Projects\0737-Coastal Bend Bays and Estuaries Project\Dagger Point Coastal Habitat Restoration\0737-EA-001 (Vicinity Map).dwg Figure 1

ANCHOR QEA

Figure 1
Vicinity Map

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration



SOURCES:

1. Aerial image ©2019 Microsoft Corporation ©2019 DigitalGlobe ©CNESS (2019) Distribution Airbus (DS)
2. Bathymetric survey by Naismith Marine Services dated August 2019

HORIZONTAL DATUM: Texas State Plane South Central, North American Datum of 1983 (NAD83), U.S. Survey Feet

VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88)

LEGEND:

Existing Bathymetry (1' Interval)

0 3600

Feet

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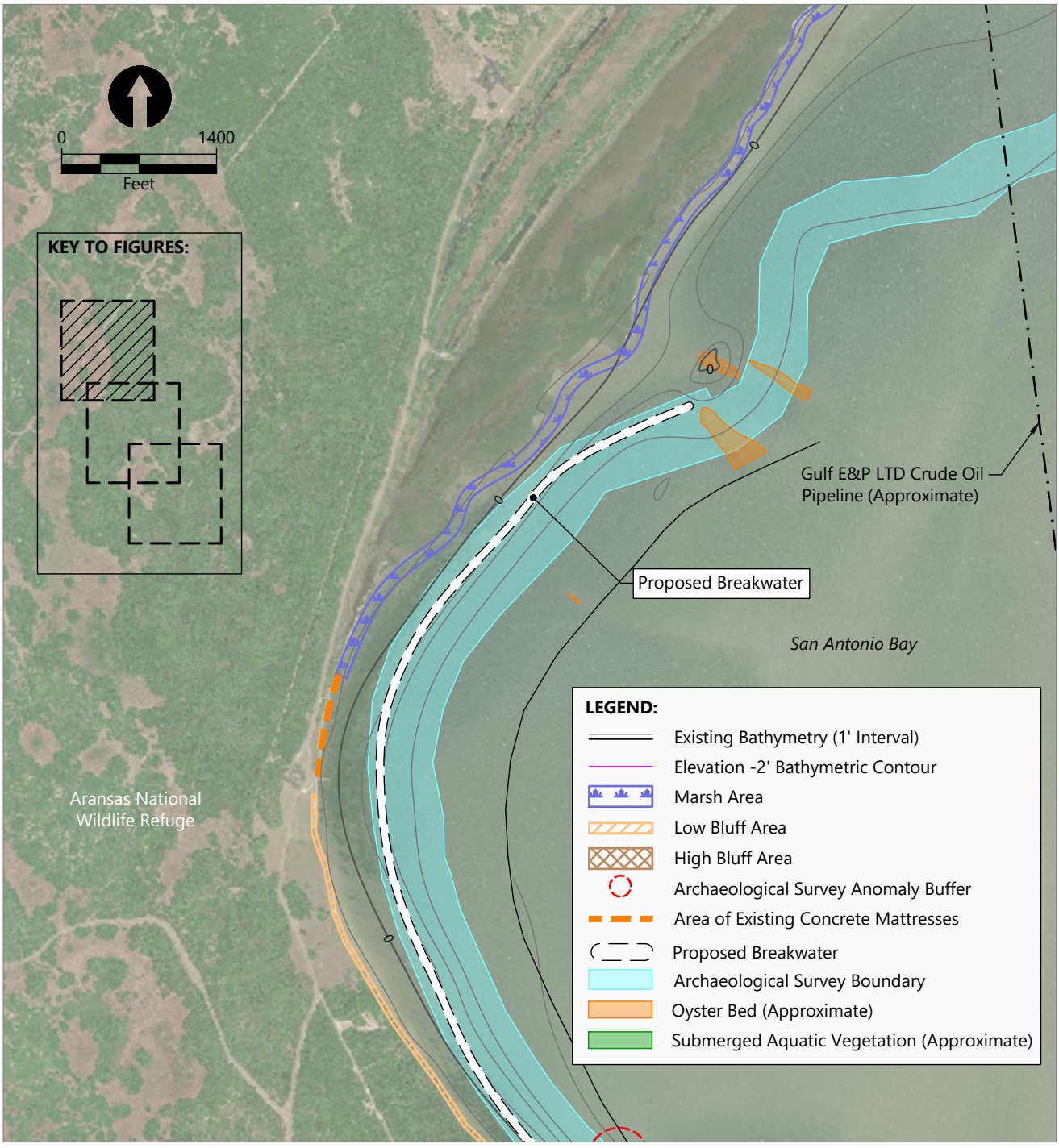
Figure 2
Project Area Plan View

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration



SOURCES:

1. Aerial image ©2019 Microsoft Corporation ©2019 DigitalGlobe ©CNESS (2019) Distribution Airbus (DS)
2. Bathymetric survey by Naismith Marine Services dated August 2019
3. Submerged aquatic vegetation (SAV) and oyster surveys by Bio West conducted between April and May 2020.
4. Archaeological survey by SEARCH conducted between April and May 2020, and January 2021

HORIZONTAL DATUM: Texas State Plane South Central, North American Datum of 1983 (NAD83), U.S. Survey Feet
VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88)

NOTES:

1. Anchor QEA proposed breakwater will generally be placed along the -1.0 to -2.0 foot NAVD 88 contour and/or outside of the extents of the SAV.
2. Gap spacing and dimensions between breakwater segments to be determined during advancement of design.

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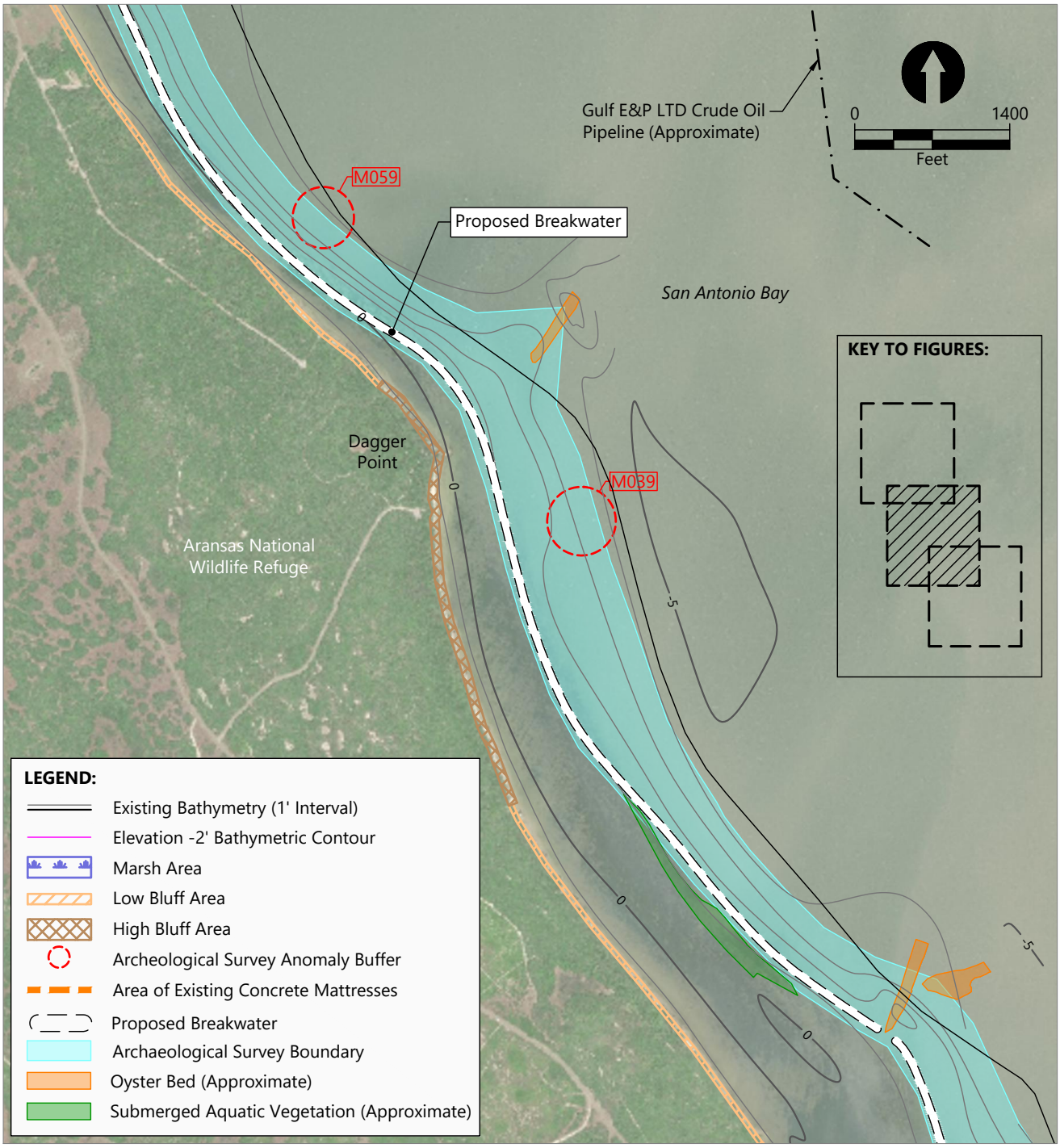
Figure 3
Plan View North

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration



SOURCES:

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2. Gap spacing and dimensions between breakwater segments to be determined during advancement of design.

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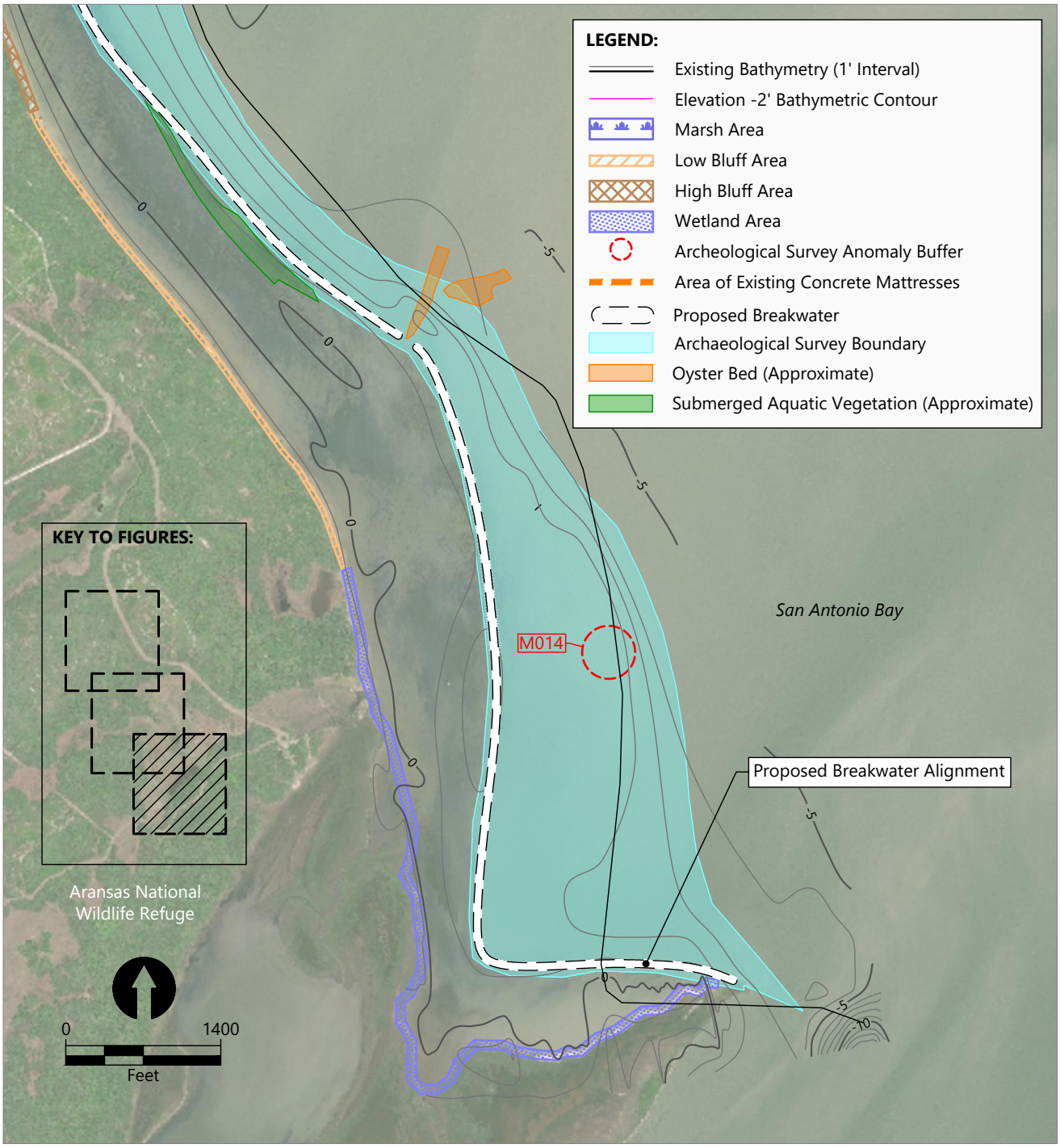
ANCHOR QEA

Figure 4
Plan View Central

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration



SOURCES:

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2. Bathymetric survey by Naismith Marine Services dated August 2019
3. Submerged aquatic vegetation (SAV) and oyster surveys by Bio West conducted between April and May 2020.
4. Archaeological survey by SEARCH conducted between April and May 2020, and January 2021

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VERTICAL DATUM: North American Vertical Datum of 1988 (NAVD88)

NOTES:

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2. Gap spacing and dimensions between breakwater segments to be determined during advancement of design.

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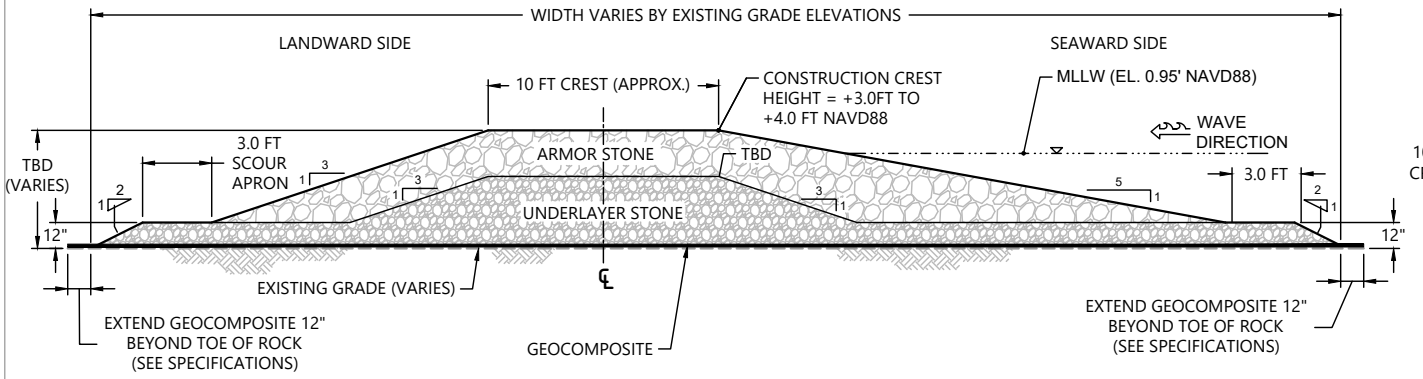
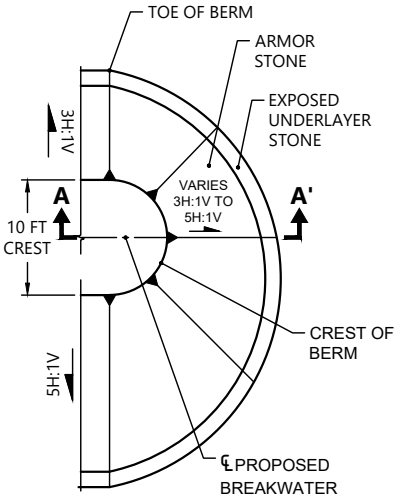
Figure 5
Plan View South

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration

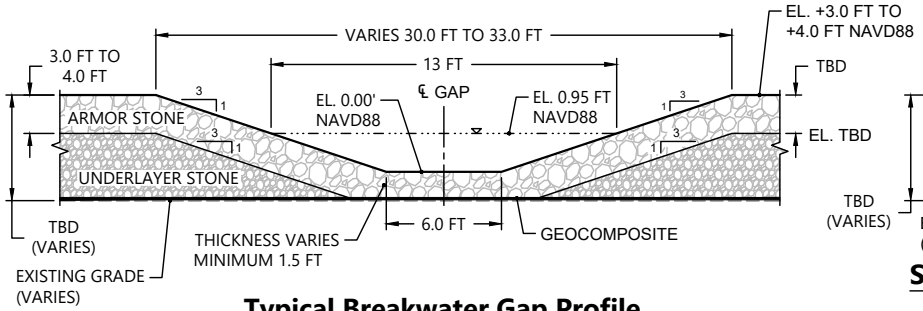


NOTE:
(1) Crest width, height, and base width of breakwater subject to revision during advancement of design.

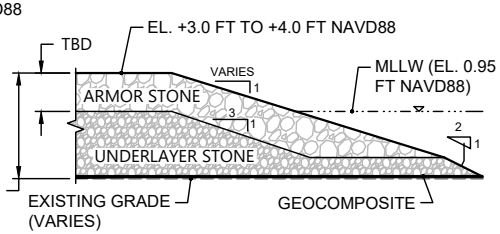
Typical Rock Rubble Breakwater Cross Section
Not to Scale



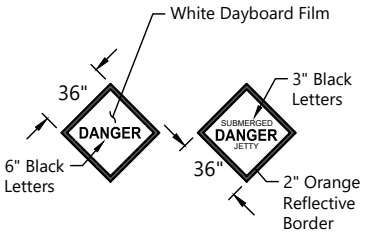
Typical Breakwater Roundhead at End Plan View
Not to Scale



Typical Breakwater Gap Profile
Not to Scale



Section A-A' - Typical Breakwater Roundhead at End
Not to Scale



Typical Warning and/or Aid to Navigation Signage
Not to Scale

NOTE:
For information only. Final Aid to Navigation details to be determined by USCG after approval of the USACE permit.

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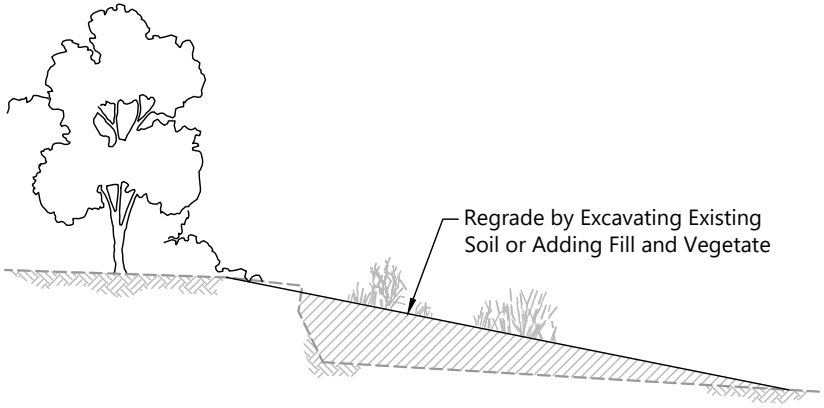
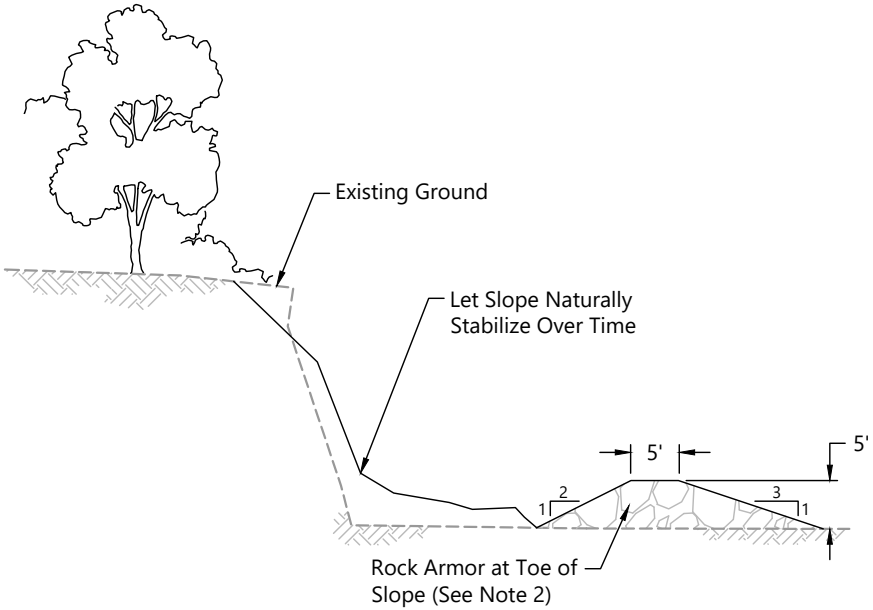
Figure 6
Typical Rock Rubble Breakwater Details

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration



Typical Low Bluff Regrading and Vegetating
Not to Scale



Typical High Bluff Self Stabilization and Toe Protection
Not to Scale

NOTES:
1. After slope has stabilized, planting of the slope may be carried out to further stabilize the slope.
2. Actual design to be determined during final design. Geometry shown is for the purposes of estimating proposed impacts for permit.

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Figure 7
Bluff Stabilization Alternatives

Environmental Assessment
Dagger Point Coastal and Marine Habitat Protection and Restoration